Petition

To

The National Organic Standards Board

To Amend the National List
Of Allowed Substances

To Include Sodium Phosphates
For Use in Food and Beverage Products
Formulated with Soymilk and Dry Soymilk
Similar to or Equivalent to Dairy Products

March 21, 2001

Submitted by
Carousel Foods of America, Inc.
535 Smith Street
Farmingdale, New York 11735

Carousel Foods of America, Inc.

Manufacturers of Carousel • Cloud Ten
Missy's • Best Little Baker • Gel-eez • Preferred Soy

Fine Desserts

March 21, 2001

National Organic Standards Board
C/o Robert Pooler
Agricultural Marketing Specialist
USDA/AMS/TM/NOP
Room 2510-So.
Ag Stop 0268
P.O. Box 96456
Washington, D. C. 20090-6456

Subject:	**Petition to Amend the National List**
Substances Petitioned:	**Sodium Phosphates**
Specific Amendment Request:	**To Include Sodium Phosphates on the National List for Use in Food and Beverage Products Formulated with Soymilk and Dry Soymilk Similar to or Equivalent to Dairy Products**

Dear Mr. Pooler,

We are writing you to request that the National Organic Standards Board consider the enclosed petition to amend the National List in its June 2001 meeting.

The reason for this petition is quite simple. Sodium phosphates are allowed for use in dairy products due to their versatility in food processing and their ability to allow researchers to create acceptable product formulations. Sodium phosphates are both commonly used and safe.

For the last 14 years, I have worked with soy directly or indirectly. I have been exposed to a full range of manufacturing and marketing activities with soy products. During 36 years of experience in the food industry, particularly in the dairy industry, I have come to appreciate the effort required to develop and market new products successfully. In my work with soy, I have felt that soy products, especially the dairy-like soy foods and beverages, have not received the level of consumer acceptance they deserve. I believe

535 Smith Street, Farmingdale, NY 11735 Tel: 631·694·9500 Fax: 631·694·3141 E-mail: carouselfoods.com

that soy researchers have not focused on creating products similar enough to dairy products to please the general consumer.

Now that so many people of all ages look to soy products for their many health benefits, it is the duty of the soy food industry and of soy food formulators to develop and bring to market products that will be acceptable to a wide range of consumers.

Initially, soy was, and still is, marketed primarily as soymilk, veggie patties, and meat analogues. Efforts have been made to produce and market cultured and fermented soy products such as yogurt, smoothies, and cheeses. Over the past several years of concentrated research and development work aimed at creating cultured soy products and shelf-stable soy drinks, I have found that it is absolutely essential to use sodium phosphates, in one or another form, to produce acceptable soy food and drink products.

The addition of phosphates helps to extend the stability of soymilk, produces acceptable textures in desserts and snacks, and offers the opportunity to produce heat-treated or retorted (sterilized) shelf-stable drinks with fruits and flavors that appeal to consumers.

Since phosphates are widely used in dairy product manufacturing, as well as, it appears, in non-organic soymilk foods and beverages, I have pursued soy product formulation using phosphates, particularly sodium phosphate. Now, the imminent establishment of the National List as law will deprive me and other researchers into organic soy products of our ability to use sodium phosphates.

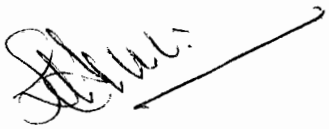
I have tried my best to use other phosphates and it is practically impossible to produce the soy foods and drinks mentioned above without the use of sodium phosphates. I believe that sodium phosphates used in soy products are not included on the National List because no one, until now, has asked for their inclusion.

The individuals in charge of scientific affairs at Quality Assurance International and Oregon Tilth understand my position and have sided with me. I have enclosed copies of their letters.

Based upon all of this, we submit the attached well-documented petition for your review, evaluation, and approval.

We appreciate your attention to this matter. If you require further information, please let me know without hesitation and we will be glad to provide you with whatever you ask for. Looking forward to your favorable response, I am

Sincerely yours,



S. R. Amin, M.S.
Executive Vice President

Oregon Tilth
Certified Organic

1860 Hawthorne NE Suite 200 • Salem OR. 97303 • Phone (503) 378-0690 Fax (503) 378-0809
email: organic@tilth.org

December 7, 2000

Herb Stein
Natural Flavors
268 Doremus Avenue
Newark, NJ 07105
Fax: 973-589-0016

Re: Phosphates in organic soy drinks

Dear Herb Stein:

OTCO has considered your request for use of di-sodium phosphate in soymilk drink to prevent protein coagulation upon heating. The reason for using di-sodium phosphate and the lack of alternatives was clearly explained by Mr. Amin, from Carousel Foods.

On the principle, OTCO would extend allowance of the use of sodium di-phosphate to soymilk. However, a complete formulation of the final product, and description of the process would need to be submitted for review for a complete approval of the final product that would include the di-sodium phosphate.

Do not hesitate to call if you have any further question.

Best regards,

Anne Plotto, PhD
OTCO Processing Technical Director

CORPORATE OFFICE
12526 High Bluff Drive, Suite 300
San Diego, CA 92130 • USA
858-792-3531 • 858-792-8665 Fax

BRANCH OFFICES
VERMONT (East Coast)
ONTARIO (Canada)
TOKYO (Japan)

QAI
QUALITY ASSURANCE INTERNATIONAL

Fax

To:	**Tom Timons**	**From:**	**QAI/ Samara**
Company:	**Caracel Foods**	**Pages:**	(including cover) 1
Fax:	631-694-3141	**Date:**	**12/14/00**
Re:	**Di-sodium Phosphate**	**cc:**	

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

Dear Tom and Amin,

Here is the letter you requested.

According to the current organic practices, di-sodium phosphate is allowed in the processing of soy products. However, di-sodium phosphate is not on the National list of allowed synthetics approved by the Secretary of Agriculture by the USDA. Therefore, when the National Organic Program ruling goes into effect this will no longer be an allowed material unless petitioned for review by the National Organic Standards Board.

I strongly suggest you complete a form to have this material petitioned. There are directions on how to do so on the OMRI web site. (www.omri.org).

Thank you,

Samara Perrell
Client Services

A162-00250

Petition

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Submitted by
Carousel Foods of America, Inc.
535 Smith Street
Farmingdale, New York 11735

Table of Contents

The Petition

We ask the National Organic Standards Board to amend the National List of Allowed Substances to include sodium phosphates for use in food and beverage products formulated with soymilk and dry soymilk similar to or equivalent to dairy products.

The Company Submitting the Petition: Carousel Foods of America, Inc.

Carousel Foods of America, Inc., is a manufacturer of dairy puddings, shelf-stable cheesecakes, frozen cheesecakes, and organic soy puddings. In business since 1965, Carousel Foods distributes its products throughout the country in a wide variety of retail, institutional, and food service outlets. Carousel Foods also supplies private label dairy products, both traditional and organic, to major supermarket chains and dairy distributors in the Northeast and Mid-Atlantic regions of the U.S.

Carousel Foods is committed to the organic foods industry and the organic soy foods industries. Quality Assurance International has inspected and certified our plant as an organic manufacturer. In the near future, Carousel Foods intends to introduce cultured organic soy products, including organic soy "yogurt-type" foods, organic soy "yogurt-type" smoothee beverages, organic soy cheesecakes, and other organic soy and non-soy products. We have developed a unique technology for processing the soy ingredients that makes our end products particularly appealing to consumers. Sodium phosphates play an important role in this technology. Carousel Foods is also in the early stages of working with a number of other companies in the organic soy business with the intent to introduce a wide range of products based on ingredients created with this technology. These products may reach into almost every segment of the food industry. As the national and international demand for soy products continues to grow, we expect our organic soy products to form a significant portion of our total future business.

The Substances:
Sodium Phosphates (Sodium Salts of Phosphoric Acid)

Sodium phosphates are the substances that we wish to have added to the list as allowed for use in soy food and beverage products formulated with soymilk and dry soymilk similar to or equivalent to the use in dairy products. We have attached a definition of the sodium phosphates from the Dictionary of Food Ingredients, Second Edition, and Published by Van Nostrand Reinhold, © 1989. See Appendix 1.

The basis for our petition is four-fold:

- Sodium Phosphates are currently allowed for use but restricted only to dairy foods. Thus, as substances, they have met the various criteria established by the NOSB, including safety, versatility, proportionality, and general acceptance. Sodium phosphates are widely accepted ingredients in the food industry. See Appendix 2.

- Our lengthy research and development has determined that the sodium phosphates provide essential and incomparable functionality in our organic soy products. It appears that producers of non-organic soymilk and soymilk products currently use phosphates of one form or another in their formulations.

- Without the use of sodium phosphates in producing our soy food and beverage products similar to dairy products, we would not be able to create products acceptable to consumers. Thus, other producers, the consumers, and we would be foreclosed from the health and business benefits received from these products. The allowance of sodium phosphates in soymilk and dry soymilk products would permit parity between organic soymilk and dry soymilk manufacturers with dairy manufacturers. With sodium phosphates, soy producers could create and market dairy-like products with the same high functional and performance standards of dairy products. Thus, the consumer demand for soy's benefits offered in dairy-like products would be satisfied.

- We believe that one of the reasons sodium phosphate usage is restricted on the National List to dairy products is simply that no company or individual has presented the case or applied for the allowance for soymilk or dry soymilk products. Thus, we are applying on behalf of consumers, our own company, and other food and beverage manufacturers.

Necessary Information for Inclusion in the Petition

1. Substance common name:

   Sodium Phosphates. These include Disodium Phosphate, Disodium Phosphate Dihydrate, Disodium Phosphate Duohydrate, Monosodium Phosphate, Trisodium Phosphate, Sodium Hexametaphosphate, and others. The naming of phosphates can be confusing since there are many names for each compound. Monosodium phosphate, for example, has over twenty-five alternate names.

2. The manufacturer's name:

   Astaris LLC, P.O. Box 411160, 622 Emerson Road, St. Louis, MO 63131. This is the supplier used by Carousel Foods. Other suppliers of food grade phosphates include ADM Arkady, Pacific Grain Products, Solutioa, Watson Foods, Dirigo Spice, Penta Mfg., J. Stewart & co., Vivion, Westco Chemicals are name a few among several dozen U.S. suppliers.

3. The intended use:

   The intended use is as a nonagricultural ingredient in processing soy food and beverage products.

4. The substance's mode of action in food processing:

Phosphates play a variety of roles in pharmaceutical and nutritional products. They act as sequestrants, emulsifiers, buffers, protein coagulants, solubility enhancers, stabilizers, and texture enhancers. This well-established food ingredient furnishes a means to control many product appearance and flavor problems. Baked products leavened with phosphates attain excellent texture, color, volume, and lightness. In process cheese products, sodium phosphates provide meltability and mouthfeel. With them, processed meat becomes juicier and tenderer.

Soy products, based on extracts of soybeans, usually do not attain shelf-stability without additives. The addition of sodium phosphates increases the shelf life of soy products. Similarly, fermented soy products, upon cooling and reheating, tend to coagulate. Sodium phosphates, either alone or in association with citrates, prevent soy protein from such precipitation and, thus, they create homogeneous and acceptable end products.

5. Source of the substance:

It is a salt derived from phosphoric acid. In Monsanto Publication No. 9181, the following description occurs under the heading **Phosphate Processes**:
"Phosphates, both simple orthophosphates and complex condensed polyphosphates, are made by neutralizing phosphoric acid with appropriate alkaline materials (sodium, potassium, ammonium or calcium salts). Using appropriate ratios of cation to phosphate and varying drying and calcining procedures affords the different phosphate products that we offer…. Monsanto makes phosphoric acid, the precursor to the phosphate salts by burning elemental phosphorus and scrubbing the product with water …."

6. A summary of available reviews by State or private certification programs:

   See attachment: Organic Materials Review Institute Processing and Handling Materials – February 1999, page 39: Sodium Phosphates, Status A, OMRI Class NOI, Use as an ingredient restricted to dairy foods. See Appendix 2.

7. Information regarding EPA, FDA, and State regulatory authority registrations:

   Please see the attached GRAS listing, and refer to page 34 "Regulatory Information" of the attached Astaris Phosphates product manual. See Appendix 3.

8. The CAS number or labels of products that contain this substance:

   Please see attached Carousel Chocolate Cheesecake and Strawberry Cheesecake labels and product sheets from Kraft and other companies that indicate the use of sodium phosphates in their products. See Appendix 4.

9. The substances physical properties and chemical mode of action, etc.:

   The phosphates are salts of phosphoric acid. Various phosphate salts are produced and each phosphate, depending on the structures, the inter-linkages and amounts of sodium molecules, varies in its functionality. They act as sequestrants, emulsifiers, buffers, and texturizers.

   Phosphates influence the properties of dairy products through three basic mechanisms: (1) calcium complexing, (2) pH modification, and (3) direct interaction with casein, the principal protein of milk. A particular phosphate might perform all three functions, interacting with the dairy formulation and with other phosphate additives. It is suspected that phosphates perform similar functions in soymilk products. Please see attached copies of two product manuals from FMC Corporation entitled *Phosphates Help Make Dairy Products Better* and *Food Phosphates* for expanded discussions of functions, applications, pH's, and other pertinent information. See Appendix 5.

Physically, in a reaction, they soften the protein in most food formulations. They also help to withstand heat and acidic materials, thus providing buffering and emulsification.

At their low regulated usage levels, and after reacting with water and protein, sodium phosphates do not create any toxicological, environmental, or health issues for humans, soil organisms, crops, or livestock through the product.

10. Safety information about the substance:

This is a GRAS item. See the attached GRAS list and the attached Material Safety Data Sheets from several companies. See Appendix 3 and Appendix 6.

11. Research Information about the substance:

Please see the attached abstracts of articles, patents, and studies that were culled from a wide variety of literature in order to indicate the uses of sodium phosphates, particularly disodium phosphate and hexametaphosphate. See Appendix 7. Please note the list of particularly relevant abastracts included at the beginning of the section. You may wish to refer to several of the articles as they pertain to the use of sodium phosphate or sodium metahexaphosphate in soymilk or okara (soy lees) products.

The use of phosphates is always considered an essential part of a food formula whenever the food formulation contains protein that is subjected to heat or an acidic environment. In these cases, the phosphates provide buffering action as well as emulsifying and texturizing the product.

These phosphates, derived from phosphoric acid, may be comprised of aluminum, calcium, potassium, or sodium salts. Each phosphate has its own merits, and depending upon the formulation, the formulator may decide to use one or another. The FDA has determined that they are safe and it has regulated phosphate usage levels in food products. Many products on the market contain these various phosphates. Some of the products that are offered to consumers are labeled foods and some are not. If they are labeled products, many times the formulator may decide not to declare the phosphates since, in these cases, they are considered to be processing aids.

Hence, there is no adverse position towards phosphates in general or, in particular, towards sodium phosphates usage in soy. In fact, many food formulations, due to the additional functionality provided by the phosphates, make commercially acceptable products with possibly extended shelf lives.

12. Petition Justification Statement:

The FDA has confirmed that the consumption of soy products, as part of a healthy diet, can provide significant health benefits to consumers, especially for cardiovascular health. In fact, soy products with certain nutritional contents may make specific heart-healthy claims on their labels. While U.S. medical researchers continue to explore a wide variety of other health benefits that soy may provide, soy's association with other preventative and treatment benefits for certain cancers, bone and skin diseases, lactose intolerance, menopausal symptom relief, and other human health issues has caused an explosion of demand among consumers for new soy food and beverage products.

Yet, no matter what health benefits a food may offer, consumers insist that food products taste as good and perform as well in the diet as traditional foods. Sodium phosphates allow soy producers to create and market soy foods and beverages that meet consumer requirements for quality, taste, texture, and other standards. Since sodium phosphates have long been used in the dairy industry to improve ingredient functionality and product performance, it is our position that the use of sodium phosphates in soymilk and dry soymilk products would bring parity to organic soy producers and organic dairy product producers.

Without the ability to use sodium phosphates in soymilk and dry soymilk products, not only can soy producers not compete with dairy producers, the future business of Carousel Foods and other manufacturers would be seriously curtailed, and a great loss would be caused by lost research and development efforts. Without the use of sodium phosphates, other companies and we would incur large new expenses for further lengthy research and development required to formulate new soymilk and dry soymilk products similar to or equivalent to dairy products.

Thus, we urge you to add sodium phosphates to the National List, particularly for use in food and beverage products formulated with soymilk and dry soymilk similar to or equivalent to dairy products.

Appendixes

Sodium Phosphates:
Selected Definitions

Sodium Phosphates

Selected Definitions

From **Dictionary of Food Ingredients**
Second Edition
Robert S. Igoe
Van Nostrand Reinhold

Monosodium Phosphate NaH2OPO4. An acidulant, buffer, and sequestrant that is mildly acid, with a pH of 4.5 and very soluble in water, with a solubility of 87 g per 100 nml of water at 25°C. It is used as an acidulant in effervescent powders and laxatives. It is also used in soft drink dry-mix formulations, in cheese, and in carbonated beverages. It is also termed monosodium dihydrogen orthophosphate; sodium phosphate, monnobasic; sodium biphosphate; and monosodium monophosphate.

Disodium Phosphate Na2HPO4. The disodium salt of phosphoric acid which functions as a protein stabilizer, buffer, dispersant, and coagulation accelerator. It is milkdly alkaline with a 1 percent solution having a pH of 9.2. It is moderately soluble in water with a solubility of 12 g in 100 ml at 25°C. It is used in farina and macaroni to shorten the cooking time by making the particles swell faster and cook more thoroughly. In evaporated milk it acts as a buffer and prevents gelation, also acting as a buffer in coffee whiteners. It is an accelerator of the setting time in instant pudding. In cream sauce and whipped products it functions as a dispersant by producing a swelling of protein. It is also termed disodium monohydrogen orthophosphate; sodium phosphate, dibasic; and disodiium monophosphate.

Sodium Hesametaphosphate (NaPO3)13. A sequestrant and moisture binder that is very soluble in water but dissolves slowly. Solutions have a pH of 7.0. It permits peanuts to be salted in the shell by making it possible for the salt brine to penetrate the peanuts. In canned peas and lima beans, it functions as a tenderizer when added to the water used to soak or scald the vegetables prior to canning. It improves whipping properties in whipping proteins. It functions as a sequestrant for calcium and magnesium, having the best sequesterizing power of all the phosphates. It prevents get formation in sterilized milk. It is also termed sodium metaphosphate, sodium polyphosphate, and Graham's salt.

OMRI Processing and Handling Material, February 1999, Page 39

OMRI Status	NAME of MATERIAL	OMRI Class	ANNOTATION
A –	Potassium tartrate†	NOI	Allowed. *NOSB: S, A. (Austin) NOSB lists this as "Potassium acid tartrate".*
R –	Pyrethrum	PPC	Only naturally occurring forms are allowed. Synthetic pyrethroids are prohibited. See 'Botanical pesticides' for restrictions. Piperonyl butoxide may not be used as a synergist. *NOSB: N, A Considered as a Botanical Pesticide at Rohnert Park*
	Quaternary ammonium sanitizers	CDS	See: "Materials Under Consideration"
A –	Rice hulls	PPA	Allowed.
A –	Salt	NOI	See 'Sodium chloride'.
A –	Sand, steamed	NOI	For use as an anti-caking agent and substitute for silicon dioxide.
A –	Sea salt	NOI	Allowed.
A –	Silicon dioxide†	NOI	Allowed for floating tree fruits and fiber processing. *NOSB: S, A. Allowed for floating tree fruits and fiber processing. (Indianapolis)*
A –	Soap	CDS	Allowed for equipment and food contact surfaces. Allowed for postharvest wash.
	Soap, in fruit wax	PPA	See: "Materials Under Consideration"
A –	Sodium bicarbonate†	NOI	Allowed. *NOSB: N, A. (Orlando)*
A –	Sodium carbonate†	NOI	Allowed. *NOSB: N, A. (Orlando)*
A –	Sodium chloride†	NOI	Allowed.
A –	Sodium citrate†	NOI	Allowed. *NOSB: N, A. (Orlando)*
A –	Sodium hydroxide†	NOI	Prohibited for use in lye peeling of fruits and vegetables and where the natural sodium bicarbonate is an acceptable substitute. *NOSB: S, A. Prohibited for use in lye peeling of fruits and vegetables and where the natural sodium bicarbonate is an acceptable substitute. (Orlando)*
A –	Sodium phosphates	NOI	Use as an ingredient restricted to dairy foods. *NOSB: S, A. Use restricted to dairy foods. (Austin)*
A –	Sodium silicate	PPA	Allowed for floating tree fruits and fiber processing. *NOSB: S, A. Allowed for floating tree fruits and fiber processing. (Indianapolis)* *NOTE: This is listed by the NOSB for Crops even though it is for postharvest and processing use.*
P –	Sodium tartrate†	NOI	Prohibited. *NOSB: S, P. (Austin)*
P –	Sorbic acid	NOI	Prohibited. *NOSB: S, P. (Austin)*
A –	Steam	NOI	Steam in contact with food may not contain boiler chemicals. See 'Water'.
P –	Sulfur	NOI	Sulfur powder for post-harvest treatment.
	Sulfur dioxide	NOI	See: "Materials Under Consideration"
R –	Sulfur dioxide†	NOI	For use in organic wine processing only; may not be added to wine at levels greater than 100 ppm; the level of free sulfites may not exceed 35 ppm in the final product. *NOSB: S, A. For use in organic wine processing only; may not be added to wine at levels greater than 100 ppm; the level of free sulfites may not exceed 35 ppm in the final product. (Orlando)*
P –	Sulfur dioxide	PPC	Prohibited.

Regulatory Information

A. GRAS List
B. Astaris Phosphates Product Manual, Page 34

182.3798	Sodium sulfite.
182.3862	Sulfur dioxide.
182.3890	Tocopherols.
182.6085	Sodium acid phosphate.
182.6197	Calcium diacetate.
182.6203	Calcium hexametaphosphate.
182.6215	Monobasic calcium phosphate.
182.6285	Dipotassium phosphate.
182.6290	Disodium phosphate.
182.6757	Sodium gluconate.
182.6760	Sodium hexametaphosphate.
182.6769	Sodium metaphosphate.
182.6778	Sodium phosphate.
182.6787	Sodium pyrophosphate.
182.6789	Tetra sodium pyrophosphate.
182.6810	Sodium tripolyphosphate.
182.7255	Chondrus extract.
182.8013	Ascorbic acid.
182.8159	Biotin.
182.8217	Calcium phosphate.
182.8223	Calcium pyrophosphate.
182.8250	Choline bitartrate.
182.8252	Choline chloride.
182.8778	Sodium phosphate.
182.8890	Tocopherols.
182.8892	α-Tocopherol acetate.
182.8985	Zinc chloride.
182.8988	Zinc gluconate.
182.8991	Zinc oxide.
182.8994	Zinc stearate.
182.8997	Zinc sulfate.

182.1500	Monoammonium glutamate.
182.1516	Monopotassium glutamate.
182.1711	Silica aerogel.
182.1745	Sodium carboxymethylcellulose.
182.1748	Sodium caseinate.
182.1778	Sodium phosphate.
182.1781	Sodium aluminum phosphate.
182.1810	Sodium tripolyphosphate.
182.2122	Aluminum calcium silicate.
182.2227	Calcium silicate.
182.2437	Magnesium silicate.
182.2727	Sodium aluminosilicate.
182.2729	Sodium calcium aluminosilicate, hydrated.
182.2906	Tricalcium silicate.
182.3013	Ascorbic acid.
182.3041	Erythorbic acid.
182.3089	Sorbic acid.
182.3109	Thiodipropionic acid.
182.3149	Ascorbyl palmitate.
182.3169	Butylated hydroxyanisole.
182.3173	Butylated hydroxytoluene.
182.3189	Calcium ascorbate.
182.3225	Calcium sorbate.
182.3280	Dilauryl thiodipropionate.
182.3616	Potassium bisulfite.
182.3637	Potassium metabisulfite.
182.3640	Potassium sorbate.
182.3731	Sodium ascorbate.
182.3739	Sodium bisulfite.
182.3766	Sodium metabisulfite.
182.3795	Sodium sorbate.

Regulatory Information

Solutia food phosphates and phosphoric acid, including the components of blends, meet the specifications of the Food Chemicals Codex (FCC), as well as other codex compendia used by other countries. Solutia food phosphates and phosphoric acid are approved as Kosher (U), and confirmatory letters are available upon request. Many of the phosphates and some grades of phosphoric acid also meet specifications defined by the U.S. Pharmacopeia and the National Formulary.

Solutia food grade phosphates and phosphoric acid are approved for use by the Food and Drug Administration (FDA) in Title 21 in the Code of Federal Regulations (CFR). In Parts 182 and 184, they are identified as substances Generally Recognized As Safe (GRAS). Under Part 182, they are listed with functional groupings as follows:

- Subpart B: Multiple Purpose GRAS Food Substances
- Subpart F: Dietary Supplements
- Subpart G: Sequestrants

  Subpart I: Nutrients

(Note – Not all phosphates are identified under every classification.)

Applications in the Meat and Poultry industry are regulated by the U.S. Department of Agriculture (USDA) and are listed in Title 9 of the CFR. Specific approvals are as follows:

- Part 318.7: Use in Meat Products
- Part 381.147: Use in Poultry Products

The USDA limits the use of phosphates in these products to 0.5% by weight of the final product. The USDA specifically prohibits the use of phosphates in fresh meat and poultry products. Meat and poultry products processed with phosphates should be labeled appropriately, and the label must be approved by the USDA. Only clear solutions may be injected into meat and poultry. Letters issued by the Proprietary Mix Committee of the USDA regarding the use of Solutia food phosphates and blends are available upon request. These provide information on use and proper labeling.

Current regulations by the FDA in the U.S. limit the level of phosphates in seafoods to Good Manufacturing Practice (GMP) and must be labeled accordingly. Solutia recommends phosphate levels should not exceed 0.5% by weight of the final product. Lower levels, however, are generally sufficient for functionality. Current Compliance Guides issued by the FDA limit the amount of water that can be added to seafood products.

Non-food uses of various phosphates in USDA-inspected plants are listed in Miscellaneous Publication Number 1419, "List of Proprietary Substances and Nonfood Compounds." These include such applications as cleaners and egg washing.

Many food phosphates are also approved for use as indirect ingredients and other applications. Specific references follow:

- 21 CFR 172.892: Use of various phosphates in preparation of modified food starches
- 21 CFR 173.310: Use of phosphates and polyphosphates in boiler water
- 21 CFR 173.315: Use of phosphates in washing or to assist in lye peeling of fruits and vegetables
- 21 CFR 175: Subpart B – Substances for use only as components of adhesives; Subpart C – Substances for use as components of coatings
- 21 CFR 176: Indirect Food Additives – Paper and Paperboard Components.

Since regulation of alcoholic beverages is the responsibility of the Bureau of Alcohol, Tobacco and Firearms, the approval of ammonium phosphates for treatment of wine and alcoholic juices is listed in 27 CFR 24.246

Many phosphates are included in the Standards of Identity of many standardized foods, including processed cheese, processed cheese food, processed cheese spread, evaporated milk, baking powder, phosphated flour, self-rising flour, enriched self-rising flour, self-rising white corn meal, self-rising yellow corn meal, and bread, rolls and buns. Certain seafood products are described by a Standard of Identity as well. Limitations are set for some products. Details are listed in 21 CFR Parts 130-169.

In addition, approvals for use in pet foods and animal feeds are listed in 21 CFR Part 582.

Food products containing food phosphates must be appropriately labeled, and attention is directed to Nutrition Labeling and Education Act (NLEA) of 1990. To assist with nutritional labeling requirements, "Nutrient Data" is listed in Table G on page 32.

Product Data and Product Labels

A. CAS Number: Sodium Hexametaphosphate

B. Product Labels

1) Carousel Foods Cheesecake
2) Fanny Bar
3) Kraft

ASTARIS
Quality Products. Exceptional Response.

PRODUCT DATA SHEET

NSF

PRODUCT: Hexaphos® -- Sodium Hexametaphosphate (SHMP) Crushed (Granular)

GRADE: FCC CODE: 208

GENERAL DESCRIPTION: Clean, white or clear, odorless, free-flowing granules.

FORMULA: $Na_{(n+2)}P_nO_{(3n+1)}$; n = 9-15 MOLECULAR WEIGHT: 978-1592

CAS NO.: 68915-31-1 DATE EFFECTIVE: December 14, 2000

CHARACTERISTICS	SPECIFICATION LIMITS
P_2O_5, %	66.5 Minimum
pH, 1% Solution	6.8 - 7.2
Loss on Ignition (30 minutes @ 800°C), %	1.0 Maximum
Water Insolubles, %	0.1 Maximum
Sizing, USSS:	
Retained on 8 Mesh, %	2 Maximum
Cumulative Retained on 20 Mesh, %	50 Maximum
Cumulative Retained on 100 Mesh, %	90 Minimum
Arsenic (as As), mg/kg	3 Maximum
Fluoride (as F), ppm	10 Maximum
Heavy Metals (as Pb), mg/kg	10 Maximum

Astaris FCC Grade SHMP meets the specifications of the current Food Chemicals Codex for Sodium Polyphosphate, Glassy.

NOTE: Specification Limits are subject to change from time to time. Please contact us for current data sheet.

Production Location:	Lawrence, KS; Trenton, MI
Packaging:	50 lb. multiwall bags
Labeling Requirements:	Product label
Shipping Classification:	Sodium Phosphate
Handling Precautions:	No precautionary statement required on label.

Handle in accordance with good industrial hygiene and safety practices. These include avoiding unnecessary exposure and removal of material from eyes, skin, and clothing.

HEXAPHOS® -- SODIUM HEXAMETAPHOSPHATE (SHMP), FCC GRADE GRANULAR

Key Properties:

- Sequestration
- Deflocculation
- Infinite Solubility in Water
- Neutral Salt
- Buffer Capacity

Applications:

- For municipal potable water treatment, Astaris sodium hexametaphosphate conforms to the requirements of ANSI / NSF Standard 60 and meets or exceeds ANSI / AWWA Standard B502-94. Used for corrosion & scale control and sequestering.
- Generally recognized as safe under 21 CFR 182.90 (Substances migrating to food from paper and paperboard products.
- Generally recognized as safe as a sequestrant under 21 CFR 182.6760 (Sodium Hexametaphosphate).
- General recognition of safety in dietary supplements affirmed by FDA letter to trade association.
- Exempted from tolerance requirements under 21 CFR 182.99 (Adjuvants for pesticide chemicals) when used as a surfactant, emulsifier, wetting agent, suspending agent, dispersing agent or buffer in pesticide use dilutions by a grower or applicator, prior to application to the raw agricultural commodity.
- Cleared as a substance from which boiler water additives may be made under 21 CFR 173.310 (Boiler Water Additives).
- Cleared by the Meat and Poultry Inspection Division to decrease the amount of cooked-out juices in poultry, canned hams, pork shoulder picnics and loins, canned hams and pork shoulder picnics, chopped ham and bacon as follows: 5.0% phosphate in pickle at 10% pump level; 0.5% phosphate in product (only clear solutions may be injected into product).[9 CFR 381.47 and 318.7]
- Cleared by the Meat and Poultry Inspection Division as a cooling and retort water treatment agent for prevention of staining on the exterior of canned goods.
- Cleared by Meat and Poultry Inspection Division as a hog scald agent to remove hair from hog carcasses, in an amount sufficient for the purpose; must be removed by subsequent cleaning operations.
- Cleared by Meat and Poultry Inspection Division as a poultry scald agent, in an amount sufficient for the purpose in scald water; must be removed by subsequent cleaning operations (FR Oct.5, & Nov. 13, 1981).
- Cleared by the Meat and Poultry Inspection Division in potable water supply at a limit of 10 ppm to retard scale formation in pipes, from an approved feeder.
- Deemed to be generally recognized as safe by the Flavor and Extract Manufacturers' Association.

FOR MORE COMPLETE INFORMATION ON PROPERTIES AND SAFE HANDLING OF THIS MATERIAL, SEE THE ASTARIS MATERIAL SAFETY DATA SHEET (MSDS).

Corporate Offices:

622 Emerson Road
Suite 500
P.O. Box 411160
St. Louis, Missouri 63141-1160
314-983-7500

For order assistance, please call our Customer Service Department Toll Free: 1-800-244-6169

Nutrition Facts

Serving Size 1 CAKE (85g)
Servings Per Container 1

Amount per Serving	
Calories 240	Calories from Fat 140
	% Daily Value*
Total Fat 16g	**24%**
Saturated Fat 10g	**48%**
Cholesterol 75mg	**25%**
Sodium 140mg	**6%**
Total Carbohydrate 20g	**6%**
Dietary Fiber 1g	**3%**
Sugars 18g	
Protein 6g	
Vitamin A 10% • Vitamin C 0%	
Calcium 6% • Iron 4%	

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on you calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram
Fat 9 • Carbohydrate 4 • Protein 4

INGREDIENTS: Cream Cheese - Sour Cream Mix (pasteurized cultured milk and cream, salt, stabilizers [blend of modified food starch, guar, locust, tara and or carrageenan], disodium phosphate, cultures and enzymes), Sugar, Eggs, Chocolate Syrup (cocoa processed with alkali, sugar, water, corn syrup, chocolate liquor, natural and artificial flavor, salt, stabilizers [carrageenan, locust and/or tara gum]), Chocolate Flavored Nuggets (bleached-enriched flour [niacin, reduced iron, thiamin mononitrate, riboflavin, folic acid], sugar, chocolate liquor, oat fiber, dextrose, lecithin and vanillin), Vanilla and Phosphoric Acid

Manufactured by
Carousel Foods of America, Inc
Farmingdale, NY 11735

0 49663 01311 8

CHOCOLATE CHEESE CAKE
NET WT. 3 oz. (85g)
NEEDS NO REFRIGERATION

CHOCOLATE CHEESE CAKE
NET WT. 3 oz. (85g)
NEEDS NO REFRIGERATION

CHOCOLATE CHEESE CAKE

SPOON INSIDE

REAL

NEEDS NO REFRIGERATION

CHOCOLATE CHEESE CAKE

CHOCOLATE CHEESE CAKE
NET WT. 3 oz. (85g)
NEEDS NO REFRIGERATION

HSM

039802

Nutrition Facts

Serving Size 1 CAKE (85g)
Servings Per Container 1

Amount per Serving	
Calories 250 Calories from Fat 160	
	% Daily Value*
Total Fat 18g	29%
Saturated Fat 11g	56%
Cholesterol 90mg	30%
Sodium 130mg	5%
Total Carbohydrate 18g	6%
Dietary Fiber 1g	3%
Sugars 16g	
Protein 5g	
Vitamin A 10% • Vitamin C 0%	
Calcium 6% • Iron 4%	

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on you calorie needs

	Calories	2 000	2 500
Total Fat	Less than	65g	80g
Sat. Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2 400mg	2 400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram
Fat 9 • Carbohydrate 4 • Protein 4

INGREDIENTS Cream Cheese - Sour Cream Mix (pasteurized cultured milk and cream, salt, stabilizers [blend of modified food starch, guar, locust, tara and or carrageenan], disodium phosphate, cultures and enzymes) Sugar, Eggs, Strawberry Fruit Base (strawberry, sugar, water, natural and artificial flavor, lemon juice, stabilizers [locust and/or tara gum, carrageenan and pectin], elderberry, citric acid), Strawberry Flavored Nuggets (bleached enriched flour [niacin, reduced iron, thiamin mononitrate, riboflavin, folic acid], sugar, partially hydrogenated vegetable oil [soybean and or cottonseed], oat fiber, dehydrated strawberries, modified food starch, sodium bicarbonate, citric acid, natural and artificial flavors, elderberry and beet juice, soy lecithin), Vanilla and Phosphoric Acid

Manufactured by
Carousel Foods of America, Inc.
Farmingdale, NY 11735

0 49663 01312 5

U6597

STRAWBERRY CHEESE CAKE
NET WT. 3 oz. (85g)
NEEDS NO REFRIGERATION

CAROUSEL

STRAWBERRY CHEESE CAKE

SPOON INSIDE

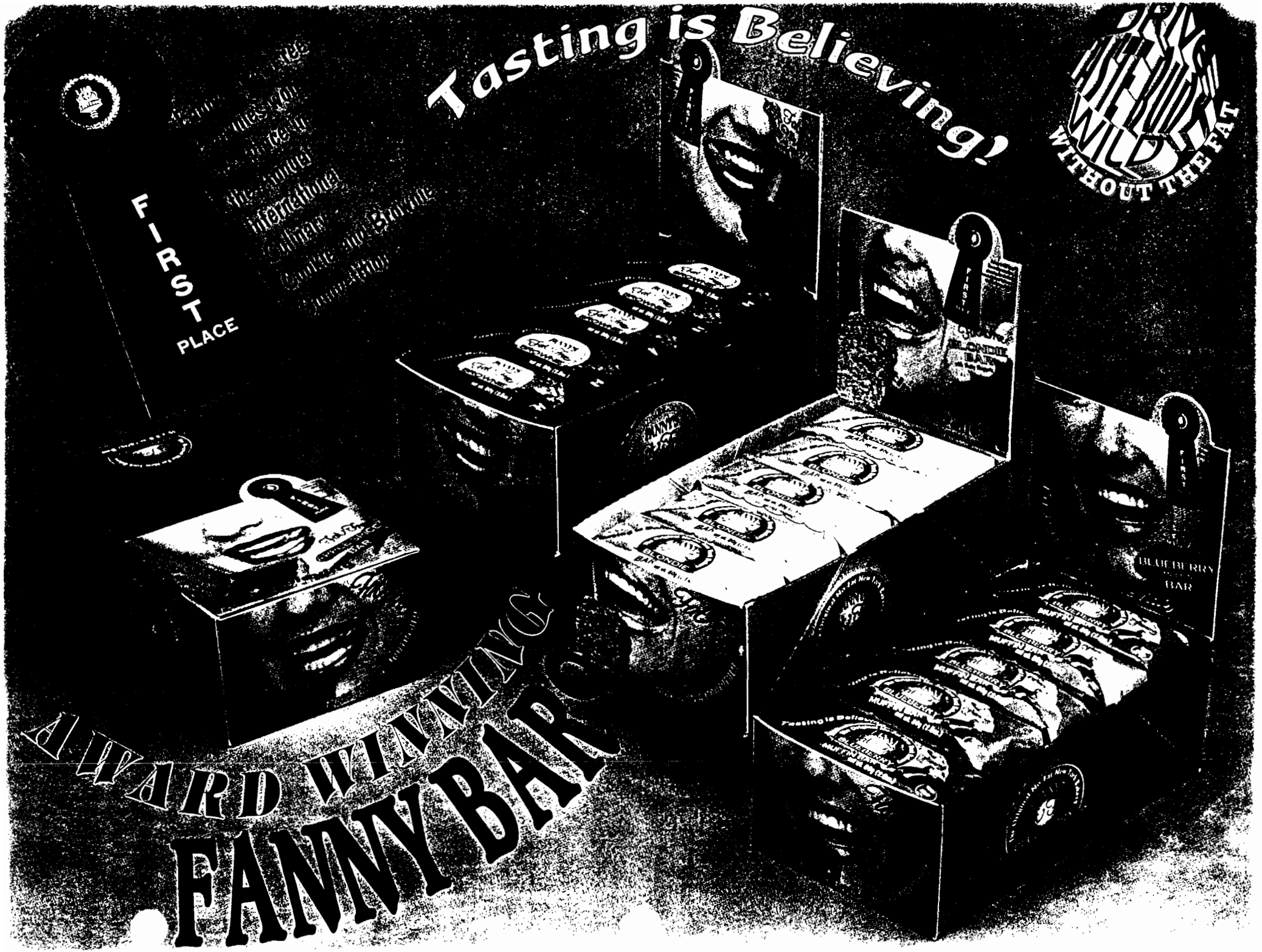
REAL

NEEDS NO REFRIGERATION

STRAWBERRY CHEESE CAKE
NET WT. 3 oz. (85g)
NEEDS NO REFRIGERATION

CAROUSEL

STRAWBERRY CHEESE CAKE


Tasting is Believing!
WITHOUT THE FAT
FIRST
PLACE
AWARD WINNING
FANNY BAR
BLONDIE BAR
BLUEBERRY BAR

FANNY BARS You Won't Believe they're Fat Free

The Original No-Fat New York Bakery
FANNY'S™ Fat Free BROWNIE BAR

Single Serve (2.8 oz.)

Brownie Bar:
7 46360 04503 8
Blondie Bar:
7 46360 04506 9
Blueberry Muffin Bar:
7 46360 04504 5
Apple Spice Bar:
7 46360 04505 2

Package:
Net Weight:2.8 oz (80
Size:5.25"x1.75"x1.2

Counter Display:
Pack: 15 / 2.8oz.
Size:
9" x 5.25" x 3.25"

Brownie Bar Pack:
7 46360 05503 7
Blondie Bar Pack:
7 46360 05506 8
Blueberry Muffin Bar Pac
7 46360 05504 4
Apple Spice Bar Pack:
7 46360 05505 1

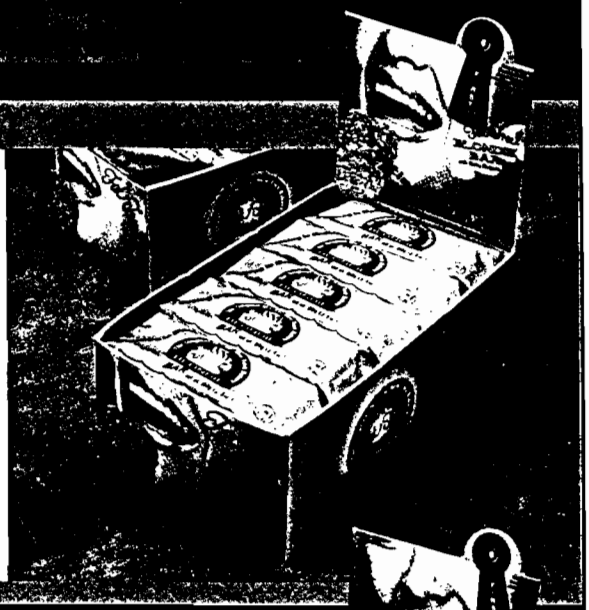
Case:
Pack: 4/15
Size:
11" x 9.875" X 7.5"
Weight:
12.5lbs.
Cube: ,47 cu ft.
Pallet Configuration:
16/8 (128 cases)

Brownie Bar Case:
7 46360 06503 7
Blondie Bar Case:
7 46360 06506 8
Blueberry Muffin Bar Ca
7 46360 06504 4
Apple Spice Bar Case:
7 46360 06505 1
Variety Case:
7 46360 06510 8

The Original No-Fat New York Bakery
FANNY'S Fat Free BLONDIE BAR

Nutrition Facts		
Serving Size 1.4 ozs (40g)		
Servings Per Container 2		
Amount per Serving		
Calories 95	Calories from Fat 0	
		% Daily Value*
Total Fat	0g	0%
Saturated Fat	0g	0%
Cholesterol	0mg	0%
Sodium	108mg	5%
Total Carbohydrate	26g	9%
Dietary Fiber	2g	10%
Sugars	18g	
Protein	2g	
Vitamin A	0%	• Vitamin C 0%
Calcium	2%	• Iron 2%
Thiamin	1%	• Riboflavin 1%
Niacin	1%	

INGREDIENTS:
Flour, brown sugar, egg substitute, fat free margerine, organic corn, organic oats, brown rice, baking powder, vanilla, apple flakes, cinnomam, nutty nuggets (wheat barley, yeast & salt).



The Original No-Fat New York Bakery
Fat Free BLUEBERRY MUFFIN BAR

Nutrition Facts		
Serving Size 1.4 ozs (40g)		
Servings Per Container 2		
Amount per Serving		
Calories 95	Calories from Fat 0	
		% Daily Value*
Total Fat	0g	0%
Saturated Fat	0g	0%
Cholesterol	7mg	2%
Sodium	129mg	6%
Total Carbohydrate	26g	9%
Dietary Fiber	1g	6%
Sugars	18g	
Protein	2g	
Vitamin A	0%	• Vitamin C 0%
Calcium	1%	• Iron 1%
Thiamin	1%	• Riboflavin 0%
Niacin	1%	

INGREDIENTS:
Enriched Bleached Flour, (contains; enriched bleached flour, malted barley flour, niacin, iron, thiamine mono nitrate, riboflavin,) sugar, non-fat dry milk, dried egg whites, soy sugar, emulsifier, polyglycerolester, modified food starch, leavening agents, sodium bicarbonate, sodium alumophosphate, mono calcium phosphate, salt, guargum, natural and artificial flavors and blue-berries.

The Original No-Fat New York Bakery
FANNY'S Fat Free APPLE SPICE BAR

Nutrition Facts		
Serving Size 1.4 ozs (40g)		
Servings Per Container 2		
Amount per Serving		
Calories 100	Calories from Fat 0	
		% Daily Value*
Total Fat	0g	0%
Saturated Fat	0g	0%
Cholesterol	0mg	0%
Sodium	121mg	6%
Total Carbohydrate	25g	9%
Dietary Fiber	1g	6%
Sugars	18g	
Protein	2g	
Vitamin A	0%	• Vitamin C 0%
Calcium	2%	• Iron 2%
Thiamin	1%	• Riboflavin 0%
Niacin	1%	

INGREDIENTS:
Apples, water, wheat flour, defotted cocoa, dried bananas, dairy whey, emulsifiers; (propylene glycol nonoesters, mono and di-glycerides, polysorbate 60), dried egg whites, non-fat dry milk, modified food starch, oat fiber, salt, sodium caseinate, leovening agents (sodium bicarbonate, sodium acid pyrophasphate, monocalcium phosphate), caramel color, xanthon gum, sugar, cinnomon.

All Products Are KOF-K Kosher Dairy

FANNY'S
FAT FREE FOODS

INGREDIENT STATEMENT

FAT FREE PLAIN CHEESECAKE
Ingredients: No-Fat Cream Cheese: (protein concentrated skim milk, cultured skim milk, skim milk, contains less than 2% of salt, sugar, cheese culture, artificial color, sodium tripoly phosphate, xanthan gum, carrageenan, with potassium sorbate and calcium propionate), No-Fat Sour Cream: (cultured pasteurized Grade A skim milk, dried corn syrup, maltodextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageenan, fruit pectin, vitamin A polmitate, xanthan gum), Wheat Flour: (wheat flour bleached, malted barley flour, niacin, iron, thiamin, mononitrate, riboflavin), Egg Whites, Sugar, Vanilla.

FAT FREE CHOCOLATE SWIRL CHEESECAKE
Ingredients: No-Fat cream Cheese: (protein concentrated skim milk, cultured skim milk, contains less than 2% of salt, sugar, cheese culture, artificial color, sodium tripoly phosphate, xanthan gum, carrageenan with potassium sorbate and calcium propionate as preservatives), Fat Free Chocolate Syrup: (corn syrup, sugar, water, cocoa, potassium sorbate (a preservative), salt, mono diglycerides from vegetable oil, polysorbate 60 (an emulsifier) and vanillin (an artificial flavoring), vanilla.) No-Fat Sour Cream: (cultured pasteurized Grande A skim milk, dried corn syrup, maltodextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageean, fruit pectin, vitamin A polmitate, xanthan gum), Wheat Flour: (wheat flour bleached, malted barley flour, niacin, iron, thiamin, mononitrate, riboflavin), Egg Whites, Sugar, Vanilla.

FAT FREE RASPBERRY SWIRL CHEESECAKE
Ingredients: No-Fat Cream Cheese: (protein concentrated skim milk, cultured skim milk, contains less than 2% of salt, sugar, cheese culture, artificial color, sodium tripoly phosphate, xanthan gum, carrageenan with potassium sorbate and calcium propionate as preservatives), Raspberry Puree: (clarified grape juice concentrate, raspberries, clarified pear juice concentrate, pectin, citric acid and natural flavor, vanilla), No-Fat Sour Cream: (cultured pasteurized Grade A skim milk, dried corn syrup, maltodextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageean, fruit pectin, vitamin A polmitate, xanthan gum), Wheat Flour: (wheat flour bleached, malted barley flour, niacin, iron, thiamin, mononitrate, riboflavin), Egg Whites, Sugar, Vanilla.

FAT FREE STRAWBERRY SWIRL CHEESECAKE
Ingredients: No-Fat Cream Cheese: (protein concentrated skim milk, cultured skim milk, skim milk, contains less than 2% of salt, cheese culture, artificial color, sodium tripoly phosphate, xanthan gum, carrageenan with potassium sorbate and calcium propionate as preservatives), Strawberry Puree: (clarified grape juice concentrate, strawberries, clarified pear juice concentrate, pectin, citric acid and natural flavor), Vanilla, No-Fat Sour Cream: (cultured pasteurized Grade A skim milk, dried corn syrup, malt dextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageean, fruit pectin, vitamin A polmitate, xanthum gum), Wheat Flour: (wheat flour bleached, malted barley flour, niacin iron, thiamin, mononitrate, riboflavin), Egg Whites, Sugar, Vanilla.

FAT FREE CHOCOLATE CHEESECAKE
Ingredients: No-Fat Cream Cheese: (protein concentrated skim milk, cultured skim milk, skim milk, contains less than 2% of salt, cheese culture, artificial color, sodium tripoly phosphate, xanthan gum, carrageenan with potassium sorbate and calcium propionate as preservatives), Fat - Free Chocolate Syrup: (corn syrup, sugar, water, cocoa, potassium sorbate (a preservative), salt, mono diglycerides from vegetable oil, polysorbate 60 (an emulsifier) and vanillin (an artificial flavoring), defatted cocoa powder, vanilla), No-Fat Sour Cream: (cultured pasteurized Grade A skim milk, dried corn syrup, malt dextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageean, fruit pectin, vitamin A polmitate, xanthan gum), Wheat Flour: (wheat flour bleached, malted barley flour, niacin, iron, thiamin, mononitrate, riboflavin), Egg Whites, Cocoa, Sugar, Vanilla.

FAT FREE BROWNIE CHEESECAKE
Ingredients: No-Fat Cream Cheese: (protein concentrated skim milk, cultured skim milk, skim milk, contains less than 2% of salt, sugar, cheese culture, artificial color, sodium tripoly phosphate, xanthan gum, carrageenan, with potassium sorbate and calcium propionate as preservatives), Fat-Free Brownie: (sugar, enriched wheat flour, enriched with niacin, iron, potassium bromate, thiamin mononitrate, riboflavin), defatted cocoa, whey protein concentrate, modified food starch, egg whites, salt, sodium bicarbonate, mono and diglycerides, potassium sorbate as a preservative.) No-Fat Sour Cream: (cultured pasteurized Grade A skim milk, dried corn syrup, maltodextrin, cream food starch modified, less than 2% artificial color, natural flavor, carrageean, fruit pectin, vitamin A polmitate, xanthan gum), Wheat Flour: (wheat flour bleached, malted barley flour, niacin, iron, thiamin, mononitrate, riboflavin), Egg Whites, Sugar, Vanilla.

FAT FREE PUMPKIN CHEESECAKE
Ingredients: No-Fat Cream Cheese: (protein concentrated skim milk, cultured skim milk, skim milk, contains less than 2% of salt, sugar, cheese culture, artificial color, sodium tripolate phosphate, xanthan gum, carrageenan, with potassium sorbate and calcium propionate as preservatives), No-Fat Sour Cream: (cultured pasteurized Grade A skim milk, dried corn syrup, maltodextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageean, fruit pectin, vitamin A polmitate, xanthan gum), Wheat Flour: (wheat flour bleached, malted barley flour, niacin, iron, thiamin, mononitrate, riboflavin), Pumpkin Puree, Egg Whites, Sugar, Cinnamon, Vanilla.

FAT FREE KEY LIME CHEESECAKE
Ingredients: No-Fat Cream Cheese: (protein concentrated skim milk, cultured skim milk, skim milk, contains less than 2% of salt, sugar, cheese culture, artificial color, sodium tripoly phosphate, xanthan gum, carrageenan, with potassium sorbate and calcium propionate as preservatives), No-Fat Four Cream: (cultured pasteurized Grade A skim milk, dried corn syrup, maltodextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageean, fruit pectin, vitamin A pomitate, xanthan gum), Wheat Flour: (wheat flour bleached, malted bartey flour, niacin, iron, thiamin, mononitrate, riboflavin), Egg Whites, Key Lime Juice, Sugar, Vanilla.

LOW FAT PLAIN NEW YORK CHEESECAKE
Ingredients: No-Fat Cream Cheese (Pasteurized Skim Milk, Cultured Starch, Sucrose, Salt, Carob Bean Gum, Guar Gum, Natural Flavors, Sodium Phosphate, Xanthum Gum, Sorbic Acid, Vitamin A Palminate), Sugar, No-Fat Sour Cream (Cultured Pasteurized Grade A Skim Milk, Dried Corn Syrup Solids, Maltodextrin, Cream, Cream, Food Starch Modified, Less than 2% Artificial Color, Natural Flavor, Carrageenan, Fruit Pectin, Vitamin A Palmitate, Xanthan Gum), Egg Whites, Flour (Bleached Wheat Flour, Malted Barley Flour, Potassium Bromate), Water, Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Hydrolyzed Oat Flour, Natural Cream Flavor, Artificial Flavors and Color

LOW FAT CHOCOLATE SWIRL CHEESECAKE
Ingredients: No-Fat Cream Cheese (Pasteurized Skim Milk, Cultured Starch, Sucrose, Salt, Carob Bean Gum, Guar Gum, Natural Flavors, Sodium Phosphate, Xanthum Gum, Sorbic Acid, Vitamin A Palminate), Sugar, No-Fat Sour Cream (Cultured Pasteurized Grade A Skim Milk, Dried Corn Syrup Solids, Maltodextrin, Cream, Cream, Food Starch Modified, Less than 2% Artificial Color, Natural Flavor, Carrageenan, Fruit Pectin, Vitamin A Palmitate, Xanthan Gum), Egg Whites, Flour (Bleached Wheat Flour, Malted Barley Flour, Potassium Bromate), Water, Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Chocolate Syrup (Corn Syrup, Sugar, Water, Potassium Sorbate, Salt, Mono- and Diglycerides From Vegetable Oil, Xanthan Gum, Polysorbate 60, Vanillin an Artificial Flavor), Hydrolyzed Oat Flour, Natural and Artificial Flavors, Artificial Colors

FAT FREE FOODS CORP.
Pompano Business Park • 1405 S.W. 6th Court • Pompano Beach, Florida 33069 • Telephone: (954) 783-0500 • Fax: (954) 783-3470
E-Mail Address: Fannys@WorldNet.ATT.NET • Internet Address: HTTP://www.FannysFatFree.com

All Products Are KOF-K Kosher Dairy

FANNY'S FAT FREE FOODS

INGREDIENT STATEMENT

LOW FAT CHEESECAKE WITH RASPBERRY SWIRL

Ingredients: No-Fat Cream Cheese (Pasteurized Skim Milk, Cultured Starch, Sucrose, Salt, Carob Bean Gum, Guar Gum, Natural Flavors, Sodium Phosphate, Xanthum Gum, Sorbic Acid, Vitamin A Palminate), Sugar, No-Fat Sour Cream (Cultured Pasteurized Grade A Skim Milk, Dried Corn Syrup Solids, Maltodextrin, Cream, Cream, Food Starch Modified, Less than 2% Artificial Color, Natural Flavor, Carrageenan, Fruit Pectin, Vitamin A Palmitate, Xanthan Gum), Egg Whites, Flour (Bleached Wheat Flour, Malted Barley Flour, Potassium Bromate), Water, Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Raspberry Preserves (Red Raspberry, High Fructose Corn Syrup, Corn Syrup, Pectin, Citric Acid), Hydrolyzed Oat Flour, Natural and Artificial Flavors, Artificial Color

LOW FAT STRAWBERRY SWIRL CHEESECAKE

Ingredients: No-Fat Cream Cheese (Pasteurized Skim Milk, Cultured Starch, Sucrose, Salt, Carob Bean Gum, Guar Gum, Natural Flavors, Sodium Phosphate, Xanthum Gum, Sorbic Acid, Vitamin A Palminate), Sugar, No-Fat Sour Cream (Cultured Pasteurized Grade A Skim Milk, Dried Corn Syrup Solids, Maltodextrin, Cream, Cream, Food Starch Modified, Less than 2% Artificial Color, Natural Flavor, Carrageenan, Fruit Pectin, Vitamin A Palmitate, Xanthan Gum), Egg Whites, Flour (Bleached Wheat Flour, Malted Barley Flour, Potassium Bromate), Water, Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Strawberry Preserves (Strawberry, Sugar, Corn Syrup, High Fructose Corn Syrup, Pectin, Citric Acid), Hydrolyzed Oat Flour, Natural and Artificial Flavors, Artificial Color

LOW FAT BROWNIE CHEESECAKE

Ingredients: No-Fat Cream Cheese (Pasteurized Skim Milk, Cultured Starch, Sucrose, Salt, Carob Bean Gum, Guar Gum, Natural Flavors, Sodium Phosphate, Xanthum Gum, Sorbic Acid, Vitamin A Palminate), Sugar, No-Fat Sour Cream (Cultured Pasteurized Grade A Skim Milk, Dried Corn Syrup Solids, Maltodextrin, Cream, Cream, Food Starch Modified, Less than 2% Artificial Color, Natural Flavor, Carrageenan, Fruit Pectin, Vitamin A Palmitate, Xanthan Gum), Water, Egg Whites, Flour (Bleached Wheat Flour, Malted Barley Flour, Potassium Bromate), Wheat Flour, Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Hydrolyzed Oat Flour, Defatted Cocoa, Whey Protein Concentrate, Natural and Artificial Flavors, Salt, Modified Food Starch, Chocolate, Lecithin, Baking Soda, Artificial Color

LOW FAT CARROT CAKE

Ingredients: Flour (Bleached Wheat Flour, Malted Barley Flour, Potassium Bromate), Sugar, Carrots, No Fat Cream Cheese (Pasteurized Skim Milk, Cultured Starch, Sucrose, Salt, Carob Bean Gum, Guar Gum, Natural Flavors, Sodium Phosphate, Xanthan Gum, Sorbic Acid, Vitamin A Palminate), Egg Whites, Raisins, Powdered Sugar, Pineapple Juice, Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Pumpkin Puree,Graham Cracker Crumbs (Enriched Wheat Flour [Containing Niacin, Reduced Iron, Thiamin Mononitrate, (Vitamin B1), and Riboflavin (Vitamin B2)], Sugar, Graham Flour, Vegetable Shortening [Partially Hydrogenated Soybean Oil and/or Cottonseed Oil], Corn Syrup, Honey, Molasses, Leavening [Ammonium Bicarbonate, Sodium Bicarbonate], Salt, Colored with Annatto/Turmeric Extract, Natural and Artificial Flavor, Caramel Color, Artificial Color [FD&C Red No. 40), Unsweetened Applesauce (Apples, Water, Applejuice Erythorbic Acid), Rice Syrup Solids, Molasses, Fruit Puree (Fruit Juice, Natural Grain Dextrins), Crushed Pineapple in Juice(Pineapples, Pineapple Juice), Vanilla, Cinnamon, Sodium Bicarbonate, Baking Powder (Sodium Acid Pyrophosphate, Sodium Bicarbonate, Cornstarch, Monocalcium Phosphate), Salt.

SUGAR FREE - PLAIN CHEESECAKE

Ingredients: Cream Cheese (pasteurized milk and cream cheese culture, salt, carob bean gum), Sour Cream (Cultured, pasteurized skim milk, cream, modified food starch, guar gum, sodium citrate, carrageenan, locust bean gum and potassium sorbate), water, maltitol, sorbitol, egg whites, flour (bleached wheat flour, malted bartey flour, potassium bromate), hydrolyzed oat flour, natural cream flavor, vanilla extract, artificial color.

SUGAR FREE - CHOCOLATE SWIRL CHEESECAKE

Ingredients: Cream Cheese (pasteurized milk and cream cheese culture, salt, carob bean gum), Sour Cream (Cultured, pasteurized skim milk, cream, modified food starch, guar gum, sodium citrate, carrageenan, locust bean gum and potassium sorbate), water, maltitol, sorbitol, egg whites, flour (bleached wheat flour, malted barley flour, potassium bromate), hydrolyzed oat flour, cocoa, natural cream flavor, glycerin, modified food starch with xanthan gum, vanilla extract, modified food starch, acesulfame K.

SUGAR FREE - RASPBERRY SWIRL CHEESECAKE

Ingredients: Cream Cheese (pasteurized milk and cream cheese culture, salt, carob bean gum), Sour Cream (Cultured, pasteurized skim milk, cream, modified food starch, guar gum, sodium citrate, carrageenan, locust bean gum and potassium sorbate), water, maltitol, sorbitol, egg whites, flour (bleached wheat flour, malted barley flour, potassium bromate), hydrolyzed oat flour, glycerin, maltodextrin with lypolized cream, vanilla extract, modified food starch, citrus juice from concentrate, natural cream flavor with xanthan gum, artificial colors, artificial raspberry flavor, acesulfame K.

SUGAR FREE - STRAWBERRY SWIRL CHEESECAKE

Ingredients: Cream Cheese (pasteurized milk and cream cheese culture, salt, carob bean gum), Sour Cream (Cultured, pasteurized skim milk, cream, modified food starch, guar gum, sodium citrate, carrageenan, locust bean gum and potassium sorbate), water, maltitol, sorbitol, egg whites, flour (bleached wheat flour, malted barley flour, potassium bromate), hydrolyzed oat flour, glycerin, natural cream flavor, vanilla extract, modified food starch, citrus juice from concentrate, modified food starch with xanthan gum, artificial colors, artificial strawberry flavor, acesulfame K.

SUGAR FREE - BROWNIE CHEESECAKE

Ingredients: Cream Cheese (pasteurized milk and cream cheese culture, salt, carob bean gum), Sour Cream (Cultured, pasteurized skim milk, cream, modified food starch, guar gum, sodium citrate, carrageenan, locust bean gum and potassium sorbate), maltitol, sorbitol, water, flour (bleached wheat flour, malted barley flour, potassium bromate), egg whites, bleached wheat flour, hydrolyzed oat flour, cocoa, glycerin, natural cream flavor, vanilla extract, egg white solids, salt, modified food starch, potassium sorbate, sodium propionate, egg shade, baking powder, sodium bicarbonate.

SUGAR FREE - FAT FREE PLAIN CHEESECAKE

Ingredients: No-Fat Cream Cheese: (pasteurized skim milk, cultured starch, salt, carob bean gum, guar gum, natural flavors, sodium phosphate, xanthan gum, sorbic acid, vitamin A palminate), No Fat Sour cream: (Cultured pasteurized grade A skim milk, maltodextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageenan, fruit pectin, vitamin A palminate, xanthan gum), maltitol, sorbitol, egg whites, flour (bleached wheat flour, malted barley flour, potassium bromate), hydrolyzed oat flour, natural cream flavor, vanilla extract, artificial color.

SUGAR FREE - FAT FREE CHOCOLATE SWIRL CHEESECAKE

Ingredients: No-Fat Cream Cheese: (pasteurized skim milk, cultured starch, salt, carob bean gum, guar gum, natural flavors, sodium phosphate, xanthan gum, sorbic acid, vitamin A palminate), No Fat Sour cream: (Cultured pasteurized grade A skim milk, maltodextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageenan, fruit pectin, vitamin A palminate, xanthan gum), maltitol, sorbitol, egg whites, flour (bleached wheat flour, malted barley flour, potassium bromate), hydrolyzed oat flour, defatted cocoa, glycerin, modified food starch with xanthum gum, natural cream flavor, vanilla extract, acesulfame K, egg shade.

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FANNY'S FAT FREE FOODS

INGREDIENT STATEMENT

SUGAR FREE - FAT FREE RASPBERRY SWIRL CHEESECAKE
Ingredients: No Fat Cream Cheese (pasteurized skim milk culture, starch, sucrose, salt, carob bean gum, guar gum, natural flavors, sodium phosphate, xanthan gum, sorbic acid[preservative], vitamin A palminate), No Fat Sour Cream (cultured pasteurized grade A skim milk, maltodextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageenan, fruit pectin, vitamin A palmitate, xanthan gum), water, maltitol, sorbitol, egg whites, flour (bleached wheat flour, malted barley flour, potassium bromate), glycerin, hydrolyzed oat flour, less than 2% natural cream flavor modified food starch, citrus juice from concentrate, food starch modified with xanthan gum, vanilla extract, artificial flavor, artificial color.

SUGAR FREE - FAT FREE STRAWBERRY SWIRL CHEESECAKE
Ingredients: No Fat Cream Cheese (pasteurized skim milk culture, starch, sucrose, salt, carob bean gum, guar gum, natural flavors, sodium phosphate, xanthan gum, sorbic acid[preservative], vitamin A palminate), No Fat Sour Cream (cultured pasteurized grade A skim milk, maltodextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageenan, fruit pectin, vitamin A palmitate, xanthan gum), water, maltitol, sorbitol, egg whites, flour (bleached wheat flour, malted barley flour, potassium bromate), glycerin, hydrolyzed oat flour, less than 2% natural cream flavor modified food starch, citrus juice from concentrate, food starch modified with xanthan gum, vanilla extract, artificial flavor, artificial color.

SUGAR FREE - FAT FREE BROWNIE CHEESECAKE
Ingredients: No-Fat Cream Cheese: (pasteurized skim milk culture, starch, salt, carob bean gum, guar gum, natural flavors, sodium phosphate, xanthan gum, sorbic acid as preservative, vitamin A palmitate), No-Fat Sour Cream (cultured pasteurized grade A skim milk, maltodextrin, cream, food starch modified, less than 2% artificial color, natural flavor, carrageenan, fruit pectin, vitamin A palmitate, xanthan gum), maltitol, sorbitol, water, flour (bleached wheat flour, malted barley flour, potassium bromate), egg whites, wheat flour, hydrolyzed oat flour, defatted cocoa, glycerin, natural cream flavor, vanilla, modified food starch, salt, sodium propionate, potassium sorbate, baking soda, baking powder.

PREMIUM PLAIN CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Light Cream (Milk and Cream with Disodium Phosphate), Cornstarch, Vanilla Flavor.

PREMIUM CHOCOLATE SWIRL CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Cornstarch, Light Cream (Milk and Cream with Disodium Phosphate), Chocolate Syrup (Corn Syrup, Sugar, Water, Potassium Sorbate, Salt, Mono- and Diglycerides From Vegetable Oil, Xanthan Gum, Polysorbate 60, Vanillin an Artificial Flavor), Vanilla Flavor.

PREMIUM APPLE WALNUT CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Apple (Golden Delicious Apples, Salt, Erythorbic Acid, Citric Acid, Calcium Chloride as a Preservative), Light Cream (Milk and Cream with Disodium Phosphate), Wheat Flour, Walnuts, Margarine (Partially Hydrogenated Soybean and Cottonseed Oils, Skim Milk and Cultured Skim Milk, Salt, Vegetable Mono and Diglycerides and Lecithin [Emulsifiers], Artificially Flavored, Colored with Beta Carotene [A Source of Vitamin A], Vitamin A Added), Cornstarch, Vegetable Shortening (Partially Hydrogenated Soybean and Palm Oils with Dimethylpolysiloxane), Brown Sugar, Vanilla Flavor, Cinnamon, Salt.

PREMIUM BLACK CHERRY CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Black Cherries (Dark Sweet Cherries, Water, Cherry Juice Concentrate), Light Cream (Milk and Cream with Disodium Phosphate), Cornstarch, Wheat Flour, Margarine (Partially Hydrogenated Soybean and Cottonseed Oils, Skim Milk and Cultured Skim Milk, Salt, Vegetable Mono and Diglycerides and Lecithin [Emulsifiers], Artificially Flavored, Colored with Beta Carotene [A Source of Vitamin A], Vitamin A Added), Vegetable Shortening (Partially Hydrogenated Soybean and Palm Oils with Dimethylpolysiloxane), Brown Sugar, Cocoa, Vanilla Flavor, Cinnamon, Salt.

PREMIUM CHOCOLATE CHIP CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Chocolate Chips (Sugar, Chocolate Liquor, Cocoa Butter, Butteroil, Soy Lecithin as an emulsifier, and Pure Vanilla), Light Cream (Milk and Cream with Disodium Phosphate), Cornstarch, Wheat Flour, Margarine (Partially Hydrogenated Soybean and Cottonseed Oils, Skim Milk and Cultured Skim Milk, Salt, Vegetable Mono and Diglycerides and Lecithin [Emulsifiers], Artificially Flavored, Colored with Beta Carotene [A Source of Vitamin A], Vitamin A Added), Cocoa, Vegetable Shortening (Partially Hydrogenated Soybean and Palm Oils with Dimethylpolysiloxane), Brown Sugar, Vanilla Flavor, Cinnamon, Salt.

PREMIUM CRANBERRY WALNUT CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Light Cream (Milk and Cream with Disodium Phosphate), Dried Cranberries (Sugar, Cranberries, Citric Acid), Wheat Flour, Walnuts, Cornstarch, Margarine (Partially Hydrogenated Soybean and Cottonseed Oils, Skim Milk and Cultured Skim Milk, Salt, Vegetable Mono and Diglycerides and Lecithin [Emulsifiers], Artificially Flavored, Colored with Beta Carotene [A Source of Vitamin A], Vitamin A Added), Vegetable Shortening (Partially Hydrogenated Soybean and Palm Oils with Dimethylpolysiloxane), Brown Sugar, Vanilla Flavor, Cinnamon, Salt.

PREMIUM TOFFEE CRUNCH CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Toffee Crunch (Sugar, Corn Syrup, Partially Hydrogenated Cottonseed and Soybean Oils, Butter, Salt, Lecithin, Natural and Artificial Flavors), Light Cream (Milk and Cream with Disodium Phosphate), Cornstarch, Vanilla Flavor.

PREMIUM BROWNIE CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Light Cream (Milk and Cream with Disodium Phosphate), Flour (Bleached Wheat Flour, Malted Barley Flour, Potassium Bromate), Margarine (Partially Hydrogenated Soybean and Cottonseed Oils, Skim Milk and Cultured Skim Milk, Salt, Vegetable Mono and Diglycerides and Lecithin [Emulsifiers], Artificially Flavored, Colored with Beta Carotene [A Source of Vitamin A], Vitamin A Added), Water, Cocoa, Cornstarch, Wheat Flour, Vegetable Shortening (Partially Hydrogenated Soybean and Palm Oils with Dimethylpolysiloxane), Brown Sugar, Milk, Vanilla Flavor, Salt, Lecithin, Sodium Bicarbonate, Baking Powder (Sodium Acid Pyrophosphate, Sodium Bicarbonate, Cornstarch, Monocalcium Phosphate), Cinnamon.

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INGREDIENT STATEMENT

PREMIUM STRAWBERRY CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Strawberries, Light Cream (Milk and Cream with Disodium Phosphate), Cornstarch, Wheat Flour, Margarine (Partially Hydrogenated Soybean and Cottonseed Oils, Skim Milk and Cultured Skim Milk, Salt, Vegetable Mono and Diglycerides and Lecithin [Emulsifiers], Artificially Flavored, Colored with Beta Carotene [A Source of Vitamin A], Vitamin A Added), Brown Sugar, Cocoa, Vegetable Shortening (Partially Hydrogenated Soybean and Palm Oils with Dimethylpolysiloxane), Vanilla Flavor, Cinnamon, Salt.

PREMIUM KEY LIME CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Key Lime Juice from Concentrate, Light Cream (Milk and Cream with Disodium Phosphate), Cornstarch, Vanilla Flavor.

PREMIUM RASPBERRY SWIRL CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Cornstarch, Light Cream (Milk and Cream with Disodium Phosphate), Raspberry Preserve (Red Raspberry, High Fructose Corn Syrup, Corn Syrup, Pectin, Citric Acid), Vanilla Flavor.

PREMIUM PINEAPPLE CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Pineapple in Juice, Light Cream (Milk and Cream with Disodium Phosphate), Cornstarch, Wheat Flour, Margarine (Partially Hydrogenated Soybean and Cottonseed Oils, Skim Milk and Cultured Skim Milk, Salt, Vegetable Mono and Diglycerides and Lecithin [Emulsifiers], Artificially Flavored, Colored with Beta Carotene [A Source of Vitamin A], Vitamin A Added), Brown Sugar, Vegetable Shortening (Partially Hydrogenated Soybean and Palm Oils with Dimethylpolysiloxane), Vanilla Flavor, Cinnamon, Salt.

PREMIUM APPLE CRUMB CHEESECAKE
Ingredients: Cream Cheese (Pasteurized Milk and Cream Cheese Culture, Salt, Carob Bean Gum), Sugar, Eggs, Apple (Golden Delicious Apples, Salt, Erythorbic Acid, Citric Acid, Calcium Chloride as a Preservative), Light Cream (Milk and Cream with Disodium Phosphate), Wheat Flour, Margarine (Partially Hydrogenated Soybean and Cottonseed Oils, Skim Milk and Cultured Skim Milk, Salt, Vegetable Mono and Diglycerides and Lecithin [Emulsifiers], Artificially Flavored, Colored with Beta Carotene [A Source of Vitamin A], Vitamin A Added), Cornstarch, Vegetable Shortening (Partially Hydrogenated Soybean and Palm Oils with Dimethylpolysiloxane), Brown Sugar, Vanilla Flavor, Cinnamon, Salt.

PREMIUM CHOCOLATE CAKE
Ingredients: Sugar, Water, Flour (Wheat Flour, Niacin, Iron, Thiamin, Mononitrate, Riboflavin), Shortening (Partially Hydrogenated Soybean and Palm Oils, with Mono and Diglycerides), Eggs, Cocoa, Fudge Base (Vegetable Shortening [Partially Hydrogenated Soybean and Cottonseed and/or Canola Oils], Cocoa processed with Alkali, Corn Syrup Solids, Soy Oil, Soy Lecithin, Salt, Artificial Flavors), Milk Solids, Salt, Baking Powder, (Sodium Acid Pyrophosphate, Sodium Bicarbonate, Cornstarch, Monocalcium Phosphate).

FAT FREE DRY MIX - MUFFIN (Add 15 lbs. of water to 50 lbs. of mix)
Ingredients: Sucrose, Wheat Flour: (enriched with iron, niacin, riboflavin, bleached), Hydrolyzed Oat Flour, Whey Protein, Egg Whites, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono and Diglycerides, Natural & Artificial Flavors.

FAT FREE DRY MIX - CHOCOLATE (Add 35 lbs. of water to 50 lbs. of mix)
Ingredients: Sucrose, Wheat Flour: (enriched with niacin, riboflavin bleached), Cocoa, Fructose, Hydrolyzed Oat Flour Whey Protein, Egg Whites, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono and Diglycerides, Natural & Artificial Flavors.

FAT FREE DRY MIX - BROWNIE (Add 15 lbs. of water to 50 lbs. of mix)
Ingredients: Sucrose, Enriched Wheat Flour: (enriched with niacin, iron, potassium bromate, thiamin mononitrate and riboflavin), Deffated Cocoa, Whey Protein Concentrate, Modified Food Starch, Egg White, Salt, Sodium Bicarbonate, Mono & Diglycerides, Sorbic Acid (as a preservative).

DAIRY QUEEN BROWNIE
Ingredients: Sugar, Flour (Bleached Wheat Flour, Malted Barley Flour, Potassium Bromate), Eggs, Water, Margarine (Liquid Soybean Oil, Partially Hydrogenated Soybean Oil, Water, Salt, Soybean Lecithin, Vegetable Mono and Diglycerides, Sodium Benzoate as a Preservative, Artificial Flavor, colored with Beta Carotene, Vitamin A Palmitate added), Cocoa, Non Fat Milk Powder (Milk Protein Concentrate, Non Fat Dry Milk and Lactose), Salt, Soy Lecithin, Vanilla Extract, Sodim Bicarbonate, Baking Powder.

FAT FREE BROWNIE BAR & BROWNIE
Ingredients: Sucrose, Enriched Wheat Flour: (enriched with niacin, iron, potassium bromate, thiamin mononitrate and riboflavin), Defatted Cocoa, Whey Protein Concentrate, Modified Food Starch, Egg White, Salt, Sodium Bicarbonate, Mono & Diglycerides, Sorbic Acid (as a preservative).

FAT FREE BLUEBERRY BAR
Ingredients: Sucrose, Enriched Wheat Flour: (malted barley flour, iron, niacin, riboflavin, unbleached, unbromated), Egg White, Water, Apple, Whey Protein, Natural Flavors, Vanilla, Salt, Sodium Bicarbonate, Mono & Diglycerides, Sorbic Acid (as a preservative).

FAT FREE APPLESPICE BAR
Ingredients: Sucrose, Enriched Wheat Flour: (malted barley flour, iron, niacin, riboflavin, unbleached, unbromated), Egg White, Water, Apple, Whey Protein, Brown Sugar, Cinnamon, Vanilla, Salt, Sodium Bicarbonate, Mono & diglycerides, Sorbic Acid (as a preservative).

FAT FREE BLONDIE BAR
Ingredients: Sucrose, Enriched Wheat Flour: (malted barley flour, iron, niacin, riboflavin, unbleached, unbromated), Egg White, Water, Chocolate Chips: (sugar, partially hydrogenated palm kernel oil, cocoa, cocoa processed with alkali, dextrose Soya lecithin (an emulsifier), sorbitan monostearate, polysorbate 60, salt, vanilla), Whey Protein, Brown Sugar, Molasses, Vanilla, Salt, Sodium Bicarbonate, Mono & Diglycerides, Sorbic Acid (as a preservative).

97% FAT FREE BROWNIE
Ingredients: Sucrose, Wheat Flour: (enriched with iron, niacin, riboflavin, wheat flour bleached), Cocoa, Whey Protien, Egg White, Modified Food Starch, Margarine, Sodium Bicarbonate, Mono & Diglycerides.

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INGREDIENT STATEMENT

SUGAR FREE DELUXE BROWNIE
Ingredients: Maltitol, Enriched Wheat Flour: (thiamin mononitrate, riboflavin, niacin reduced iron, wheat flour bleached), Cocoa, Eggs, Sugar Free Chocolate Chips: (manitol, hydrogenated palm kearnel oi, cocoa, cocoa processed with alkali, sorbitan tristarate, soya lecithin), Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate, sodium aluminum phosphate), Chocolate Liquor, Vanilla, Ace Sulfame Potassium.

LOW FAT SUGAR FREE BROWNIE
Ingredients: Maltitol, Enriched Wheat Flour: (thiamin mononitrate, riboflavin, niacin reduced iron, wheat flour bleached), Cocoa, Eggs, Partially Hydrogenated Soy Bean Oil, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate, sodium aluminum phosphate), Chocolate Liquor, Vanilla, Ace Sulfame Potassium.

FAT FREE BLUEBERRY MUFFIN BATTER
Ingredients: Sucrose, Wheat Flour: (enriched with iron, niacin, riboflavin, bleached), Fructose, Blueberries, Hydrolyzed Oat Flour, Whey Protein, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural & Artificial Flavors.

FAT FREE APPLE CINNAMON MUFFIN BATTER
Ingredients: Sucrose, Wheat Flour: (enriched with iron, niacin, riboflavin, bleached), Fructose, Apples, Hydrolyzed Oat Flour, Whey Protein, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural & Artificial Flavors.

FAT FREE ORANGE CRANBERRY MUFFIN BATTER
Ingredients: Sucrose, Wheat Flour: (enriched with iron, niacin, riboflavin, bleached), Fructose, Cranberries, Hydrolyzed Oat Flour, Whey Protein, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural & Artificial Flavors.

FAT FREE LEMON POPPY MUFFIN BATTER
Ingredients: Sucrose, Wheat Flour: (enriched with iron, niacin, riboflavin, bleached), Fructose, Hydrolyzed Oat Flour, Whey Protein, Egg White, Modified Food Starch, Poppy Seeds, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural & Artificial Flavors.

FAT FREE CHOCOLATE RASPBERRY MUFFIN BATTER
Ingredients: Sucrose, Wheat four: (enriched with iron, niacin, riboflavin, bleached), Cocoa, Fructose, Hydrolyzed Oat Flour, Raspberry Puree, Whey Protein, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural & Artificial Flavors.

FAT FREE CHOCOLATE MUFFIN BATTER
Ingredients: Sucrose, Wheat Flour: (enriched with iron, niacin, riboflavin, bleached), Cocoa, Fructose, Hydrolyzed Oat Flour, Whey Protein, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural & Artificial Flavors.

FAT FREE CARROT RAISIN MUFFIN BATTER
Ingredients: Sucrose, Wheat Flour: (enriched with iron, niacin, riboflavin, bleached), Fructose, Carrots, Hydrolyzed Oat Flour, Whey Protein, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural & Artificial Flavors.

FAT FREE BANANA MUFFIN BATTER
Ingredients: Sucrose, Wheat Flour: (enriched with iron, niacin, riboflavin, bleached), Fructose, Hydrolyzed Oat Flour, Wheay Protein, Banana Puree, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural & Artificial Flavors.

97% FAT FREE - NO SUGAR ADDED APPLE CINNAMON MUFFIN BATTER
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin), Maltitol, Water, Apples, Eggs, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Cinnamon, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

97% FAT FREE - NO SUGAR ADDED BLUEBERRY MUFFIN BATTER
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin), Maltitol, Water, Blueberries, Eggs, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

97% FAT FREE - NO SUGAR ADDED ORANGE BLOSSOM CRANBERRY MUFFIN BATTER
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin), Maltitol, Water, Cranberries, Eggs, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

97% FAT FREE RAISIN BRAN MUFFIN BATTER
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin), Maltitol, Water, Crude Wheat Bran, Raisins, Sugar, Water, Eggs, Fruit Juice, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

97% FAT FREE APPLE OAT BRAN MUFFIN BATTER
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin), Crude Wheat Bran, Sugar, Water, Apples, Eggs, Fruit Juice, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

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INGREDIENT STATEMENT

97% FAT FREE BLUEBERRY BRAN MUFFIN BATTER
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin), Crude Wheat Bran, Sugar, Water, Blueberries, Eggs, Fuit Juice, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dretters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil wilth Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

97% FAT FREE BANANA WALNUT MUFFIN BATTER
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin), Sugar, Water, Banana Puree, Eggs, Fruit Juice, Banana Chips, Walnuts, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil wilth Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

97% FAT FREE CARROT RAISIN WALNUT MUFFIN BATTER
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin), Sugar, Carrots, Raisings, Eggs, Fruit Juice, Water, Walnuts, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil wilth Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

97% FAT FREE APPLE CINNAMON MUFFIN BATTER
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin), Sugar, Water, Apples, Eggs, Fruit Juice, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Cinnamon, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil wilth Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

97% FAT FREE BLUEBERRY MUFFIN BATTER
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin), Sugar, Water, Blueberries, Eggs, Fruit Juice, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil wilth Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

40% REDUCED FAT - NO SUGAR ADDED SWEET CORN MUFFINS BATTER
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacim, reduced iron, thiamin mononitrate, riboflavin), Maltitol, Corn Meal, Eggs, Partially Hydrogenated Soy Bean Oil, Milk Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

40% REDUCED FAT - NO SUGAR ADDED LEMON POPPY MUFFIN BATTER
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Maltitol, Water, Eggs, Milk Powder, Partially Hydrogenated Soybean Oil, Poppy Seeds, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil wilth Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

40% REDUCED FAT - NO SUGAR ADDED RAISIN NUT BRAN MUFFIN BATTER
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Maltitol, Water, Raisins, Eggs, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Walnuts, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil wilth Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

40% REDUCED FAT - NO SUGAR ADDED DOUBLE CHOCO CHIP MUFFIN BATTER
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Water, Chocolate Chips: (manitol, hydrogenated palm kearnel oil, cocoa, cocoa processed with alkali, sorbitan tristearate, soya lecithin), Cocoa, Eggs, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil wilth Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

40% REDUCED FAT - NO SUGAR ADDED CHOCOLATE CHIP MUFFIN BATTER
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Maltitol, Water, Chocolate Chips: (manitol, hydrogenated palm kearnel oil, cocoa, cocoa processed with alkali, sorbitan tristearate, soya lecithin), Eggs, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil wilth Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

40% REDUCED FAT - NO SUGAR ADDED BASIC MUFFIN BATTER
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Maltitol, Water, Chocolate Chips: (manitol, hydrogenated palm kearnel oil, cocoa, cocoa processed with alkali, sorbitan tristearate, soya lecithin), Eggs, Milk Powder, Partially Hydrogenated Vegetable Oil, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Modified Food Starch, Hydrolyzed Oat Flour, Vanilla, Salt, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil wilth Lecithin, BHT & Citric Acid (as a preservative), Natural & Artificial Flavors.

SUGAR FREE CREAM CAKE BATTER
Ingredients: Maltitol, Enriched Wheat Flour: (malted barley flour, enriched with niacin, iron, thiamin mononitrate, riboflavin, bleached, unbromated), Partially Hydrogenated Soybean Oil, Eggs, Water, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate), Modified Food Starch, Milk Solids, Egg White Solids, Ace Sulfame Potassium, Salt, Vanilla, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), & Natural Flavors.

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The Original Nofat New York Bakery

FANNY'S

FAT FREE FOODS

INGREDIENT STATEMENT

SUGAR FREE CHOCOLATE CREAM CAKE BATTER
Ingredients: Maltitol, Enriched Wheat Flour: (malted barley flour, enriched with niacin, iron, thiamin mononitrate, riboflavin, bleached, unbromated), Partially Hydrogenated Soybean Oil, Cocoa, Eggs, Water, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate), Modified Food Starch, Milk Solids, Egg White Solids, Ace Sulfame Potassium, Salt, Vanilla, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), & Natural Flavors.

SUGAR FREE POUND CAKE BATTER
Ingredients: Maltitol, Enriched Wheat Flour: (malted barley flour, enriched with niacin, iron, thiamin mononitrate, riboflavin, bleached, unbromated), Partially Hydrogenated Soybean Oil, Eggs, Water, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate), Milk Solids, Ace Sulfame Potassium, Salt, Vanilla, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), & Natural Flavors.

SUGAR FREE CHOCOLATE POUND CAKE BATTER
Ingredients: Maltitol, Enriched Wheat Flour: (malted barley flour, enriched with niacin, iron, thiamin mononitrate, riboflavin, bleached, unbromated), Partially Hydrogenated Soybean Oil, Cocoa, Eggs, Water, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate), Milk Solids, Ace Sulfame Potassium, Salt, Vanilla, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), & Natural Flavors.

SUGAR FREE CHOCOLATE CHIP COOKIES
Ingredients: Unbleached Wheat Flour: (enriched with niacin, riboflavin bleached), Maltitol, Chocolate Chips: (manitol, hydrogenated palm kearnel oil, cocoa, cocoa processed with alkali, sorbitan tristearate, soya lecithin), Butter, Margarine, Eggs, Water, Vanilla, Salt, Sodium Bicarbonate, Ace Sulfame Potassium.

97% FAT FREE FRENCH CRUMB CAKE
Ingredients: Sucrose, Enriched Wheat Flour: (thiamin, mononitrate, riboflain, niacin reduced iron, bleached), Water, Fructose, Crumbs: (wheat flour, sucrose, margarine, vanilla, cinnamon, salt), Hydralized Oat Flour, Whey Protein, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural Flavors.

97% FAT FREE CHOCOLATE CRUMB CAKE
Ingredients: Sucrose, Enriched Wheat Flour: (thiamin, mononitrate, riboflain, niacin reduced iron, bleached), Water, Cocoa, Fructose, Crumbs: (wheat flour, sucrose, margarine, vanilla, cinnamon, salt), Hydralized Oat Flour, Whey Protein, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural Flavors.

97% FAT FREE APPLE CRUMB CAKE
Ingredients: Sucrose, Enriched Wheat Flour: (thiamin, mononitrate, riboflain, niacin reduced iron, bleached), Water, Apples, Fructose, Crumbs: (wheat flour, sucrose, margarine, vanilla, cinnamon, salt), Hydralized Oat Flour, Whey Protein, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Cinnamon, Mono & Diglycerides, Natural Flavors.

97% FAT FREEE CHOCOLATE CHIP CRUMB CAKE
Ingredients: Sucrose, Enriched Wheat Flour: (thiamin, mononitrate, riboflain, niacin reduced iron, bleached), Water, Chocolate Chips: (sugar, partially hydrogenated pam kernel oil, cocoa, cocoa processed with alkali, dextrose, soy lecithin, emulsifier), Fructose, Crumbs: (wheat flour, sucrose, margarine, vanilla, cinnamon, salt), Hydralized Oat Flour, Whey Protein, Egg White, Modified Food Starch, Leavenings: (baking soda, monocalcium phosphate, sodium aluminum phosphate), Mono & Diglycerides, Natural Flavors.

GOURMET BLUEBERRY
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Water, Partially Hydrogenated Soybean Oil, Eggs, Blueberries, Leavenings: (baking soda, sodium aluminum phosphate, aluminum sulfate), Modified Food Starch, Milk Solids, Egg Whites, Salt, Mono Diesters of Fatty Acids, Monoglycerides, Polysorbate 60, Vanilla, Natural & Artificial Flavors.

GOURMET ORANGE CRAZE
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Water, Partially Hydrogenated Soybean Oil, Eggs, Cranberries, Leavenings: (baking soda, sodium aluminum phosphate, aluminum sulfate), Modified Food Starch, Milk Solids, Egg Whites, Salt, Mono Diesters of Fatty Acids, Monoglycerides, Polysorbate 60, Vanilla, Natural & Artificial Flavors.

GOURMET SWEET CORN
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Water, Partially Hydrogenated Soybean Oil, Eggs, Corn Meal, Leavenings: (baking soda, sodium aluminum phosphate, aluminum sulfate), Modified Food Starch, Milk Solids, Egg Whites, Salt, Mono Diesters of Fatty Acids, Monoglycerides, Polysorbate 60, Vanilla, Natural & Artificial Flavors.

GOURMET SUNDROP LEMON & POPPY
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Water, Partially Hydrogenated Soybean Oil, Eggs, Poppy Seeds, Leavenings: (baking soda, sodium aluminum phosphate, aluminum sulfate), Modified Food Starch, Milk Solids, Egg Whites, Salt, Mono Diesters of Fatty Acids, Monoglycerides, Polysorbate 60, Vanilla, Natural & Artificial Flavors.

GOURMET KILLER CAPPUCCINO
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Coffee, Partially Hydrogenated Soybean Oil, Eggs, Chocolate Chips, Leavenings: (baking soda, sodium aluminum phosphate, aluminum sulfate), Modified Food Starch, Milk Solids, Egg Whites, Salt, Mono Diesters of Fatty Acids, Monoglycerides, Polysorbate 60, Vanilla, Natural & Artificial Flavors.

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The Original No-Fat New York Bakery
FANNY'S
FAT FREE FOODS

INGREDIENT STATEMENT

OUTRAGEOUSLY BROWNIE BATTER
Ingredients: Sugar, Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Partially Hydrogenated Soybean Oil, Chocolate Chips: (sugar, partially hydrogenated palm kearnel oil, cocoa, cocoa processed with alkali, dextrose, soy lecithin, emulsifier), Cocoa, Eggs, Corn Syrup, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Vanila, Salt, Natural & Artificial Flavors.

CHOCOLATE COFFEE MADNESS BATTER
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Coffee, Partially Hydrogenated Soybean Oil, Cocoa, Eggs, Chocolate Chips, Leavenings: (baking soda, sodium aluminum phosphate, aluminum sulfate), Modified Food Starch, Milk Solids, Egg Whites, Salt, Mono Diesters of Fatty Acids, Monoglycerides, Polysorbate 60, Vanilla, Natural & Artificial Flavors.

BODACIOUS BANANA BATTER
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Water, Partially Hydrogenated Soybean Oil, Banana Puree, Eggs, Banana Chips, Leavenings: (baking soda, sodium aluminum phosphate, aluminum sulfate), Modified Food Starch, Milk Solids, Egg Whites, Cinnamon, Salt, Mono Diesters of Fatty Acids, Monoglycerides, Polysorbate 60, Vanilla, Natural & Artificial Flavors.

GONE BEZSERK (Chocolate Chip Cookies with Pecans)
Ingredients: Sugar, Enriched Wheat Flour: (unbleached, unbromated, enriched with niacim, reduced iron, thiamin mononitrate, riboflavin), Butter, Margarine, Chocolate Chips: (sugar, partially hydrogenated palm kearnel oil, cocoa, cocoa processed with alkali, dextrose, soy lecithin, emulsifier), Pecans, Eggs, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Salt, Vanilla.

CHOCOLATE DREAM (Chocolate Chocolate Chip Cookies with Pecans)
Ingredients: Sugar, Enriched Wheat Flour: (unbleached, unbromated, enriched with niacim, reduced iron, thiamin mononitrate, riboflavin), Butter, Cocoa, Margarine, Chocolate Chips: (sugar, partially hydrogenated palm kearnel oil, cocoa, cocoa processed with alkali, dextrose, soy lecithin, emulsifier), Pecans, Eggs, Baking Powder: (monocalcium phosphate, sodium aluminum phosphate, sodium bicarbonate), Salt, Vanilla.

GOURMET BLUEBERRY BURST
Ingredients: Enriched Wheat Flour: (unbleached, unbromated, enriched with niacin, reduced iron, thiamin mononitrate, riboflavin), Water, Blueberries, Partially Hydrogenated Soybean Oil, Eggs, Leavenings: (baking soda, sodium aluminum phosphate, aluminum sulfate), Modified Food Starch, Milk Solids, Egg Whites, Salt, Mono Diesters of Fatty Acids, Monoglycerides, Polysorbate 60, Vanilla, Natural & Artificial Flavors.

CREAM CAKE
Ingredients: Sugar, Enriched Wheat Flour: (enriched with niacin, iron, thiamin mononitrate, riboflavin, bleached, unbromated), Partially Hydrogenated Soybean Oil, Eggs, Water, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate), Modified Food Starch, Milk, Egg White, Salt, Vanilla, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), & Natural Flavors.

CHOCOLATE CREAM CAKE
Ingredients: Sugar, Enriched Wheat Flour: (enriched with niacin, iron, thiamin mononitrate, riboflavin, bleached, unbromated), Partially Hydrogenated Soybean Oil, Cocoa, Eggs, Water, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate), Modified Food Starch, Milk, Egg White, Salt, Vanilla, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), & Natural Flavors.

POUND CAKE
Ingredients: Sugar, Enriched Wheat Flour: (enriched with niacin, iron, thiamin mononitrate, riboflavin, bleached, unbromated), Partially Hydrogenated Soybean Oil, Eggs, Water, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate), Milk, Salt, Vanilla, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), & Natural Flavors.

CHOCOLATE POUND CAKE
Ingredients: Sugar, Enriched Wheat Flour: (enriched with niacin, iron, thiamin mononitrate, riboflavin, bleached, unbromated), Partially Hydrogenated Soybean Oil, Cocoa, Eggs, Water, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate), Milk, Salt, Vanilla, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), & Natural Flavors.

SOUR CREAM POUND CAKE
Ingredients: Sugar, Enriched Wheat Flour: (enriched with niacin, iron, thiamin mononitrate, riboflavin, bleached, unbromated), Sour Cream, Partially Hydrogenated Soybean Oil, Eggs, Water, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate), Milk, Salt, Vanilla, Propylene Glycol, Mono & Dietters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), & Natural Flavors.

SOUR CREAM CAKE
Ingredients: Sugar, Enriched Wheat Flour: (malted barley flour, enriched with niacin, iron, thiamin mononitrate, riboflavin, bleached, unbromated), Sour Cream, Partially Hydrogenated Soybean Oil, Eggs, Water, Baking Powder: (sodium bicarbonate, monocalcium phosphate, sodium aluminum phosphate), Modified Food Starch, Milk, Egg White Solids, Ace Sulfate Potassium, Salt, Vanilla, Propylene Glycol, Mono & Dretters of Fatty Acids, Mono & Diglycerides, Partially Hydrogenated Soybean Oil with Lecithin, BHT & Citric Acid (as a preservative), & Natural Flavors.

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Kraft CHEESE

KRAFT FOOD INGREDIENTS

PRODUCT SPECIFICATIONS

KRAFT K FAT FREE CREAM CHEESE KOSHER

Product No. 7351100000
Formula : 201B-2
Effective : 11/09/95

DESCRIPTION:

Kraft Fat Free Cream Cheese has a white to light cream color and a mild lactic acid flavor. It has a medium firm body and a smooth texture. This product is a non fat pasteurized process cream cheese.
This product is Kosher Dairy.

INGREDIENTS:

Protein concentrated skim milk, skim milk, contains less than 2% of sugar*, sodium tripolyphosphate*, pasteurized milk and cream**, carob bean gum, salt, artificial color*, xanthan gum, artificial flavor*, carrageenan, potassium sorbate*, and calcium propionate* as preservatives, cheese culture, vitamin A palmitate.
*Ingredient not found in regular cream cheese
**Trival source of fat

ANALYTICAL:

Moisture, %	73.2 +/- 2.0
Fat, %	1.0 +/- 0.5 (1.5% legal max due to nutritional claim)
Salt, %	0.7 +/- 0.25
pH	5.1 +/- 0.25

MICROBIOLOGICAL:

Standard Plate Count	Less than 10,000/g	FDA/BAM
Coliform	Less than 10/g	FDA/BAM
Yeast	Less than 10/g	FDA/BAM
Mold	Less than 10/g	FDA/BAM

PACKAGING:

31.0 lb. (gross weight) poly-lined, corrugated carton with 60 carton's per pallet. 30 lb. (net weight)

SHIPPING & STORAGE:

Storage should be in clean, dry facilities with storage temp. between 35-40 degrees F. Shipping temperatures from 35-45 degrees F are recommended. The freezing of this product is NOT recommended. Textural and/or functional changes may result.

COMMENTS:

For technical assistance call the Cheese Group at 800-458-TECH (8324).

KFI
KRAFT FOOD INGREDIENTS
TECHNOLOGY GROUP

8300 Horton Cir. Blvd. · Memphis, TN · 38133 · (901) 385-6500 · 800-458-83

PRODUCT NO. 04999-5000
FORMULA:
EFFECTIVE: 11/14/97

BAKER'S CHEESECAKE FILLING MIX

PRODUCT: Baker's Cheese Cake Filling Mix

DESCRIPTION:
Cream-colored powdered mixture that hydrates into a creamy mass characteristic of cheese cake in flavor and texture.

INGREDIENTS:
Sugar, Baker's Cheese (skim milk, cultures, lactic acid), Buttermilk, Partially Hydrogenated Palm Kernel Oil, Modified Tapioca Starch, Whey, Sodium Phosphates, Corn Syrup Solids, Sodium Caseinate, Salt, Glycerol Monostearate, Artificial Flavor, BHA (preserves freshness), Yellow 5, Yellow 6.

PHYSICAL CHARACTERISTICS:

Appearance:	Uniform cream-colored fine powder
Granulation:	99.0% Through a U.S. #40 Screen
Bulk Density:	0.72 g/cc ± 0.2
Hydrated Texture:	Smooth and creamy with good body
Flavor:	Moderately sweet, dairy fresh creamy taste

CHEMICAL SPECIFICATION:

Moisture:	4.0% maximum
Packaging:	75 lb polylined multiwall bag
Storage	Store on pallets or dunnage, in odor-free area, out of sunlight, away from walls. Recommended temperature and humidity: 70 ± 5°F; 60% RH maximum
Shelf Life:	18 months under ideal storage conditions.

Kraft® Processed Specialty Cheese

Processed Specialty Cheeses are replacements for traditional standard-of-identity cheese products. These cheeses provide comparable flavor and functionality, with the added benefit of cost optimization. Our Processed Specialty Cheeses give you a variety of cheese solutions that deliver the desired characteristics utilizing traditional manufacturing procedures and a broader range of ingredients.

The natural cheeses incorporated in each specialty cheese product are critical in achieving the desired characteristics of the finished product. Fat and protein from other sources are also utilized to achieve these characteristics at the lowest possible cost.

Product Types

Blends

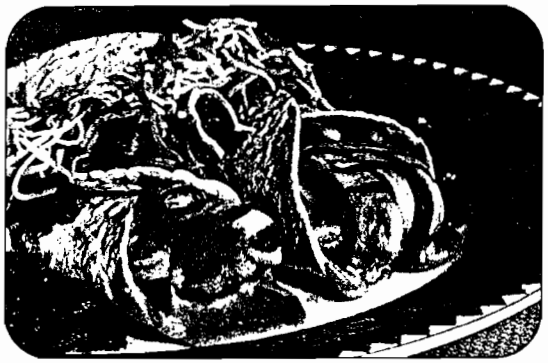
- Designed for one-for-one replacements for natural or process cheese
- Available in American, Cheddar, and Italian flavor profiles
- Melt-restricted versions available
- Designed for cost optimization

Sample Ingredient Statement
American Cheese (milk, cheese culture, salt, enzymes), Water, Skim Milk, Partially Hydrogenated Soybean Oil, Milk Protein Concentrate, Sodium Phosphate, Salt, Oleoresin Paprika, Annatto (color)

Bases

- Designed for lower-than-traditional usage levels
- High impact cheddar flavor profiles
- Lower usage levels provide cost-efficient delivery of cheese flavor
- Designed for maximum cost optimization

Sample Ingredient Statement
Cheddar Cheese (milk, cheese culture, salt, enzymes), Water, Enzyme-Modified Cheese (milk, water, milk-fat, sodium phosphate, cheese culture, salt, enzymes, vitamin A palmitate), Milk Protein Concentrate, Partially Hydrogenated Soybean Oil, Sodium Phosphate. Contains less than 2% of Salt, Lactic Acid, Sorbic Acid as a preservative, Sodium Alginate, Oleoresin Paprika, Annatto (color).



Applications

- Sauces/Spreads
- Soups
- Fillings
- Frozen Entrées/ Vegetable Side Dishes
- Meat/Poultry
- Baked Goods
- Hors d'oeuvres
- Enrobed Sandwiches
- Microwaveable Products
- Fried Appetizers

KRAFT
Kraft Food Ingredients

Formulation Suggestion:

SEASHELL PASTA AND CHEESE SAUCE

Pasteurized Process Cheese Spread Blend, PN 83219	23.58%
Water	44.21%
Heavy Cream	28.76%
Modified Food Starch	2.36%
Salt	0.68%
Granulated Garlic	0.37%
Cayenne Pepper	0.04%
TOTAL	100.00%

- Dice the Cheese Spread Blend into one-half-inch pieces
- Combine water, cream, and starch; bring to a boil.
- Lower heat and add Cheese Spread Blend, stirring until melted and smooth.
- Blend in remaining ingredients.

FMC Corporation Product Manuals

A. Phosphates Help Make Dairy Products Better
B. Food Phosphates
C. Astaris – Disodium Phosphate

Food Phosphates

chemistry,
nomenclature,
and
general functions

FMC and food phosphates

Phosphates are functional food additives with widely diverse uses.

They can be used to buffer, sequester metal ions, and increase the ionic strength of solutions. They can be used to react with proteins in a variety of ways, including emulsification enhancing in oil-water-protein systems. They can also be used as leavening acids and as nutritional supplements. In short, phosphates are essential additives in a great number of processed foods made today, including meat, poultry, seafood, dairy products, baked goods, and potato products.

Since 1948, FMC has been supplying these important additives to the food industry. We are a back-integrated producer. We mine our own phosphate shale, silica, and coal, and manufacture our own coke. Our elemental phosphorus plant is the largest in the world. From elemental phosphorus we make food grade phosphoric acid and a full line of food grade sodium, potassium, and calcium phosphates.

We produce food phosphates and phosphoric acid meeting Food Chemicals Codex quality specifications at our plants in Carteret, NJ; Buffalo, NY; Lawrence, KS; and Newark, CA. And our phosphates are available through our network of distribution centers strategically located in the major business centers of the food industry. Whenever and wherever you need them, FMC food phosphates can be delivered to you rapidly and economically.

As a complement to our manufacturing and distribution resources, our food research and development group in Princeton, NJ, is also an important resource for our customers. Our Technical Specialists with their in-depth knowledge of phosphorus chemistry can help solve customer problems in the food industry and develop new uses for phosphates in foods.

FMC's technical resources are available by contacting any Industrial Chemicals regional sales office listed at the back of this book, or by calling the Food Phosphates Research Department in Princeton, NJ, at (800) 848-3362.

Phosphate chemistry

Phosphates are salts of phosphoric acid. The two general classes of phosphates are orthophosphates and polyphosphates. The orthophosphates contain a single phosphorus atom while the polyphosphates contain two or more phosphorus atoms.

Orthophosphates are made by partially or fully neutralizing phosphoric acid with an alkali source. This results in replacing one or more of the three available hydrogen atoms on phosphoric acid with alkali metal ions.

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Monobasic orthophosphates have one hydrogen atom replaced with an alkali metal. **Dibasic** orthophosphates have two hydrogen atoms replaced. **Tribasic** orthophosphates have all three hydrogen atoms replaced.

Orthophosphates may be manufactured with sodium, potassium, or calcium as the element substituted for the hydrogen atom. The monobasic orthophosphates have acidic properties, while di-and tribasic orthophosphates exhibit alkaline properties.

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Polyphosphates are made by heating mixtures of orthophosphates to high temperatures where they condense into phosphate chains.

Pyrophosphate is the simplest polyphosphate and contains two phosphorus atoms.

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Tripolyphosphate contains three phosphorus atoms. Both pyro-and tripolyphosphate are crystalline solids, while sodium polyphosphates with chain lengths greater than three phosphorus atoms are not crystalline, but amorphous products, commonly called **"glassy" phosphates.** There are actually three commercial types of glassy phosphates which contain averages of 6, 13, and 21 phosphorus atoms per molecule. Under existing FDA regulations the official designation for the glassy phosphates for labeling purposes is "sodium polyphosphates, glassy."

The crystalline polyphosphates are fully neutralized (contain no hydrogen atoms) and behave as bases, except for the acidic form of pyrophosphate, known as sodium acid pyrophosphate, which has two hydrogen atoms remaining.

Polyphosphates are generally available only in the sodium form. However, two polyphosphates are available with potassium substituted for the sodium. These are the fully neutralized form of pyrophosphate and tripolyphosphate. Phosphates perform three basic chemical functions: they control pH by buffering; they sequester metal ions; and they provide polyvalent anions to increase the ionic strengths of solutions.

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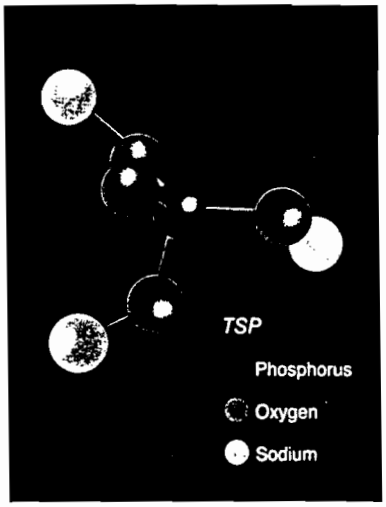
Buffering is the ability to maintain a constant pH even when components of a different pH are added to the system. The orthophosphates are the best buffers. Of the polyphosphates, buffering capacity is greatest for pyrophosphate, and decreases with increasing chain length.

• • • • •

Sequestering is the process of tying up metal ions in solution so that the ions cannot participate in chemical reactions. Long chain polyphosphates (particularly the glassy phosphates), are the best sequestering agents for hardness metal ions such as calcium and magnesium. Polyphosphate sequestering efficiency for calcium

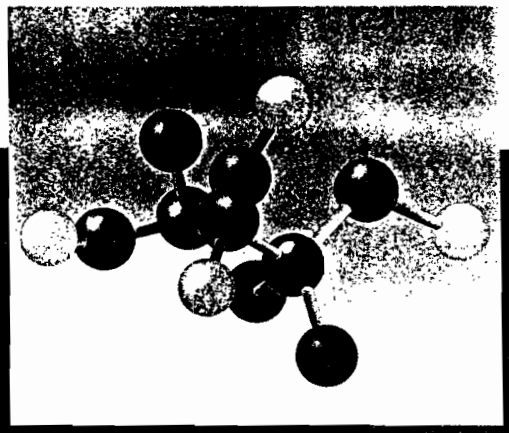


and magnesium increases as pH increases. Short chain polyphosphates (especially pyrophosphates) are best for sequestering heavy metal ions such as iron and copper. Sequestering efficiency of polyphosphates for heavy metal ions decreases as pH increases. Orthophosphates react with metal ions to form precipitates.

• • • • •

Polyvalent anions are ions that have more than one negative charge. All phosphates provide polyvalent anions in solution Orthophosphates can have up to three negative charges depending on concentration and pH Polyphosphates, because they are made up of chains of phosphorus atoms, exhibit a much more pronounced polyionic character. This leads to several types of useful effects. For example, polyphosphate ions can attach one end of their chain to a positively charged site on a particle surface, and the rest of the chain can attract water molecules from the surrounding solution. This tends to maintain particles in suspension keeping them separated and surrounded by water. On the other hand, under different conditions, polyphosphates can bridge two or more positively charged sites and help bind particles together, causing precipitation

FMC



TSPP

Phosphorus

Oxygen

Sodium

The three basic chemical functions of phosphates—pH buffering, sequestration, and polyvalent anionic behavior—provide many beneficial effects in food systems.

These effects are color stabilization, water binding, prevention of rancidity, prevention of coagulation, dry acid for leavening, texture improvement, emulsification, faster curing, nutritional enhancement, and easier processing.

Phosphates provide these benefits by interacting with food components and other additives. This means that the effects depend as much on the food system as upon the actual phosphate used. The following six examples will help to clarify this important concept.

1. Phosphates cannot emulsify a simple mixture of oil and water. However, process cheese which is basically an oil, water and protein mixture can be effectively emulsified by disodium phosphate (DSP). The actual emulsification is carried out by the proteins. That is, the DSP interacts with the proteins to increase their emulsifying capacity.

2. A more obvious example is a leavening system for baking. Acid phosphates are used in many leavening applications, but by themselves acid phosphates do not have any leavening effect. They must be combined with sodium bicarbonate. By neutralizing the bicarbonate the acid phosphates cause CO_2 gas to be driven off and leavening to occur.

3. Many phosphates — especially SAPP and STPP — show antioxidant effects in foods, yet phosphates are chemically unreactive toward oxygen. The antioxidant effects are brought about by the sequestering action of phosphates on iron and copper. Iron and copper ions act as oxidation catalysts, and when they are sequestered by phosphates, their catalytic abilities are lost.

4. Phosphates can be used to precipitate proteins during whey processing to allow easier filtering of the lactose solution. In this process the whey and lactose solution is acidified to near the isoelectric point of the whey protein, and a glassy phosphate is added to link the proteins together to hasten their coagulation.

5. In an opposite effect, glassy phosphates can be used to stabilize proteins and thus prevent coagulation. When pasteurized liquid egg products are made, the egg white may begin to coagulate from the heat of pasteurization. Small amounts of glassy phosphates added to the eggs before heat treatment can prevent this.

6. Phosphates such as sodium tripolyphosphate (STPP) provide increased moisture retention in meat, poultry, and seafood. The water-binding effect is brought about by specific interaction between meat proteins and phosphate. The use of STPP prevents the decrease in nutritional value by retaining the soluble proteins, minerals, and vitamins normally lost during rigor.

These examples show that phosphate applications must be considered in the context of the food systems in which they will be used. Because a phosphate exhibits a property such as emulsification in one food, it does not follow that the same phosphate can be used as an emulsifier in another food product.

It should also be kept in mind that phosphates generally provide more than one benefit. Therefore, choosing a phosphate only on the basis of one desired effect is not always the best course of action. For example, an orthophosphate may be chosen because buffering is required. However, a pyrophosphate might be almost as good a buffer, and could provide additional benefits such as oxidation protection.

Other factors to be considered are the physical properties of the phosphates. These affect the way in which phosphates can be applied. For instance, if the phosphate is to be applied as a water solution, its solubility is important, while if it is to be applied dry, its solubility in water is not as important.

This bulletin attempts to describe only the general uses of phosphates in the food industry. The unique properties of phosphates, however, lend themselves to almost unlimited applications — it would take a large book to describe them all. It is hoped that this overview will familiarize the food technologist with the fundamental properties of food phosphates and their modes of action and help guide in the selection of phosphates for use in new and improved food products. To provide specific background, FMC has published the additional bulletins on specific applications listed below:

- Phosphates in meat and poultry
- Phosphates in dairy products
- Phosphates in the baking industry
- Phosphates in the potato industry
- Phosphates in seafood

Phosphate nomenclature

Naming of various phosphates is sometimes a confusing matter, because there are many names for each single compound (monosodium phosphate, for example, has over twenty-five alternate names)

Although many of these names are considered nonstandard or obsolete, occasionally they are found in outdated literature or in translations from other languages.

The following section is designed to bring some order to the subject by allowing the reader to convert a nonstandard one used by FMC in its product line description. The following table is in alphabetical order for easy searching. To use the table, in most cases, it is necessary only to look up the given name in table to find the standard name. For example, in the table:

• • • • •

Under the **reference name** sodium acid phosphate, the **standard name** MSP is given. If there is any doubt as to the meaning of MSP, it is cross-referenced in the table as monosodium phosphate.

• • • • •

Potassium pyrophosphate tetrabasic is shown as TKPP, tetrapotassium pyrophosphate.

The list does not contain every possible name for every phosphate. To do so would make the list repetitious and several times larger. But the list does contain enough names and cross references that a little searching will usually provide a standard identification of the material. If, however, a material cannot be positively identified, it is likely that the name given is either incomplete or erroneous. For instance, the name phosphate of soda is not listed, and a search of the list will not lead to any sure identification. In this case, the name is too general, and identification cannot be made from the information given.

Some products other than standard FMC phosphates and phosphoric acid are included. This is an aid in identifying ammonium, calcium and aluminum phosphates which are sometimes the subject of inquiries by our customers. Fewer names are shown for these non-FMC products, but they can be identified by comparison with corresponding sodium phosphates.

The table contains some trademark names, FMC's and others, to aid in product identification for those customers who ask for such products or their equivalents. If there is a direct FMC equivalent, it is named in the **FMC product** column.

Several entries under FMC product are marked with an asterisk (*). This indicates that, although the product named is not an FMC product, there may be an alternate FMC product that will satisfy the customer's requirements. Specific inquiries about generic or non-FMC products should be referred to Phosphorus Marketing or a Technical Representative for alternate products available from FMC.

Reference name	Standard name or abbreviation	FMC product
Acid orthophosphoric	Phosphoric acid	Yes
Acid phosphoric	Phosphoric acid	Yes
Acid polyphosphoric	PPA	Yes
Acid pyrophosporic	Pyrophosphoric acid	No*
Acid sodium pyrophosphate	SAPP	Yes
Acid superphosphoric	SPA	Yes
Actif-8[1]	SALP/MCP blend (for leavening)	No
Ammonium phosphate monobasic	MAP	No
Ammonium phosphate dibasic	DAP	No
Anhydrous monocalcium phosphate	MCP-Anhydrous	No
BL-60[1]	SALP/Ammonium Sulfate blend (for leavening)	No
B.P. PYRO[1]	SAPP	Yes
Basic potassium pyrophosphate	TKPP	Yes
Basic sodium pyrophosphate	TSPP	Yes
Brifisol[2] D510	STPP/SHMP	Yes
Brifisol[2] 512	Instantized STPP/Poly Glassy blend	No*
Brifisol[2] 414	Pyro/Poly Glassy blend	No*
Calcium acid phosphate	MCP	Yes
Calcium biphosphate	MCP	Yes
Calcium phosphate dibasic	DCP	Yes
Calcium phosphate monobasic	MCP	Yes

[1] Trademark – Rhône-Poulenc

[2] Trademark – Joh. A Benckiser GmbH

Reference name	Standard name or abbreviation	FMC product
Calcium phosphate tribasic	TCP	Yes
Calcium pyrophosphate	Calcium pyrophosphate	No
Calgon[6]	SHMP	Hexaphos[4]
Crystalline disodium phosphate	DSP duohydrate	Yes
Crystalline trisodium phosphate	TSPX	Yes
Curacel[3]	SAPP (for sausage)	Yes
Curafos[1]	STPP	Yes
Curafos[1] Formula 11-2, 22-4	STPP/SHMP blend	Yes
Curavis[1] Formula 250, Formula 350	STPP/SHMP/SAPP blend	No*
Diammonium phosphate	DAP	No
Dibasic potassium phosphate	DKP	Yes
Dibasic sodium phosphate	DSP	Yes
Dibasic sodium pyrophosphate	SAPP	Yes
Dicalcium phosphate	DCP	Yes
Dipotassium hydrogen phosphate	DKP	Yes
Dipotassium phosphate	DKP	Yes
Disodium dihydrogen pyrophosphate	SAPP	Yes
Disodium hydrogen phosphate	DSP	Yes
Disodium phosphate	DSP	Yes
Disodium phosphate duohydrate	DSP duohydrate	Yes
Disodium pyrophosphate	SAPP	Yes
Donut Pyro[1]	SAPP	Yes
Fish-Plus[2]	Polyphosphate/ Potassium Sorbate/ Citric Acid blend	No
FOS-6[3]	STPP/SHMP blend (for meat)	Yes
Freez-Gard[1] Formula FP-19	STPP	Yes
Freez-Gard[1] Formula FP-88E	SHMP/NaCl/Sodium Erythorbate blend	No
Glass H[4]	SHMP-long chain	Yes
Glassy sodium phosphate	SHMP	Yes
Graham's salt	SHMP	Yes
Hexaphos[4]	SHMP – Medium chain	Yes
IMP	Insoluble sodium metaphosphate	No
KTPP	Potassium tripolyphosphate	Yes
Kasal	SALP	No
Kena[1] Formula FP-28	STPP/SHMP Blend	Yes
Levair[1]	SALP	No
Levn-Lite[5]	SALP	No
MAP	Monoammonium phosphate	No
MCP	Monocalcium phosphate	Yes
MKP	Monopotassium phosphate	Yes
MSP	Monosodium phosphate	Yes
Maddrell's salt	Insoluble sodium metaphosphate	No
Monoammonium phosphate	MAP	No
Monobasic potassium phosphate	MKP	Yes
Monobasic sodium phosphate	MSP	Yes
Monocalcium phosphate	MCP	Yes
Monopotassium dihydrogen phosphate	MKP	Yes
Monopotassium phosphate	MKP	Yes
Monosodium dihydrogen phosphate	MSP	Yes
Monosodium phosphate	MSP	Yes
Monosodium phosphate crystalline	MSP monohydrate	Yes
Monosodium phosphate hydrate	MSP monohydrate	Yes
90/10 Blend	STPP/SHMP blend	Yes
Nutrifos[5]	STPP	Yes
Nutrifos[5] B-90	STPP/SHMP blend	Yes
Orthophosphoric acid	Phosphoric acid	Yes
Pan-O-Lite[5]	SALP	No
Perfection[1]	SAPP	Yes*
Phosphoric acid	Phosphoric acid	Yes
Potassium dihydrogen phosphate	MKP	Yes
Potassium diphosphate	TKPP	Yes
Potassium monohydrogen phosphate	DKP	Yes
Potassium phosphate dibasic	DKP	Yes
Potassium phosphate monobasic	MKP	Yes
Potassium phosphate tribasic	TKP	Yes

[1] Trademark – Rhône-Poulenc

[2] Trademark – Benckiser-Knapsack GmbH

[3] Trademark – Griffith Laboratories, U.S.A., Inc.

[4] Trademark – FMC Corporation

[5] Trademark – Monsanto Company

[6] Trademark – Merck & Co.

Reference name	Standard name or abbreviation	FMC product
Potassium pyrophosphate tetrabasic	TKPP	Yes
Potassium tripolyphosphate	KTPP	Yes
Py-ran[5]	MCP-Anhydrous	No
RD-1	SAPP 22	Yes
Regent 12xx[1]	MCP	Yes
SALP	Sodium aluminium phosphate	No
SAPP	Sodium acid pyrophosphate	Yes
SHMP	Sodium hexametaphosphate	Yes
STPP	Sodium tripolyphosphate	Yes
Sodaphos[4]	SHMP-Short Chain	Yes
Sodium acid phosphate	MSP	Yes
Sodium acid pyrophosphate	SAPP	Yes
Sodium aluminium phosphate	SALP	No
Sodium dihydrogen phosphate	MSP	Yes
Sodium diphosphate	TSPP	Yes
Sodium hexametaphosphate	SHMP	Yes
Sodium monohydrogen phosphate	DSP	Yes
Sodium phosphate dibasic	DSP	Yes
Sodium phosphate glass	SHMP	Yes
Sodium phosphate monobasic	MSP	Yes
Sodium phosphate tribasic	TSP	Yes
Sodium polyphosphate, glassy	SHMP	Yes
Sodium pyrophosphate tetrabasic	TSPP	Yes
Sodium tetrametaphosphate	Sodium tetrametaphosphate	Sodaphos[4]
Sodium triphosphate	STPP	Yes
Sodium tripolyphosphate	STPP	Yes
SQ Phosphate	SHMP	Sodaphos[4]
Stabil-9[5]	SALP/MCP Blend (for leavening)	No
TCP	Tricalcium phosphate	Yes
TKP	Tripotassium phosphate	Yes
TKPP	Tetrapotassium pyrophosphate	Yes
TMP-65	Sodium polyphosphate (for bacon)	Yes
TSP	Trisodium phosphate	Yes
TSPP	Tetrasodium pyrophosphate	Yes
Taterfos[1]	SAPP	Yes
Tetrapotassium pyrophosphate	TKPP	Yes
Tetrasodium pyrophosphate	TSPP	Yes
Tribasic potassium phosphate	TKP	Yes
Tribasic sodium phosphate	TSP	Yes
Tricalcium phosphate	TCP	Yes
Tripotassium phosphate	TKP	Yes
Trisodium phosphate	TSP	Yes
Trisodium phosphate crystals	TSPX	Yes
Trisodium phosphate dodecahydrate	TSPX	Yes
V-90[1]	MCP-Anhydrous	No
Victor Cream[1]	SAPP	Yes*
Vitafos	SHMP	Hexaphos[4]

[1] Tradernark – Rhône-Poulenc

[4] Tradernark – FMC Corporation

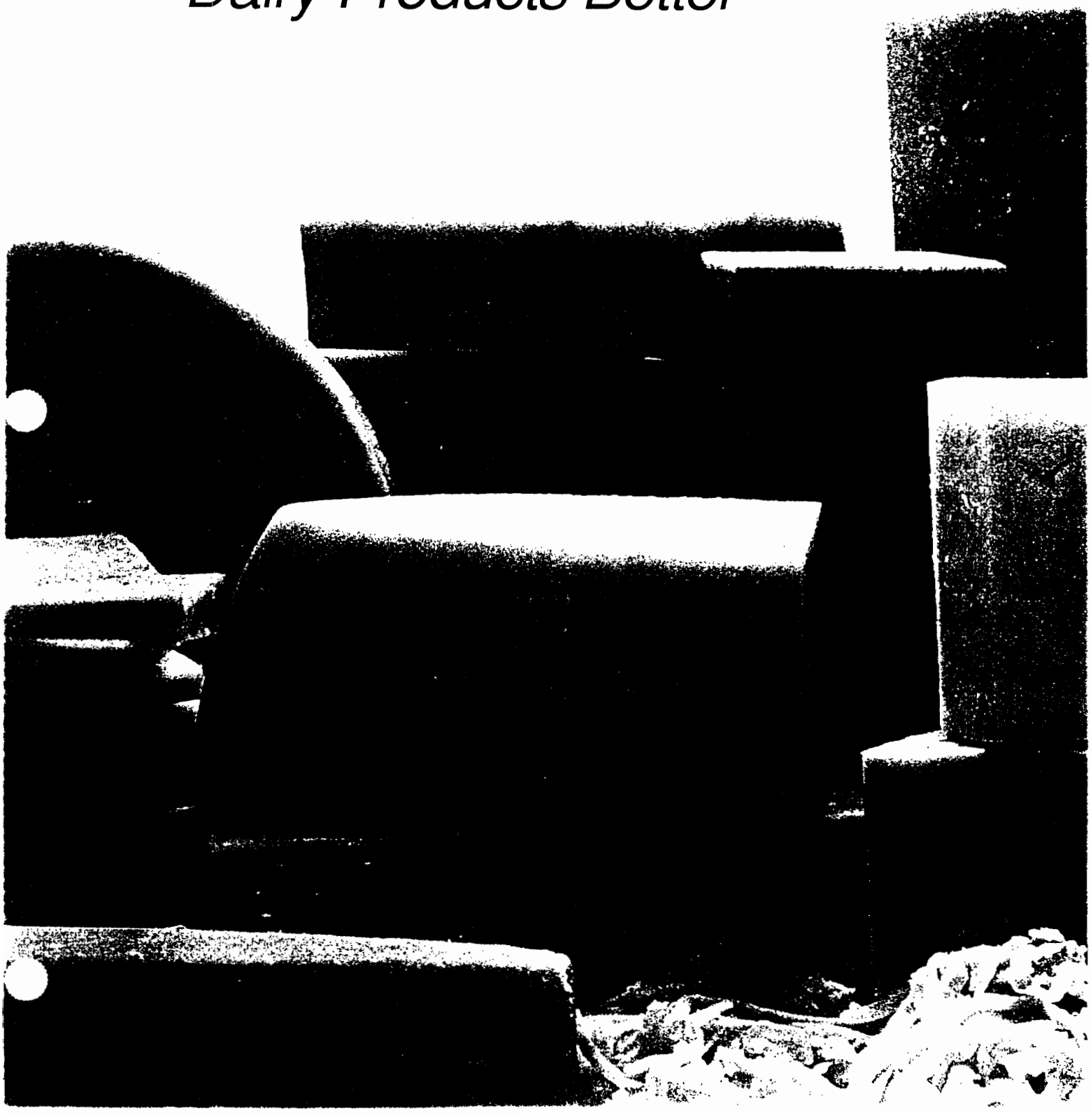
[5] Tradernark – Monsanto Company

FMC

FMC Corporation
Food Phosphates Marketing
2000 Market Street
'adelphia PA 19103

FMC

Phosphates Help Make Dairy Products Better



FMC and food phosphates

Phosphates are functional food additives with a wide range of applications. They can be used to buffer, to sequester metal ions, and to increase the ionic strength of a solution.

They enhance emulsification of oil/water/protein suspensions, and react with proteins in a variety of ways that may help to stabilize or accelerate a given process. They add to the shelf life and attractiveness of processed foods, and are themselves essential additives in a great number of processed foods, including meat, poultry, seafood, dairy products, baked goods, and potato products.

Manufacturing

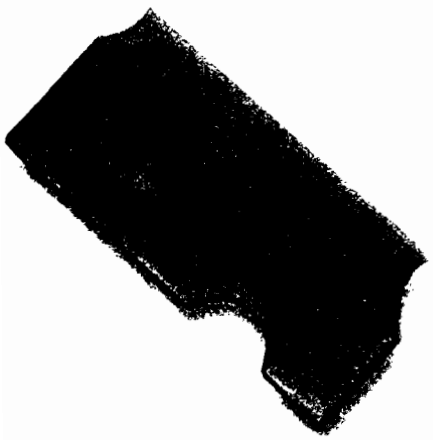
FMC has been supplying these important additives to the food industry since 1948. We are a back-integrated producer: we mine our own phosphate shale, silica, and coal, and manufacture our own coke. Our elemental phosphorus plant is the largest in the world. From elemental phosphorus we make food-grade phosphoric acid and a full line of sodium, potassium, and calcium phosphates.

Our plants in Buffalo NY, Carteret NJ, Lawrence KS, and Newark CA produce food phosphates meeting or exceeding the Food Chemicals Codex quality specifications. With our network of distribution centers located in the major business centers of the food industry, we can deliver FMC phosphates to you whenever and wherever you need them.

Technical Service

As a complement to our manufacturing and distribution resources, our research and development group in Princeton NJ provides additional services to our customers.

Our technical specialists apply their in-depth understanding of phosphorus chemistry to solving customer problems with phosphate formulations and processes. In addition, they are



actively researching new applications of phosphates in the food industry.

Product information and availability may be obtained by contacting any Chemical Products Group sales office listed at the back of this book. The Technical Service toll-free number is 1-800-848-3362.

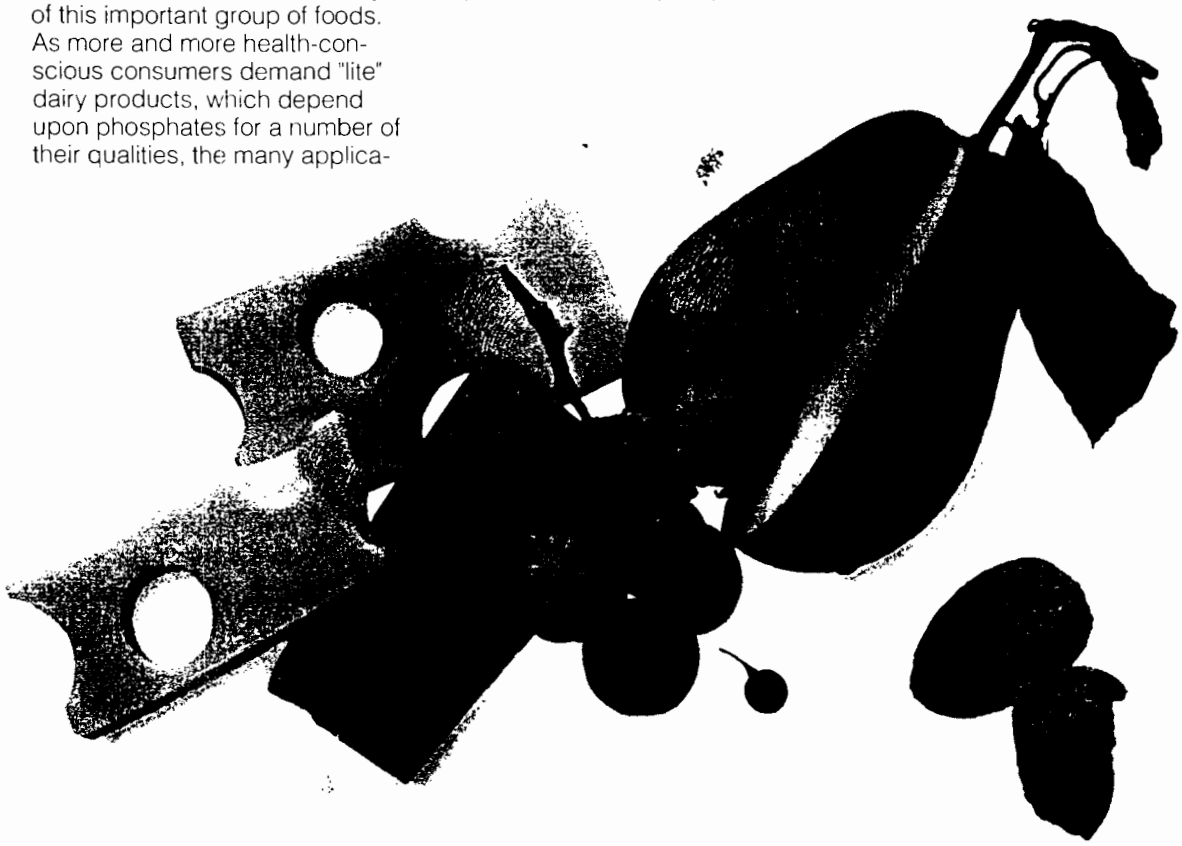
Product Application

Today hundreds of different products are produced from milk, and dairy analogues comprise a similarly large and growing industry. Food phosphates play an important role in dairy foods processing by making better products more economically. Food phosphates can be used to thicken, buffer, stabilize, and improve texture, as well as to control coagulation and gelling. From process cheese to instant puddings, phosphates enhance the taste, shelf life, and diversity of this important group of foods. As more and more health-conscious consumers demand "lite" dairy products, which depend upon phosphates for a number of their qualities, the many applications of food phosphates in the dairy industry will continue to diversify.

Nomenclature

The phosphates commonly used as food additives are sodium, potassium, and calcium salts of phosphoric acid. The two general classes of phosphates are orthophosphates and polyphosphates. The orthophosphates contain a single phosphorus atom while the polyphosphates contain two or more phosphorus atoms. The orthophosphates are termed monobasic, dibasic, or tribasic (as in monosodium phosphate, disodium phosphate, and trisodium phosphate). Pyrophosphate is the simplest polyphosphate unit, with two phosphorus atoms, while tripolyphosphate contains three phosphorus atoms. Longer-chain polyphosphates, known collectively as sodium hexametaphosphate, have average chain lengths of 6, 13, and 21. The corresponding FMC products are known as Sodaphos®, Hexaphos®, and Glass H®. FMC manufactures a complete line of sodium, potassium, and calcium salts for the many applications of food phosphates in dairy products.

FMC has been supplying food phosphates since 1948



Functions

Phosphates influence the properties of dairy products through three basic mechanisms:
(1) calcium complexing,
(2) pH modification, and
(3) direct interaction with casein, the principal protein of milk. A particular phosphate might perform all three functions, interacting both with the dairy formulation and with other phosphate additives.

Phosphates can influence the properties of dairy products by calcium complexing, pH modification, and direct interaction with casein.

Although the chemistry of phosphate additives is thus quite complex, a few general principles can be stated.

- The dibasic and tribasic phosphates are most often used as alkaline buffers, while monobasic phosphate provides acidity.
- Sodium hexametaphosphate (SHMP) is used to inhibit coagulation.
- Tetrasodium pyrophosphate (TSPP) promotes coagulation.
- Disodium phosphate (DSP) interacts with milk protein to promote emulsification. At room temperature it accelerates coagulation; at high temperatures it prevents coagulation.
- Monocalcium phosphate (MCP) adds firmness to gels by contributing calcium.
- Polyphosphates (SHMP) have a polyionic character, which can aid in maintaining a suspension or can accelerate precipitation.

Calcium Complexing

The affinity of phosphates for calcium directly influences the emulsification, coagulation, and heat stabilization properties of dairy products. These properties are affected by the solubility of the calcium phosphate complex, which is dependent on the chain length of the phosphate. Sodium and potassium orthophosphates and pyrophosphates generally form insoluble calcium phosphate-protein complexes. As a result, these phosphates generally destabilize the liquid phase and accelerate coagulation. Milk coagulates almost instantly when TSPP is added. In contrast, polyphosphates, such as SHMP, form soluble calcium phosphate-protein complexes. This action helps stabilize protein dispersions.

pH Modification

A wide range of phosphates are available to increase, decrease, or buffer the pH of dairy systems.

Orthophosphates are used to buffer the pH of heat-processed products such as coffee whiteners, ultra-high temperature (UHT) beverages and shelf-stable beverages. Acidic orthophosphates such as monosodium phosphate (MSP) effectively emulsify and acidify cheese sauces. Alkaline orthophosphates increase the pH in process cheese, providing a smooth, meltable product. The pH values of the phosphates most commonly used in the dairy industry are shown in Table 1.

Protein Interaction

Direct interaction with milk proteins is the most important mechanism by which phosphates influence dairy systems. In milk and milk products, the fat and the casein proteins are present as a colloidal suspension. In process cheese manufacturing, phosphates solubilize casein proteins to enhance their emulsification properties. Phosphates also play an important role in protein dispersion and stabilization of imitation dairy products made with soy proteins or sodium caseinate.

Applications

Process Cheese

Process cheese products are produced from natural cheeses, salt, water, and emulsifying salts. They are classified into three categories based on U.S. Food and Drug Administration Standards of Identity: pasteurized process cheese, pasteurized process cheese foods, and pasteurized process cheese spreads (Table 2). These products differ in their fat and moisture contents, but for our purposes they may be considered to be similar.

Phosphates are the most widely used and the most cost-effective emulsifying salts. Although Federal Standards allow a maximum of 3% emulsifying salts in process cheese, phosphates provide optimal benefits at the 2% level.

The most commonly used salts are disodium phosphate duohydrate (DSP DUO) and trisodium phosphate dodecahydrate (TSPX, typically known as trisodium phosphate crystals). These alkaline orthophosphate salts have a weak affinity for calcium and produce soft, meltable cheese. They are used to produce slices, loaves and cheese foods.

Polyphosphates such as TSPP, sodium tripolyphosphate (STPP), and SHMP bind calcium more strongly, resulting in cheeses that are firmer and non-melting. These phosphates are preferred for cheese spreads.

In the manufacturing of cheese powder, a slurry containing cheese, water, coloring, and phosphate is pasteurized,

Phosphates can emulsify process cheeses, set instant puddings, stabilize heat-processed dairy products, and aid in the formulation of low-fat products

homogenized, and spray-dried Disodium phosphate (DSP) is dissolved in the water prior to forming the slurry. Typical levels are 1.5–2.5% of the weight of the cheese, depending on the age and variety.

Instant Puddings

Instant pudding mixes contain starch, sugar, flavoring, and phosphates. When added to cold milk, the phosphates in the mix cause the milk protein to precipitate and produce a firm gel.

The preferred setting system is a combination of TSPP and DSP. The pyrophosphate TSPP reacts with the milk calcium to form a gel, while the orthophosphate DSP accelerates the rate of setting. Typically, the level of phosphates in the dry mix ranges from 2.5–3.0%.

Phosphates can also be used as setting salts for instant cheesecake fillings. TSPP and monocalcium phosphate monohydrate (MCPM) are recommended to produce a firm-bodied cheesecake with a creamy texture. The additional calcium from MCPM increases the firmness of the gel. The level of phosphates in the dry mix is about 1.5% by weight.

Milk Products

Phosphates are used to buffer and stabilize milk proteins, which undergo heat treatment during processing. DSP and the SHMPs (Sodaphos, Hexaphos, and Glass H) at levels between 0.1–0.5% prevent precipitation and gelation in UHT beverages. Products in this category include

microwavable gourmet coffees, fruit- and chocolate-flavored milk drinks, and flavored coffee creamers. DSP at the 0.02–0.1% level is added to evaporated and condensed milk to prevent gelation during storage. In the production of low-fat dry milk powder, the use of 2% DSP (based on solids) ensures a uniform dispersion when the milk is reconstituted. DSP minimizes the denaturation of casein that may occur during drying.

Imitation Dairy Products

Imitation dairy products contain vegetable oils and soy, whey, or casein proteins. Demand for these products is growing because of their low cholesterol content.

Coffee whiteners made with vegetable oils and milk proteins contain dipotassium phosphate (DKP) or DSP to prevent oil droplets from coalescing and protein from curdling in hot coffee. Phosphate levels in powdered whiteners range from 1.0–2.0%; liquid products contain 0.1–1.0%.

Phosphates perform a similar function in imitation process cheeses as they do in their dairy counterparts. The levels of DSP DUO and TSPX may vary, depending on the raw materials in the formulation.

In whipped toppings, phosphates enable the protein to form a stable foam, thus providing stiffening and preventing syneresis (weeping). The phosphates used in these products are DSP, DKP, and TSPP.

Low-Sodium Products

Reduction of sodium content can be achieved by partial substitution of sodium chloride with potassium chloride and the use of potassium phosphates instead of sodium phosphates. FMC produces a complete line of potassium phosphates for formulating a wide variety of low-sodium products.

Low-Fat, Low-Cholesterol Products

In certain products, milk and vegetable proteins are used to partially replace the fat. Phosphates aid in maintaining the proper dispersion and stability of these ingredients.

FMC Food Ingredients

In addition to our versatile food phosphates, FMC produces many other food ingredients for the dairy industry. Marine Colloids Division produces carrageenan and konjac flour products. Food and Pharmaceutical Products Division offers the family of Avicel® cellulose gel products for fat replacement and stabilization. Peroxygen Division produces calcium peroxide and Durox® food-grade hydrogen peroxide, while our Alkali Division manufactures and markets sodium carbonate and sodium bicarbonate to the food industry. For more information on any of these products, just call your local sales office.

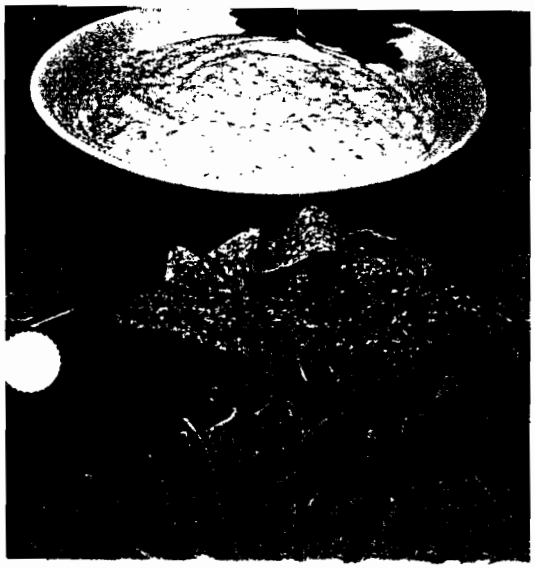
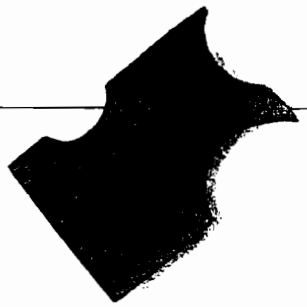


Table 1

pH Values of Phosphates Commonly Used for Dairy Products

Product name	Abbreviation	pH of a 1% solution
Monosodium phosphate	MSP	4.6
Monopotassium phosphate	MKP	4.6
Disodium phosphate	DSP	9.2
Disodium phosphate duohydrate	DSP DUO	9.1
Dipotassium phosphate	DKP	9.3
Trisodium phosphate crystals	TSPX	12.4
Tripotassium phosphate	TKP	12.4
Sodium acid pyrophosphate	SAPP	4.3
Tetrasodium pyrophosphate	TSPP	10.3
Tetrapotassium pyrophosphate	TKPP	10.5
Sodaphos®	SHMP	7.7
Hexaphos®	SHMP	6.9
Glass H®	SHMP	6.3
Sodium tripolyphosphate	STPP	9.7
Potassium tripolyphosphate	KTPP	9.6
Monocalcium phosphate monohydrate	MCPM	3.8 *
Dicalcium phosphate dihydrate	DCPD	7.4 *
Tricalcium phosphate	TCP	7.4 *

*pH, 1% slurry



Government Regulations

Table 2

Standards of Identity for Pasteurized Process Cheese and Related Products*

Type	Ingredients	Fat Content (minimum)	Moisture (maximum)	pH (minimum)
Cheese	Natural cheese, emulsifying salts, water, coloring, other optional ingredients	47% of solids (Swiss, 43%) (Gruyere, 45%)	43% (Colby, 40%) (Swiss, 44%) (Limburger, 51%)	5.3
Cheese food	Natural cheese, emulsifying salts, water, salt, coloring, spices or flavorings, other optional ingredients	23%	44%	5.0
Cheese spread	Natural cheese, emulsifying salts, water, salt, coloring, hydrocolloids (0.8%, max.), sweetening agent, spices or flavorings, other optional ingredients	20%	60%	4.0

*21 Code of Federal Regulations Chapter 1 (4-1-91 Edition)

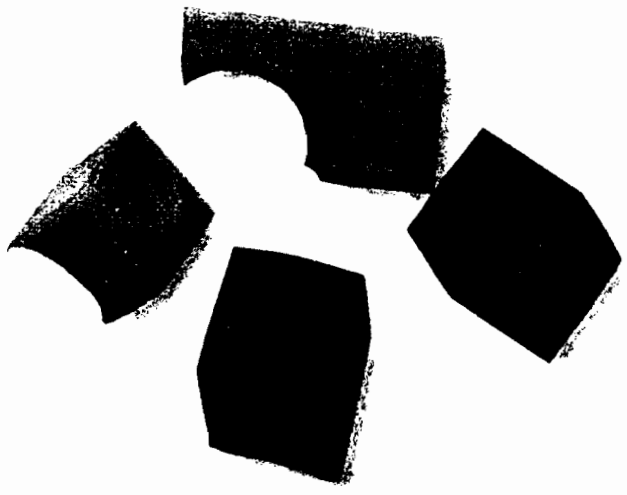


Table 3

Phosphates in Dairy Products

Dairy Product	Phosphate Used	Function	Recommended Phosphate Level (% weight)
Process Cheese			
Melting	DSP DUO, TSPX	emulsifier,	2.0
Non-melting	STPP, SHMP	protein stabilizer	2.0
Cheese Powder	DSP	protein stabilizer	1.5–2.5
Instant Pudding	TSPP, DSP	protein coagulant	2.5–3.0
Cheesecake Filling Mix	TSPP, MCPM	protein coagulant	1.5
UHT Beverage	DSP, SHMP	protein stabilizer	0.1–0.5
Evaporated and Condensed Milk	DSP	protein stabilizer	0.02–0.1
Lowfat Milk Powder	DSP	dispersant	2% max based on solids
Coffee whitener	DKP, TKPP, DSP, STPP	dispersant, protein stabilizer	
Liquid			0.1–1.0
Powder			1.0–2.0
Whipped Toppings	DSP, DKP, TSPP	protein stabilizer	0.02–1.0
Whey Processing	SHMP	protein dispersant	0.1–0.5
Ice Cream, Frozen Dairy Desserts	DSP, TSPP, SHMP	protein stabilizer, emulsifier	0.1–0.2

Technical Service

Our experienced technical staff is available to assist you in your product development efforts. Please call 1-800-848-3362 to obtain prompt and reliable technical service from our phosphate specialists.

The levels and type of phosphate to be used differ greatly depending on the product. FMC can provide the technical expertise to assist you with your formulation changes.

Federal Regulations

FMC food-grade sodium, potassium, and calcium phosphates comply with Food Chemicals Codex specifications and are classified as GRAS (Generally Recognized As Safe) by the U.S. Food and Drug Administration. In pasteurized process cheese and related products, phosphates may be added to a maximum of 3.0% of the weight of the finished product. Lowfat milk may contain up to a maximum of 2.0% phosphates based on the weight of the solids. The amount of phosphates that can be added to most other dairy products is limited to good manufacturing practice. A summary of phosphate functions and sugested use levels in various dairy products is provided in Table 3.

FMC

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Food Phosphates Marketing
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Quality Products. Exceptional Response.

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food hospital

Our commitment to you.

Solutia has been providing the food industry with food phosphates for over 60 years. At Solutia, our goal is to help you obtain the most efficient utilization of phosphate ingredients – by providing you with high-quality phosphates for your specific applications. Our commitment to supply our customers with quality ingredients, service and assistance is ensured by using statistically proven Total Quality Methods and manufacturing resource planning (MRP II) for manufacturing, customer service, research and delivery. When developing and manufacturing food products, it's important to use only the most consistent and effective ingredients. Ingredients coupled with dependable technical assistance make Solutia a leader in the food phosphate industry. Our team of experienced technologists wants to work with you in support of your product development and in support of the use of our ingredients. Solutia is your partner in product development and delivery.

That's our promise to you.

Table of Contents

Phosphates for Every Application

We're Solutia, formerly the chemical businesses of Monsanto Company. For more than 60 years, we've been producing food phosphates that apply to your applications.

Your formulas.

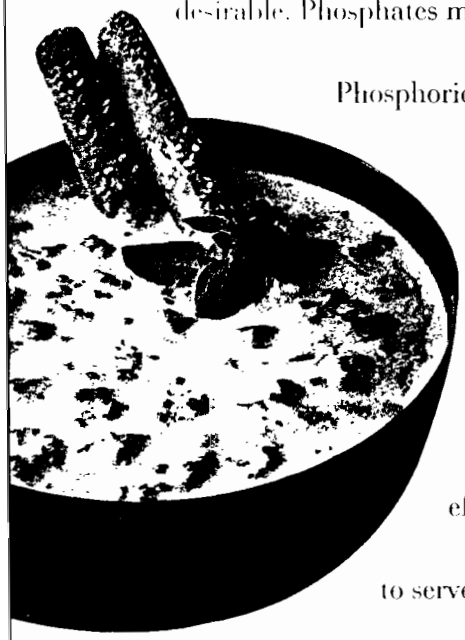
And your manufacturing processes.

We begin by tailoring innovative solutions that fit the specific needs of our customers. Then we design dynamic new products. So whether you use food phosphates in anything from cakes to hams, we're the name to remember for new creative solutions.

SOLUTIA

Phosphates are well-established ingredients for many food products. Their strength and versatility are founded on their multifunctional and diverse properties. Individual phosphates also are capable of providing more than one functionality. The phosphates furnish a means to control many texture, appearance and flavor problems. Baked products leavened with phosphates exhibit excellent texture, color, volume and lightness. In process cheese products, phosphates provide the meltability and smooth mouthfeel that is so desirable. Phosphates make processed meat more juicy and tender.

Phosphoric acid enhances the clean, sparkling flavor of beverages.



Solutia food phosphates meet or exceed the standards established in the Food Chemicals Codex. In addition, specific products meet U.S. Pharmacopeia and/or National Formulary standards for pharmaceutical use. Solutia provides phosphates which are consistent and effective. With these phosphorus-based ingredients comes our commitment to serve your information needs on the functions of phosphates in food. At Solutia, you have direct access to a team of technologists. With Solutia phosphates and know-how, you can achieve even greater quality and profitability for your food products.

Table A – Functions of Solutia Food Phosphates

Function	Phosphate Ingredients	
Acidulant	■ Adipic Acid	■ Pan-O-Lite®
	■ H.T.® Monocalcium Phosphate Monohydrate	■ Phosphoric Acid
	■ Levn-Lite® Sodium Aluminum Phosphate	■ Py-Ran® Anhydrous Monocalcium Phosphate
	■ Monoammonium Phosphate	■ Sodium Acid Pyrophosphate
	■ Monopotassium Phosphate	■ Stabil-9®
	■ Monosodium Phosphate	■ Leverage® Heat Activated Leavener
Absorbent	■ Disodium Phosphate	■ Tricalcium Phosphate
Alkalinity	■ Diammonium Phosphate	■ Nutrifos L-50
	■ Disodium Phosphate	■ Nutrifos SK
	■ Emulsi-Phos® 440, 660 and 990	■ Nutrifos STP Powder
	■ Katch® Fish Phosphate	■ Sodium Potassium Tripolyphosphate
	■ Nutrifos® 088	■ Sodium Tripolyphosphate
	■ Nutrifos BC	■ Tetrapotassium Pyrophosphate
	■ Nutrifos B-75	■ Tetrasodium Pyrophosphate
	■ Nutrifos B-90	■ Trisodium Phosphate
	■ Nutrifos H30	
Buffering Agent	■ Adipic Acid	■ Sodium Acid Pyrophosphate
	■ Diammonium Phosphate	■ Sodium Hexametaphosphate
	■ Disodium Phosphate	■ Sodium Potassium Tripolyphosphate
	■ H.T. Monocalcium Phosphate	■ Sodium Tripolyphosphate
	■ Monoammonium Phosphate	■ Tetrapotassium Pyrophosphate
	■ Monopotassium Phosphate	■ Tetrasodium Pyrophosphate
	■ Monosodium Phosphate	■ Trisodium Phosphate
	■ Phosphoric Acid	
Coagulant	■ Adipic Acid	■ Sodium Potassium Tripolyphosphate
	■ Phosphoric Acid	■ Sodium Tripolyphosphate
	■ Sodium Acid Pyrophosphate	■ Tetrapotassium Pyrophosphate
	■ Sodium Hexametaphosphate	■ Tetrasodium Pyrophosphate
Dispersing Agent	■ Sodium Acid Pyrophosphate	■ Sodium Tripolyphosphate
	■ Sodium Hexametaphosphate	■ Tetrapotassium Pyrophosphate
	■ Sodium Potassium Tripolyphosphate	■ Tetrasodium Pyrophosphate
Emulsifying Agent	■ Disodium Phosphate	■ Sodium Hexametaphosphate
	■ Emulsi-Phos 440, 660 and 990	■ Sodium Potassium Tripolyphosphate
	■ Monopotassium Phosphate	■ Sodium Tripolyphosphate
	■ Monosodium Phosphate	■ Tetrapotassium Pyrophosphate
	■ Sodium Hexametaphosphate	■ Tetrasodium Pyrophosphate
	■ Sodium Acid Pyrophosphate	■ Tetrasodium Phosphate

Table A – Functions of Solutia Food Phosphates

Function	Phosphate Ingredients	
Esterification	■ Sodium Trimetaphosphate	
Flow Conditioner	■ Tricalcium Phosphate	
Leavening Agent	■ Leverage®	■ Stabil-9
	■ Diammonium Phosphate	■ Monoammonium Phosphate
	■ Dicalcium Phosphate Dihydrate	■ Monopotassium Phosphate
	■ H.T. Monocalcium Phosphate Monohydrate	■ Monosodium Phosphate
	■ Levn-Lite Sodium Aluminum Phosphate	■ Py-Ran Anhydrous Monocalcium Phosphate
	■ Pan-O-Lite	■ Sodium Acid Pyrophosphate
Mineral Supplement	■ Dicalcium Phosphate	■ Calcium Pyrophosphate
	■ H.T. Monocalcium Phosphate Monohydrate	■ Tricalcium Phosphate
	■ Mag-nificent® Source of Magnesium	
Nutrient	■ Diammonium Phosphate	■ Phosphoric Acid
	■ Monoammonium Phosphate	■ Mag-nificent
	■ Monopotassium Phosphate	
Protein Modifier	■ Dicalcium Phosphate	■ Nutrifos SK
	■ Disodium Phosphate	■ Nutrifos STP Powder
	■ Emulsi-Phos 440, 660 and 990	■ Py-Ran Anhydrous Monocalcium Phosphate
	■ H.T. Monocalcium Phosphate Monohydrate	■ Sodium Acid Pyrophosphate
	■ Katch Fish Phosphate	■ Sodium Hexametaphosphate
	■ Monosodium Phosphate	■ Sodium Potassium Tripolyphosphate
	■ Nutrifos 088	■ Sodium Tripolyphosphate
	■ Nutrifos B-75	■ Tetrapotassium Pyrophosphate
	■ Nutrifos B-90	■ Tetrasodium Pyrophosphate
	■ Nutrifos H-30	■ Trisodium Phosphate
	■ Nutrifos L-50	
Sequestrant	■ Sodium Acid Pyrophosphate	■ Sodium Tripolyphosphate
	■ Sodium Hexametaphosphate	■ Tetrapotassium Pyrophosphate
	■ Sodium Potassium Tripolyphosphate	■ Tetrasodium Pyrophosphate
Stabilizer	■ Disodium Phosphate	■ Tetrapotassium Pyrophosphate
	■ Sodium Hexametaphosphate	■ Tetrasodium Pyrophosphate
	■ Sodium Potassium Tripolyphosphate	■ Trisodium Phosphate
	■ Sodium Tripolyphosphate	

Bakery Applications of Solutia Phosphates

Solutia food phosphates find many uses in baking:

- Leavening acidulants
- Dough conditioners
- Mineral supplementation
- pH and buffering

The phosphates used include ingredients tailored to meet the home and commercial baker's specific leavening acid requirements. In addition to their role as the most commonly used acidulants for chemical leavening formulas, the phosphates also play an important part in bread and roll production. Food phosphates contribute to bread production directly in dough improvers and yeast foods, as well as indirectly as acidifiers in the production of yeast.

In every baking application, you will find Solutia phosphate ingredients uniformly high in quality and reliable in their functionality. You can depend on Solutia to supply expert advice when you encounter a challenge in formulating or processing.

Leavening

In baking, the phosphates function as leavening acids, which react with sodium bicarbonate, baking soda, to release carbon dioxide gas. The amount of gas and the rate of gas production determine the main effects of leavening. Table B below shows leavening uses of Solutia phosphates.

Exact levels of the phosphates needed to obtain a balanced leavening system can be calculated by use of the Neutralizing Value (NV), defined as the parts of baking soda neutralized by 100 parts of the leavening acid. See "Properties for Solutia Food Phosphates" in Table G on pages 30-31 for the NV of specific phosphates.

Table B – Leavening Applications of Solutia Phosphates

Product	Sodium Bicarbonate (%)	Leavening Acids (To Neutralize)
Baking Powders	30 - 40	H.T. MCP, Py-Ran, SAPP 28, Levn-Lite, Adipic Acid, Leverage
Biscuit Mixes	1.5 - 2.0	Stabil-9, Levn-Lite, SAPP 28
Breading Batter Mixes	0.0 - 2.0	SAPP 40, Levn-Lite, Pan-O-Lite, SAPP 28
Cake Doughnut Mixes	0.5 - 1.0	SAPP 40, SAPP 28, Levn-Lite, Py-Ran, SAPP 26, SAPP 37, SAPP 43, Leverage
Cake Mixes-Angel	1.5 - 2.0	H.T. MCP, Py-Ran, SAPP 40, Levn-Lite
Cake Mixes-Layer	0.6 - 1.0	Levn-Lite, Pan-O-Lite, SAPP, DCPD, Py-Ran, Leverage
Cookie Mixes	0.0 - 0.7	Stabil-9, SAPP RD-1, Levn-Lite
Crackers	0.5 - 1.8	H.T. MCP, Py-Ran, SAPP 28
Frozen Biscuit Doughs	1.5 - 2.0*	Levn-Lite, SAPP 28, SAPP 26, Leverage
Frozen Cake Batter	0.6 - 1.25	Levn-Lite, Pan-O-Lite, SAPP 28, H.T. MCP, DCPD, Leverage
Frozen Pancake Batter	1.7 - 2.2*	Pan-O-Lite, Levn-Lite, DCPD, Leverage
Hush Puppy Mixes	1.5 - 2.0	SAPP 28, SAPP 40, Py-Ran, Stabil-9
Muffins	1.5 - 2.0	Stabil-9, Pan-O-Lite, SAPP 28, DCPD, Leverage
Pancake Mixes	1.5 - 2.0	Pan-O-Lite, Levn-Lite, H.T. MCP, Py-Ran, SAPP 40, SAPP 28
Pizza Mixes	0.3 - 1.2	Pan-O-Lite, Levn-Lite, SAPP 28, DCPD, Leverage
Refrigerated Dough	2.0 - 2.5*	SAPP RD-1, SAPP 26, Levn-Lite, Leverage
Self-Rising Corn Meal	1.5 - 2.0	Py-Ran, Stabil-9, Levn-Lite, H.T. MCP
Self-Rising Flour	1.2 - 1.5	Stabil-9, Py-Ran, SAPP 28
Waffle Mixes	1.5 - 2.0	Pan-O-Lite, Levn-Lite, H.T. MCP, Py-Ran, SAPP 40, SAPP 28, Leverage

* % of solids

Phosphates for the Bakery Industry

SAPP (sodium acid pyrophosphate) leavening acids are supplied in several grades which have different rates of reaction with baking soda. In general, the grades of Solutia SAPP ingredients are designated by a number related to the Dough Rate of Reaction (DRR), which is expressed as the percentage of available carbon dioxide released in 8 minutes under standardized test conditions.

SAPP RD-1 and SAPP 26 are the slowest reacting SAPPs. Their primary use is in products that require a long production cycle, long bench tolerance or long storage life. For refrigerated doughs, the low rates of carbon dioxide gas production provide tolerance to process variation, yet the carbon dioxide is released at the right time to ensure that proper pressure is produced in the container.

SAPP 28 is an all-purpose leavening phosphate. Its delayed gas release is especially suited to institutional and commercial baking of large batches, where extended mixing and forming times are necessary. The acid's reaction rate is stabilized by a special Solutia process. Doughnut applications employ SAPP 28 in combination with faster reacting SAPPs. SAPP 28 is also used in the manufacture of baking powders, either alone or in combination with MCP.

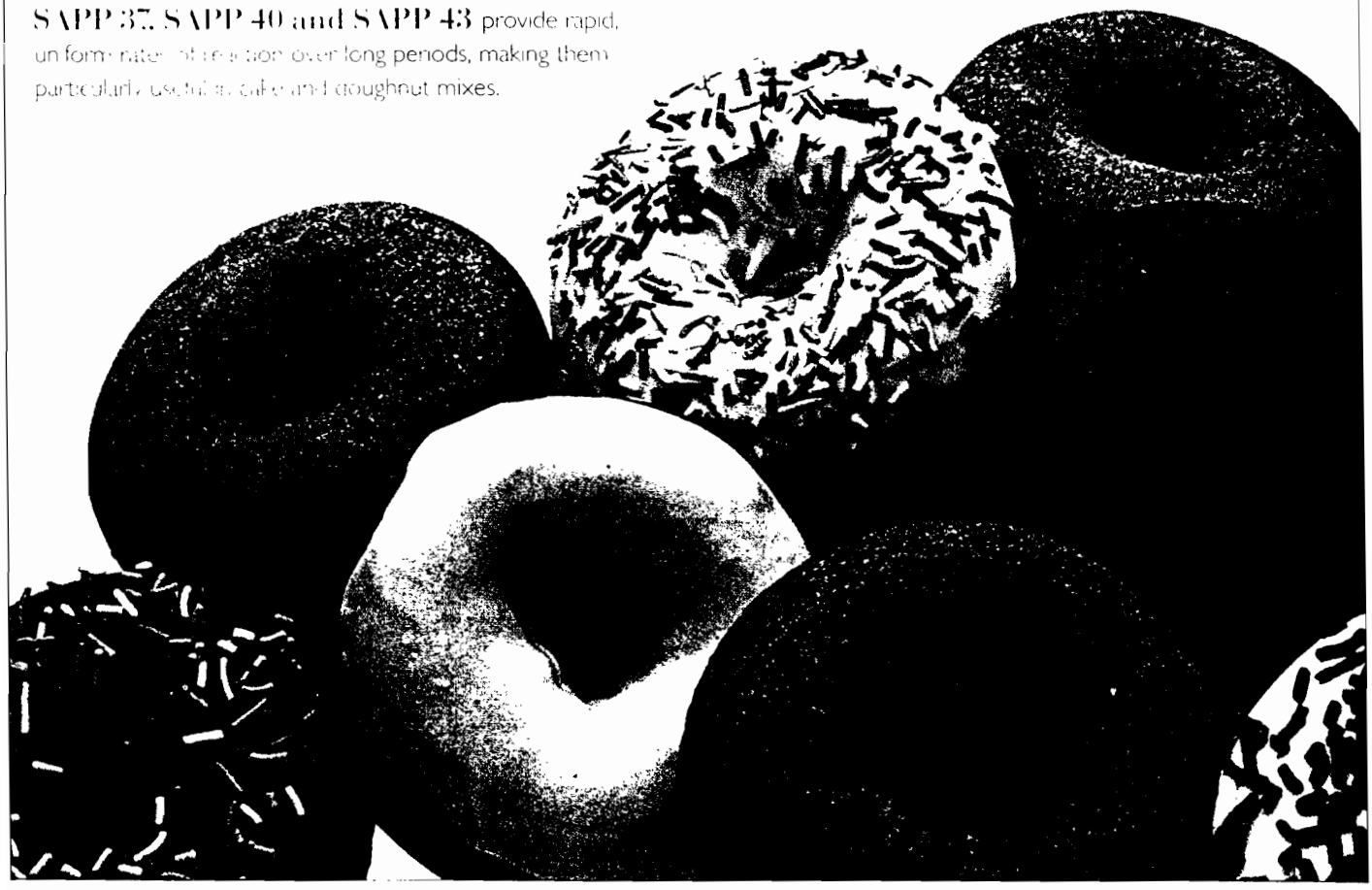
SAPP 37, SAPP 40 and SAPP 43 provide rapid, uniform rates of reaction over long periods, making them particularly useful in cake and doughnut mixes.

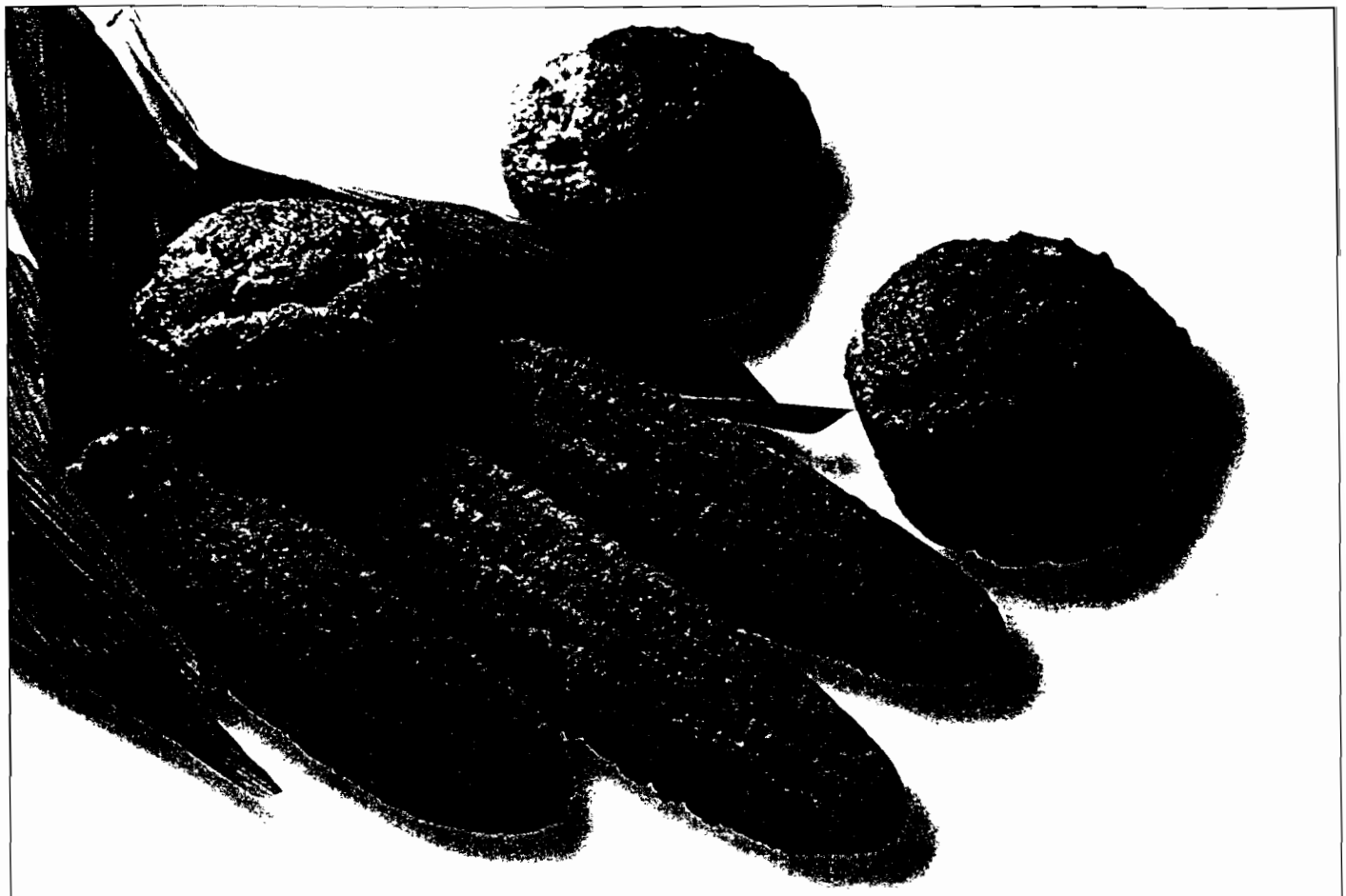
These agents combine well with slower leavening acids to accommodate variation in other ingredients. In a balanced leavening system using any grade of SAPP, the final pH is typically 7.2 to 7.6.

SALP (sodium aluminum phosphate acid blends) offers consistency in leavening rate throughout dough or batter storage and use. It also provides desired batter thickness, baking tolerance, and increased crumb whiteness and resiliency. SALP is an ideal leavening agent for prepared mixes.

Solutia's three SALP products are Levn-Lite®, Stabil-9 and Pan-O-Lite leavening agents.

Levn-Lite® is SALP. Its major leavening action takes place only when the product is heated. Levn-Lite is used in cake, pancake and waffle mixes, where it helps ensure good volume. In cake formulations, it is compatible with high-aerating emulsifiers. Levn-Lite has applications in both wet and refrigerated products and in some commercial baking powders.





Stabil-9® combines SALP with anhydrous monocalcium phosphate for "double action": the early release of carbon dioxide by anhydrous monocalcium phosphate and the heat-triggered release by SALP in the oven. Available in regular and high calcium grades, Stabil-9 is used primarily in self-rising flours and biscuit mixes, where its properties permit long storage life of the dry mix. Furthermore, batters and doughs containing Stabil-9 retain satisfactory leavening action even when held for hours or days in the refrigerator. Stabil-9 gives finer grain to cakes. Other uses include self-rising corn meal and muffin mixes.

Pan-O-Lite®, a blend of SALP and monocalcium phosphate monohydrate, works well in pancake, waffle and cake mixes. It is used in cakes that do not contain high-aerating emulsifiers. Batter made with Pan-O-Lite resists thickening and loss of leavening power during storage under refrigerated or room temperature conditions, so this leavening agent is particularly appropriate for refrigerated pancake batters.

H.T.® MCP (monocalcium phosphate monohydrate) reacts rapidly with baking soda, so it is well suited for use in double-acting baking powders and in products that require double action, such as cake and pancake mixes. MCP's spherical particles make it a free-flowing compound that lends itself to use in phosphated flours.

Py-Ran® (anhydrous monocalcium phosphate) is stabilized by a coating that protects against premature leavening action by slowing dissolution and the subsequent reaction with baking soda. Consequently, Py-Ran has excellent leavening characteristics in self-rising and phosphated flours, self-rising corn meal, cake and pancake mixes, and household baking powder.

DCPD (dicalcium phosphate dihydrate or duohydrate) is useful in bakery products with a high set temperature, such as high sugar cakes. It begins to react with baking soda when the batter or dough temperature rises to about 135°F-140°F.

Adipic Acid is a white crystalline powder that's ideal for multiple food applications. In many food applications, adipic acid is preferred because of its non-hygroscopisity, which means dry products containing adipic acid have a longer storage life under humid conditions.

Leverage (dimagnesium phosphate) is a heat-activated leavening agent that provides no leavening action before baking. It provides a consistent leavening rate for greater control in batters and dough. Leverage produces finished products which are moist and tender.

Other Bakery Applications

Frosting and icing rely upon phosphates for pH adjustment and stabilization. Calcium phosphates are also used in gum based systems to give proper gelling and thickening.

Dough conditioners, also known as dough improvers or yeast foods often include MCP to optimize dough pH and to provide calcium in yeast-raised products. One dough conditioner employs a high level of dicalcium phosphate anhydrous. Monoammonium phosphate in a dough conditioner can buffer the pH and provide nitrogen.

Yeast production sometimes utilizes phosphoric acid to adjust the pH of growth media. Diammonium phosphate, monoammonium phosphate, monopotassium phosphate and dipotassium phosphate are sometimes used to provide nourishment to the yeast.

Breakfast cereals and pasta have shorter cooking times and richer, creamier color with the addition of DSP. Use of DSP can reduce processing time for ready-to-eat cereals. The use of DSP is permitted by the FDA Standards of Identity, found in the CFR Title 21.

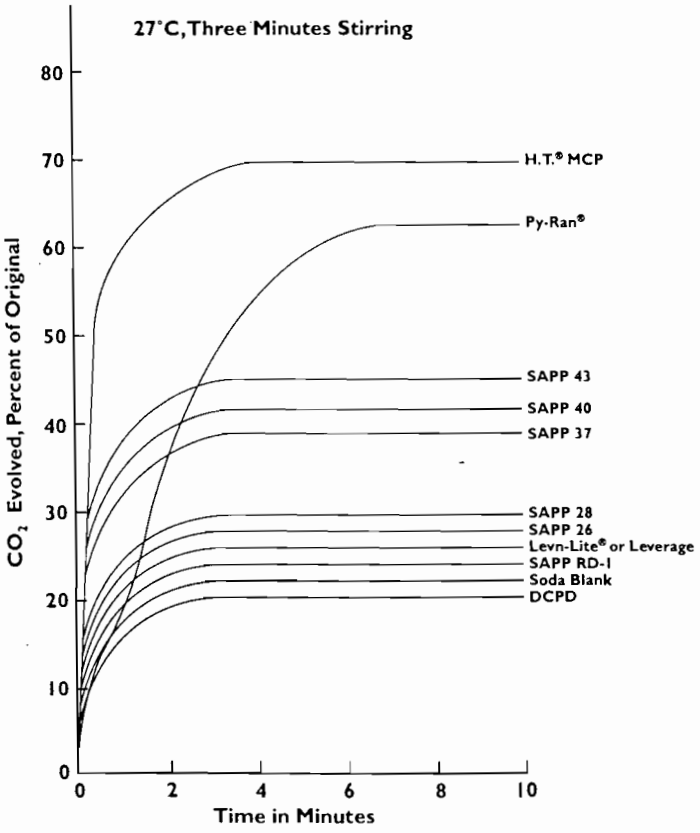
Starches, modified by addition of phosphate groups exhibit several desirable properties, which include resistance to freeze-thaw breakdown, greater clarity, higher water-binding capacity, and high viscosity without gel formation.

Dough Rate of Reaction

The selection of the leavening acid is based upon the rate of release of carbon dioxide in your dough or batter mixture. The rate of leavening action is the key to a successful application. Solutia manufactures and markets a diverse line of leavening acids with varying reaction rates. The baker or formulator can select the right product for their particular "critical zone"... the point in the preparation process where it is desired to have the necessary gas released. The Dough Rate of Reaction test is used as a guide because it shows typical reaction curves for leavening acids.

Figure 1 demonstrates the leavening rates of various leaveners as characterized by the DRR test. The soda blank curve includes all the ingredients minus the leavening acid. These tests were conducted at 27°C with three minutes of stirring. Note that increase in temperature, stir time and other ingredients will impact the final rate of reaction. In general, higher temperatures accelerate the rate of reaction.

Figure 1 – **Typical Dough Rates of Reaction**



Meat, Poultry and Seafood Applications of Solutia Phosphates

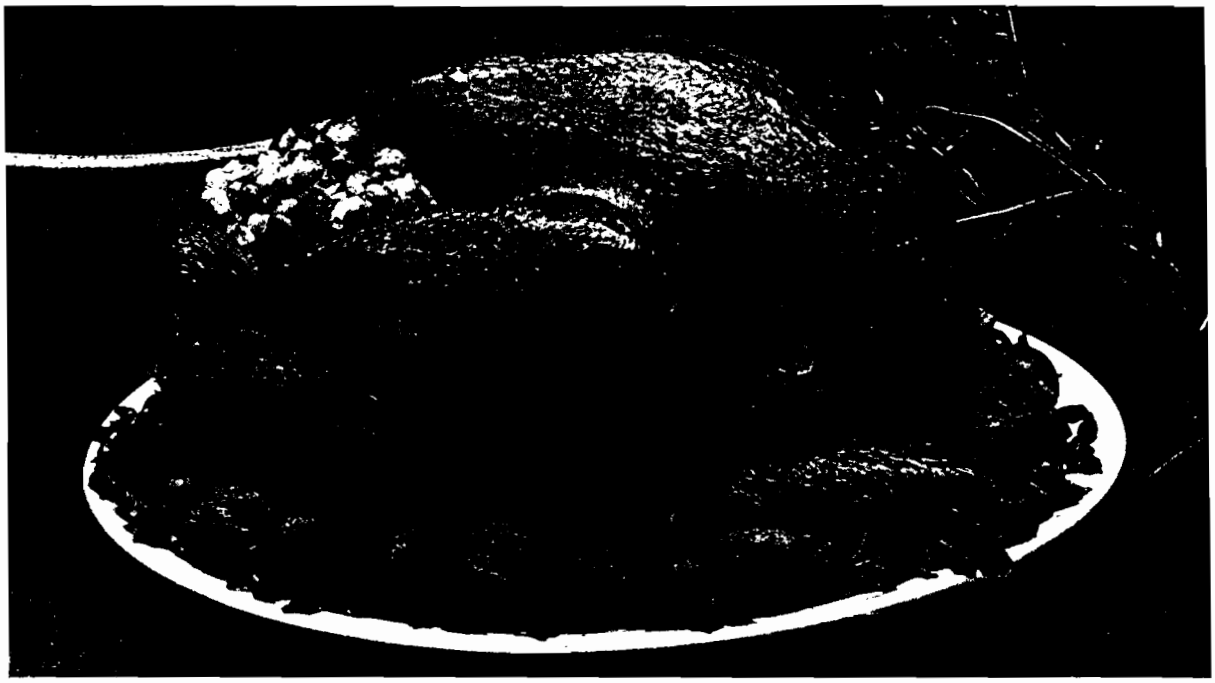
Polyphosphates are primarily used in meat, poultry and seafood products to provide protection from moisture loss during processing. In general, processors utilize sodium tripolyphosphate (STP), which can be used alone or in blends with sodium hexametaphosphate (SHMP). Alkaline polyphosphates, like STP, are believed to increase the local pH and ionic strength surrounding the protein. These changes allow the protein to uncoil exposing sites, which increases the protein's capacity to bind water. During cooking or thawing, the protein will release significantly lower quantities of moisture, therefore increasing total product yield. The increase in water-binding capacity results in:

- Reduced moisture loss during cooking
- Improved yield following cooking
- Reduced moisture loss during thawing
- Increased tenderness
- Improved cooked flavor
- Reduced freezer burn
- Increased binding between muscle pieces

Other functions of polyphosphates include:

- pH adjustment and buffering
- Sequestration of multivalent cations to inhibit oxidative rancidity
- Stabilization of the color of cured products
- Emulsion stabilization and/or viscosity reduction
- Emulsification of fat and protein

United States Department of Agriculture (USDA) regulations generally allow addition of phosphate ingredients up to 0.5% by weight of the finished product. In the following sections, specific phosphates are recommended for particular applications.



Cured Meat and Poultry

Incorporation of phosphates confers several benefits on bacon, ham, corned beef and cured poultry products. By decreasing moisture loss during processing, phosphates increase yields and give products that are more moist to eat. Keeping the moisture level up and partially dissolving fibrous protein make the products more tender. By sequestering metal ions, especially iron, phosphates inhibit development of rancidity during storage. Phosphates also extend shelf life by stabilizing the red color of cured meat and poultry.

Processed Meat and Poultry

Blending Nutrifos H30 or SAPP (sodium acid pyrophosphate) into the meat during the chopping operation will accelerate development of red color in wieners, bologna and similar emulsion products. These ingredients offer the potential of increased production in a plant that is operating at smokehouse capacity and is able to increase smokehouse temperature. Including phosphates also makes the emulsion more resistant to a drop in pH.

Adding sodium tripolyphosphate, sodium hexametaphosphate or tetrasodium pyrophosphate, either singly or in any combination, increases emulsion stability and reduces fat cook-out when the product is prepared for consumption

Frozen Products

Meats, poultry, fish and other seafoods all benefit from treatment with phosphate solutions before they are frozen.

Addition of phosphate:

- Inhibits development of rancidity during storage
- Decreases loss of protein-containing juices at thawing
- Reduces shrinkage when the product is cooked

The result is a cooked product that is juicier, more tender and better flavored.

Shrimp

Phosphates can help the seafood processor by making the shells of shrimp easier to remove, thereby increasing the meat yield of the deshelling operation. STP or a blend of STP and SHMP is added to the boiling water, and the shells are removed with high-pressure water jets.

Canned Seafood

Addition of SAPP to albacore tuna during canning decreases or prevents formation of troublesome struvite crystals. Phosphates will also inhibit white protein curd formation in canned salmon.

Reformed and Restructured Products

In production of frozen products, such as restructured steaks, shrimp shapes, formed poultry parts, meat loaves, sectioned and formed roasts, turkey and chicken rolls, and fish blocks, phosphate solubilizes the protein that binds the pieces together and aids in moisture retention.

For surimi production and seafood analog manufacturing, Nutrifos polyphosphates have been found especially useful as cryoprotectants and binding aids.

Phosphates for the Meat, Poultry and Seafood Industries

Nutrifos® 088 sodium tripolyphosphate (STP) is an extremely fast-dissolving, multi-purpose phosphate for all meat, poultry and seafood applications. It is economical to use and provides most all the functions of more expensive phosphate blends. Nutrifos 088 is versatile. It is well-suited for injection use (hams, poultry and fish fillets), in solution (marinades, fish and shellfish), for dry addition (sausage, meat toppings), and for tumbling.

Nutrifos BC combines the high performance of STP with the ability to dissolve concurrently with salt. Usual STP procedure requires phosphate dissolution before the addition of sodium chloride. With Nutrifos BC this requirement is no longer necessary. Nutrifos BC dissolves rapidly and completely in combination with salt, potentially shortening preparation time. Nutrifos BC is ideal for prepackaged marinades and blends containing spices, salt and other ingredients.

Nutrifos B-90 is a blend of STP and the more soluble sodium hexametaphosphate (SHMP). Nutrifos B-90 is ideal when increased solubility or water softening are desired. It has a marked advantage in highly concentrated pickles, like those for hams where the high solubility of SHMP allows a processor to keep more phosphate in solution. Due to its sequestration, Nutrifos B-90 will delay oxidative rancidity in processed meat, poultry and seafood. Nutrifos B-90 substantially reduces the risk of clogged needles.

Nutrifos B-75 is a blend of STP and SHMP developed for applications requiring extremely high solubility. It is formulated to dissolve in hard water and has tremendous compatibility with high solid brines, such as those used for preparing canned hams. It is ideal for products requiring a slow cure. Nutrifos B-75 will also improve overall sliceability in bacon and ham.

Nutrifos H-30 is a blend of polyphosphates specially formulated for emulsion meat and poultry products, such as hot dogs and bologna. It has a near neutral pH which favors rapid cured color development. This allows for faster processing with the potential for increased production. Nutrifos H-30 improves emulsion stability and helps control viscosity, which is important when pumping emulsions. It also ensures the characteristic bite associated with emulsion products. With Nutrifos H-30, the processor does not have to sacrifice yield in order to have maximal bind.

Nutrifos SK sodium potassium tripolyphosphate (SKTP) is a reduced sodium polyphosphate combining the benefits of phosphate functionality with high solubility and handling ease. Use of Nutrifos SK does not result in off flavors usually associated with potassium. Nutrifos SK is a cost-effective alternative for achieving reduced sodium in meat, poultry and seafood products while retaining the benefits of polyphosphate functionality.

Nutrifos L-50 is a powder blend of STP and tetrasodium pyrophosphate (TSPP) developed for the seafood analog industry. Through its unique ability to solubilize and extract protein, Nutrifos L-50 results in surimi with optimal gel strength. Nutrifos L-50 is added dry to the minced fish, which avoids additional moisture incorporation.

Katch® fish phosphate is a blend of sodium polyphosphates created for the fish and seafood industries. Katch maintains moisture levels by minimizing cook and thaw loss. It also works as a cryoprotectant to help extend shelf life in frozen products and delays the onset of oxidative rancidity in even the fattiest of fish species. This versatile blend can be used as a dip (fillets, shrimp, scallops), for injection applications, and in tumbling.

Sodium acid pyrophosphate (SAPP NL) is an acid phosphate frequently used as a dry ingredient to stabilize emulsions. SAPP NL favors color development and improves flavor and texture in hot dogs and luncheon meats.

Tetrasodium pyrophosphate (TSPP), a highly alkaline phosphate, is used when maximal protein solubilization is desired. However, TSPP use is limited by its low solubility, and it is primarily utilized in combination with other more soluble phosphates or in specialty applications.

Tetrapotassium pyrophosphate (TKPP), like TSPP, is a very alkaline phosphate. TKPP is suitable for applications requiring extremely high solubility (60%) and/or reduced sodium. TKPP is an excellent choices for specialized applications and pet foods.

Table C – Phosphate Usage in Meat, Poultry and Seafood Products

Application Summary	Phosphates	Method
Meat		
Ham, Bacon, Corned Beef, Roast Beef, Pastrami	Nutrifos 088, BC, B-90 or B-75	injection, vacuum tumbling 0.4-0.5% by weight
Frozen Hamburger Patties and Ground Beef Patties (Cooked or Frozen)	Nutrifos 088 or STP Powder	dry addition 0.2-0.4% by weight
Cooked Sausage	Nutrifos 088, BC, SK STP Powder or B-90	dry addition 0.15-0.35% by weight
Frankfurters, Bologna, Luncheon Meats	Nutrifos H-30, BC, SK, SAPP NL, Nutrifos 088	dry addition 0.15-0.35% by weight
Reduced Sodium Products	Nutrifos SK, TKPP	injection, tumbling, dry addition 0.15-0.5% by weight
Poultry		
Whole Turkeys 0.5% by weight	Nutrifos 088 or B-90	injection, tumbling
Turkey Hams, Pastrami, Corned Beef	Nutrifos 088, B-90, B-75, or BC	injection, tumbling 0.5% by weight
Restructured Poultry, Patties, Rolls, Nuggets, Cooked Sausage	Nutrifos 088, B-90 or STP Powder	dry addition 0.15-0.35% by weight
Ground Chicken or Turkey	Nutrifos 088 or B-90	dry addition 0.15-0.35% by weight
Frankfurters, Bologna, Luncheon Meats	Nutrifos H-30, SAPP NL, Nutrifos 088, BC, SK	dry addition 0.2-0.3% by weight
Reduced Sodium Products	Nutrifos SK, TKPP	injection, tumbling, marinades, dry addition 0.15-0.5% by weight
Seafood		
Fish Fillets	Katch, Nutrifos 088 or B-90	injection, dipping or tumbling to achieve 0.4-0.5% by weight
Shrimp Deshelling	Nutrifos 088, BC or B-90	dipping fresh shrimp in a 5-7% solution
Shrimp for Freezing or Cooking	Nutrifos 088, BC or B-90	dipping fresh shrimp in a 5-7% solution
Scallops	Nutrifos 088 or B-90	dipping fresh scallops in a 5-7% solution
Surimi	Nutrifos L-50, TSPP or TKPP	dry addition 0.1-0.5% by weight
Canned Tuna or Crab	SAPP NL	dry addition 0.3-0.5% by weight
Salmon for Canning	Nutrifos 088	dipping fillets in 3-5% solution
Reduced Sodium Products	Nutrifos SK, TKPP	injection, tumbling, marinades dry addition 0.15-0.5% by weight or dipping in 5-7% solution

Dairy Applications of Solutia Phosphates

There is a great variety of phosphate applications in the dairy industry. Phosphate functionality in dairy products involves interactions between phosphates and milk proteins and between phosphates and calcium. Solutia phosphates perform the following functions in dairy products:

- Buffer products within the desired pH range
- Stabilize casein proteins in milk against heat coagulation
- Disperse flavors and proteins in reconstituted milk powders
- Coagulate proteins to enhance gelation
- Acidify products
- Interact with proteins to promote emulsification

Solutia can offer the appropriate phosphate for virtually any dairy application. We will work with you and supply any technical support you may need.

Process Cheese Products

Phosphates are used in process cheese products primarily to help maintain the emulsion of butterfat in its protein-water matrix. Consequently, the product is uniform in flavor, and fat does not separate from the cheese when melted. In addition to stabilizing the protein-water-fat emulsion, phosphates also buffer the product at an optimum pH and give the product appropriate firmness and melting characteristics.

Phosphates are used for the same functionality in "filled cheese" products, imitation cheese products, and pasteurized cream cheese products.

Federal regulations govern the use of emulsifying agents in the manufacture of pasteurized process cheese (CFR 133.169), cheese food (CFR 133.173), and cheese spread (CFR 133.179). Under these regulations, emulsifying agents may not exceed 3% of the weight of the finished product.

The most economical level of use for the cheese processor is the maximum limit of 3%. How phosphates can be used at this maximum level without compromising the quality of the finished product. Solutia has developed three blends that can be used at the maximum 3% level: Emulsi-Phos™ 440, Emulsi-Phos 660 and Emulsi-Phos 990. These specially developed phosphate blends provide the optimum combination of desirable processing and end product properties, such as viscosity, melt spread, body and hardness. Table D on the next page describes the phosphates for process cheese manufacturing.

Table D – Solutia Phosphates for Process Cheese Manufacture

Emulsifying Agent	Properties	Recommended Usage Level
Emulsi-Phos 440	A blend of DSPA and IMP. Produces soft, easily melted product. Gives greater flexibility than using either DSP or TSP.	3% Can be used singly or in combination
Emulsi-Phos 660	A blend of TSPA and IMP. Used exclusively when high processing fluidity and softer, more meltable cheese is desired. Gives greater flexibility than using either DSP or TSP.	3% Can be used singly or in combination
Emulsi-Phos 990	A blend of TSPA and IMP. Normally used in combination with another phosphate for process cheese production to maximize desired texture and melt characteristics. Gives greater flexibility than using either DSP or TSP.	3% Can be used singly or in combination
MSP	Used to decrease the pH and melt spread and to firm the cheese. Added late in mixing. Produces acidic cheese if used alone.	Very low Used in combination with DSP, TSP or TSPP
DSPA	Produces cheese that is soft and meltable. Sufficiently prevents oil-off during melting. Allows for optimum pH control.	1.8% in process cheese; higher in cheese foods and spreads
DSPD	Hydrated species of DSP. Same properties as DSPA.	2.3% in process cheese; higher in cheese foods and spreads
TSPA	An alkaline orthophosphate which, like DSPD, produces soft, easy-melting products. Recommended where maximum melt strength is desired.	1.2%
TSPC	Hydrated species of TSP. Same properties as TSPA.	2.8%
MKP	Low-sodium alternative to MSP. Used to decrease pH and melt spread and to firm the cheese.	Very low Used in combination with other emulsifying agents
SAPP	Produces hard, non-melting cheese for use in specialty products. Melts only at higher temperatures. Produces acidic cheese if used alone.	Very low Used in combination with TSPP, DSP and/or TSP
TSPP	Produces hard cheese, which will melt only at higher temperatures.	2% Used in combination with MSP, DSP and/or TSP
TKPP	Alkaline, sodium-free pyrophosphate with excellent solubility to produce hard cheese with sharp flavor.	2%
SHMP	Contributes texture to process cheese. Normally used in conjunction with other emulsifying agents to increase firmness of product. Produces brittle cheese if used alone.	0.5-1.5%

Natural Cheese

Phosphates can be used during the production of natural cheese. Bacteriophages typically require free calcium to multiply in starter cultures. Through precipitation of calcium by DSP, these cultures can be protected from phages. Ammonium and potassium phosphates are used to supply valuable nutrients to the starter culture media.

During cheese manufacture, milk can be directly acidified by MCP or phosphoric acid to decrease processing time, increase yield, and increase calcium levels in cheese, especially cottage cheese. The use of TSPP will also shorten processing time. It is added with the culture, rennet and phosphoric acid to produce a curd that can be molded and allowed to start the aging process immediately.

Dried Milk Products

Incorporating DSP into skim milk before drying yields a nonfat dry milk that will dissolve more smoothly in water. The phosphate keeps milk proteins dispersed by protecting them from heat coagulation during spray drying.

Powdered TSPP helps disperse and suspend cocoa and malted milk powder in milk, thus minimizing sediment. In addition, incorporating TSPP at the appropriate level promotes formation of a thin gel layer around the milk proteins. The gel enriches both the flavor and the color and contributes to the smooth mouthfeel of the final beverage.

The use of instant pudding and "no-bake" cheesecake mixes depends on the reaction between TSPP and calcium in the milk protein, which induces gelation. The addition of DSPA will accelerate setting of the pudding but may not be necessary, depending on the calcium content of the milk protein. In some cases, calcium is added to the pudding system in the form of MCP to strengthen the gel.

DSP and SHMP are commonly used during the production of spray-dried cheese. These phosphates protect milk proteins from heat denaturation. In addition, they act to disperse milk proteins upon spray drying to assist in solubility of cheese powder upon reconstitution with water. They also stabilize the protein-water-fat emulsion to enhance flavor, body and appearance of the reconstituted product.

Fluid Milk Products

To prevent heat coagulation in condensed and evaporated milk or cream, DSP is used to stabilize casein in the milk.

Sterilized milk, cream and half-and-half products, including UHT concentrated products, gain added storage life when stabilized with DSP or SHMP to prevent age gelation during storage. Buttermilk produced by direct acidification via the addition of phosphoric acid has a reduced processing time and a longer refrigerated shelf life than cultured buttermilk. Addition of TSPP prior to acidification acts as a dispersing agent for the curd that would normally be formed in the acidic medium. Thus, TSPP enhances: flavor, viscosity, body, stability to whey-off, and appearance of buttermilk.

Cream Products

To maintain fat dispersion in ice cream mix, DSP, TSPP or SHMP may be added so "churning" will not form lumps of butter during the freezing operation. In chocolate ice cream, DSP, TSPP and SHMP also function to maintain a stable chocolate suspension. These phosphate ingredients can also serve the same purpose in other frozen desserts.

DSP is used in canned cream and cheese soups which are subjected to high sterilization temperatures. The DSP functions as a stabilizer to prevent proteins from flocculation and to maintain a smooth appearance and taste.

The addition of STP in imitation sour cream and chip dips controls syneresis. STP interacts with proteins to promote swelling of the molecules.

Whipped Toppings and Non-Dairy Coffee Whiteners

Whipped toppings of various composition obtain increased whipping efficiency and foam stability from addition of TSPP. By stabilizing the protein films, SHMP inhibits weeping in milk-based toppings, while DSP functions similarly in products based on other protein sources such as soybean.

In non-dairy coffee whiteners, a phosphate buffering system consisting of DSP, SAPP and/or STP contributes to stability of the protein layer around the fat droplets, thus preventing syneresis. This buffer system also prevents feathering and fat separation when the coffee whitener is added to the hot acidic coffee medium. TSPP has also been used as a stabilizing agent to help disperse soy proteins.

Some of the major applications for phosphates in the dairy industry are described in Table E, along with recommended usage levels for each particular application.

Table E – Dairy Applications of Solutia Phosphates

Application	Phosphates	Usage Level
Evaporated, Condensed Milk, Cream	DSP	0.02-0.10% of final product
Flavored Milk Powders	TSPP, TKPP	0.1-0.3%
Non-Dairy Coffee Creamers	DSP	1.0-2.0% of dry product 0.1-1.0% of liquid product
Buttermilk	TSPP, TKPP, Phosphoric Acid	0.01-1.0%
UHT Concentrated Milk	SHMP	0.1-1.0%
Dried Milk-Drink Products	DSP	2.0% milk solids' weight
Sterile Concentrated Milk, Cream	SHMP	0.1-1.0%
Instant Pudding, No-Bake Cheesecake	TSPP, DSP, MCP, SAPP, STP, TKPP	2-7% total phosphate
Milk Foams	TSPP, TKPP, SHMP	1.5-2.0% milk solids' weight
Imitation Sour Cream, Chip Dips	STP	0.05-0.20% oil basis
Spray-Dried Cheese	DSP, SHMP	1-3%
Canned Cream and Cheese Soups	DSP	0.2%
Whipped Toppings	TSPP, TKPP, DSP	0.025-1.0% of complete liquid base
Process Cheese	Emulsi-Phos 440, 660, 990, MSP, DSP, TSP, MKP, SAPP, TSPP, SHMP, TKPP	0.5-3.0%
Cheese Sauce	DSP, TSP, SHMP	0.5-3.0%
Starter Cultures	DSP, MAP, DAP, MKP	2-3%
Frozen Desserts, Ice Cream	DSP, TSPP, SHMP, TKPP	0.1-0.2% of final product
Direct-Set Cottage Cheese	MCP, Phosphoric Acid	0.03%

Other Applications of Solutia Phosphates

Pharmaceutical and Nutritional Products

The calcium phosphates are broadly utilized in nutritional supplementation and fortification, since they are a quality source of both calcium and phosphorus. For infant foods and formulas, the calcium phosphates provide both calcium and phosphorus, essential nutrients for proper growth and bone development. The fine particle size of both DCP and TCP make them particularly useful in infant formulas. Both DCP and TCP can be used as excipients for tableting applications in vitamins and drugs.

Mag-nificent is an ideal source of magnesium and phosphorus for a number of products, such as infant formula, geriatric beverages, nutritional supplements, vitamins and ready-to-eat cereals. It is compatible for use with calcium phosphates, so that all the essential minerals can be balanced.

Beverages

Phosphoric acid is used as an acidulant for cola and root beverages. The usual cola contains about 0.05% phosphoric acid and has a pH of about 2.3. Root beer has a higher pH of about 5.0 and contains 0.01% phosphoric acid. On a price performance basis, phosphoric acid is less expensive than organic acid alternatives. It provides many advantages in the formulating of these products:

- Sparkling bite and astringency counteract the heaviness of root and cola flavors
- Low pH improves flavor and storage stability
- Chelation of troublesome metal ions helps establish a stable carbonation

Monocalcium phosphate monohydrate (MCP) can be used in the formulation of beverage powders. MCP has many benefits:

- Economical pH buffer to control tartness
- Nonhygroscopic acidulant replaces up to 50% of citric acid
- Calcium and phosphorus are contributed to the products' nutrient profile.

Tricalcium phosphate (TCP) is also commonly used for dry powder formulations where it contributes several useful properties:

- Flow conditioner for dry base products
- Clouding agent in reconstituted beverages
- Calcium and phosphorus are contributed to the products' nutrient profile

Monosodium phosphate (MSP) and **Monopotassium phosphate** (MKP) are used in isotonic formulations. They are added to the formulation to replace sodium and/or potassium that are lost as a result of athletic or physical activity.

In nutritionally fortified beverages, the metal complexing properties of polyphosphates afford protection for Vitamin C, which is readily oxidized in the presence of some metal ions.

Monoammonium and Diammonium phosphates are used in the wine industry in production of sparkling wines.

Produce

Potatoes

Sodium acid pyrophosphate non-leavening (SAPP NL) and **Tetrasodium pyrophosphate** (TSPP) are used for several processed potato applications:

- Protection from after-cooking darkening in french fries and frozen potatoes. This iron-induced phenomenon is eliminated by the metal-complexing ability of SAPP NL and TSPP.
- Production of dehydrated mashed potatoes where SAPP NL or TSPP are added during mixing, just before drying
- Protection of color in sweet potatoes by SAPP NL, TSPP, or SAPP NL plus Nutrifos 088

Fruits

Calcium phosphates, such as MCP, are used to increase the firmness in canned fruit by increasing the calcium pectinate content. Other fruit applications include:

- Phosphoric acid to furnish acidity and optimal gel strength in jellies or bakery filling
- Polyphosphates to delay color changes in preserves made from red berries
- Sodium hexametaphosphate (SHMP) to extend shelf life of apple cider and other juices

Vegetables

Nutrifos 088, Sodium hexametaphosphate (SHMP) or **Tetrasodium pyrophosphate** (TSPP) are used in the canning or freezing of fresh peas or beans to improve tenderness. These phosphates, included in the wash or blanch water, can prevent toughening of skins due to absorption of calcium and magnesium from the water.

Egg Products

Phosphates serve a multitude of functions in processed eggs:

- Nutrifos 088 and SHMP inhibit development of rancidity in yolk lipids
- MSP and MKP preserve the color of egg yolk during refrigerated or frozen storage
- Nutrifos 088, Nutrifos B-90 or SHMP can prevent the coagulation of dried eggs during the heat-intensive drying period
- SHMP or Nutrifos 088 improve whipping efficiency and foam stability in dried-egg products. This improves functionality of the dried egg in cakes and meringues.

Fats and Oils

- Phosphoric acid acts synergistically with other additives to prevent oxidative rancidity in vegetable shortening
- TCP added to lard and then filtered out removes color and absorbs iron, which promotes rancidity
- Phosphoric acid can be used in the degumming processes for the purification of soy and other vegetable oils. It also provides pH control and ties up small amounts of transition metal ions, such as iron, nickel and copper, which catalyze the development of rancidity.

Miscellaneous Food Applications

Flow Conditioning

TCP is generally applicable as a flow conditioner for powdered and fine granular products due to its small particle size and inertness.

Gelatin Desserts

MSP and disodium phosphate (DSP) serve as buffers in gelatin desserts. They control the water-binding capacity, which is dependent on pH.

Peanuts

SHMP and Nutrifos 088 are used to economically salt peanuts in the shell by making it possible for brine to quickly penetrate into the shells.

Gels and Gums

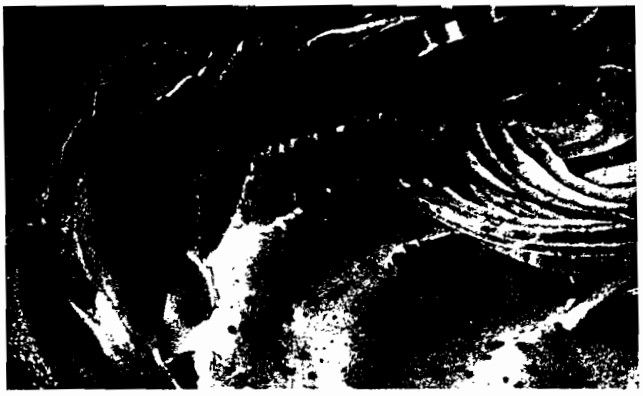
Gel strength of alginate, agar, carrageenan and other gums is modified by the presence of phosphates, such as TSPP, TKPP, DSP, DCP, SHMP and Nutrifos 088. Polyphosphates also can retard syneresis in these gels.

Microbiological Operations

Phosphoric acid and phosphate salts are used as nutrients and buffering agents in microbiological operations, such as yeast and antibiotic production.

Sugar Processing

Phosphoric acid aids in the clarification step in sugar processing. Impurities are removed by treating heated sugar liquid with phosphoric acid and lime in a long, shallow tank in the presence of air introduced from the bottom of the tank. The precipate of calcium phosphate, together with occluded insolubles and non-sugars precipitated from the liquid, is carried to the top to form a scum, which is separated mechanically. The scum is filtered to recover contained sugar, but the liquor itself is not filtered. The process is superior to the older procedure (of only liming the liquid) with respect to removal of colored and other soluble impurities.



Salad Dressing

Phosphoric acid is employed in small amounts to impart an acidic flavor to salad dressings. It is also used to increase the biological activity of preservatives in the dressings.

Jams and Jellies

Phosphoric acid is used in the jam and jelly industry, especially for preparing firm, nonsoaking jellies, such as those used in doughnuts, jelly rolls and cake fillings. The acid is added during the final stages of cooking to minimize hydrolysis of the pectin. Phosphoric, together with citric and tartaric acid, is used as a buffering agent to control the acidity so as to give the firmest pectin gel and, at the same time, to complex heavy metal cations, such as iron, which give a dull color to the jelly

Dental Applications of Solutia Phosphates

Phosphates are used in a variety of dental applications. More effective dentifrices have been developed over the last two decades, combining therapeutic (anticaries), cosmetic (whitening, tarter control), and cleaning benefits. Solutia produces a complete line of calcium phosphate products which span a wide range of abrasive levels for use as polishing agents, including dicalcium phosphate dihydrate, dicalcium phosphate anhydrous, calcium pyrophosphate and Lustre-Phos®. Other phosphates, including sodium and potassium pyrophosphates, sodium tripolyphosphate and tricalcium phosphate, are currently being used in dentifrices and mouth rinses for functions such as anti-calculus activity and sensitive teeth protection.

Pet Food Applications of Solutia Phosphates

Phosphates and phosphoric acid are used in pet foods for the same functionalities they exhibit in human food. For cats, it is important to provide the correct pH in order to meet the cat's palate requirements. Phosphoric acid is used to adjust the pH of both dry and moist food products. The polyphosphates (STP, SKTP, TKPP, TSPP, SHMP) can be used to solubilize protein in the production of canned pet food for both canines and felines. The solubilized protein provides binding and moisture retention, which aid in product release from the can.

The orthophosphates (MSP, DSP, TSP and MKP) are incorporated for pH and buffering. The calcium phosphates are used to provide nutrient supplementation in both pet food and animal feed. The potassium salts can be used to increase potassium levels in food for cats. This aids in the prevention of urinary tract disease. In animal feeds, phosphoric acid is used to adjust the pH for palatability for many different animals. Sodium and potassium phosphates can be used in salt blocks. Phosphates (STP and SAPP) are also Generally Recognized As Safe (GRAS) as general-purpose additives in Animal Feed and Pet Foods and are listed in Title 21 CFR 582. The use of phosphates in animal feed products is regulated by Association of American Feed Control Officials, Incorporated (AFCO).

Technology, New Applications and Formulations

Whether it's new technology for your company or for the industry, Solutia has a staff of technical specialists prepared to assist you in designing a product that meets your specifications. Solutia researchers are continually exploring new trends and are available to assist in optimization of products.

For most applications, a recommendation is available on which phosphate to use and what level to use it. For many applications, starting formulations can be provided.

Solutia stands ready as your partner to create the best food products possible!

Table F – Applications by Product

Solutia Product	Applications		
Acids			
Phosphoric Acid	Beef Jerky Beer Cola Beverages	Cottage Cheese Fats & Oils Fillings	Jams & Jellies Pet Food Sugar
Adipic Acid	Bakery Mixes Candy	Desserts Gelatin	Jams & Jellies Pudding
Orthophosphates			
Monoammoniurn Phosphate	Breads & Doughs	Cheese Starter Cultures	Yeast
Diammonium Phosphate	Breads & Doughs Cheese Starter Cultures	Cookies Crackers	Yeast
Monosodium Phosphate	Cola Beverages Dry Powder Beverages Egg Yolks	Gelatin Instant Cheesecake	Instant Pudding Isotonic Beverages
Disodium Phosphate	Breakfast Cereal Cheese Condensed Milk Cream Evaporated Milk Flavored Milk Powders Gelatin	Half & Half Ice Cream Imitation Cheese Infant Food Instant Cheesecake Instant Pudding Isotonic Drinks	Nonfat Dry Milk Pasta Pet Food Processed Cheese Starch Vitamin Capsules Whipped Topping
Trisodium Phosphate	Cereals Cheese	Imitation Cheese Isotonic Beverages	Processed Cheese
Monopotassium Phosphate	Breads & Doughs Dry Powder Beverages Eggs	Isotonic Beverages Mineral Supplement	Starter Cultures Yeast
Monocalcium Phosphate	Bakery Mixes Baking Powder Dough Conditioner Dry Powder Beverages	Flour Fruits Infant Food Milk-Based Beverages	Multivitamin Capsules Pet Food Pudding Yogurt
Dicalcium Phosphate	Bakery Mixes Cereals Dry Powder Beverages Flour	Food Bars Infant Food Milk-Based Beverages Mineral Supplementation	Multivitamin Tablets Pet Food Yogurt
Tricalcium Phosphate	Cereal Dry Powders Grated & Powdered Cheese Infant Food Lard	Milk-Based Beverage Mineral Supplementation Multivitamins Pet Food Polymers	Salt Spice Blends Sugar Yogurt
Sodium Aluminum Phosphate	Bakery Mixes	Baking Powder	
Dimagnesium Phosphate	Bakery Mixes Beverages	Cereals Infant Formula	

Table F – Applications by Product

Solutia Product	Applications		
Pyrophosphates			
Sodium Acid Pyrophosphate	Bakery Mixes Baking Powder Canned Seafood Cured Meats	Icing & Frostings Imitation Cheese Potatoes Poultry	Processed Cheese Processed Meat Seafood Vegetables
Tetrasodium Pyrophosphate	Cured Meat Flavored Milk Powders Instant Cheesecake Instant Pudding	Pet Food Poultry Processed Meat Seafood	Starch Vegetables Whipped Topping
Tetrapotassium Pyrophosphate	Cured Meat Flavored Milk Powders Instant Cheesecake Instant Pudding	Pet Food Poultry Processed Meat Seafood	Starch Vegetables Whipped Topping
Polyphosphates			
Sodium Tripolyphosphate	Dips Eggs Meat Pet Food Poultry	Processed Cheese Seafood Sour Cream Table Syrup Vegetable Protein	Vegetables Whey Whipped Toppings Yogurt
Sodium Trimetaphosphate	Starch	Vitamins	
Sodium Hexametaphosphate	Cream Eggs Half & Half Ice Cream	Meat Poultry Processed Cheese Seafood	Table Syrup Vegetables Whey Whipped Toppings
Sodium Potassium Tripolyphosphate	Dips Eggs Meat Pet Food Poultry	Processed Cheese Seafood Sour Cream Table Syrup Vegetable Protein	Vegetables Whey Whipped Toppings Yogurt

Table G – Typical Properties for Solutia Food Phosphates

Product Name	Abbreviation	Synonyms	Formula
Monosodium Phosphate, Anhydrous	MSP	Monosodium dihydrogen phosphate Sodium phosphate, monobasic Sodium biphosphate Acid sodium phosphate Sodium phosphate, primary	NaH_2PO_4
Disodium Phosphate, Anhydrous	DSPA	Disodium monohydrogen phosphate Sodium phosphate, dibasic Neutral sodium phosphate	Na_2HPO_4
Disodium Phosphate, Dihydrate	DSPD	Disodium phosphate duohydrate	$Na_2HPO_4 \cdot 2\ H_2O$
Trisodium Phosphate, Anhydrous	TSPA	Trisodium orthophosphate Sodium phosphate, tribasic Basic sodium phosphate Sodium phosphate, tertiary	Na_3PO_4
Trisodium Phosphate, Crystalline Decahydrate	TSPC	Trisodium phosphate decahydrate	$Na_3PO_4 \cdot 10\ H_2O \cdot$¼ NaC
Emulsi-Phos® Phosphate Blends Emulsi-Phos 440 (Blend of DSPA & IMP) Emulsi-Phos 660 (Blend of TSPA & IMP) Emulsi-Phos 990 (Blend of TSPA & IMP)			
Sodium Acid Pyrophosphates Leavening Grades SAPP RD-1 SAPP 26 SAPP 28 SAPP 37 SAPP 40 SAPP 43 Nonleavening SAPP NL	SAPP	Acid sodium pyrophosphate Disodium dihydrogen diphosphate Dibasic sodium pyrophosphate Disodium pyrophosphate	$Na_2H_2P_2O_7$
Tetrasodium Pyrophosphate	TSPP	Sodium pyrophosphate tetrabasic Tetrasodium diphosphate Sodium diphosphate	$Na_4P_2O_7$
Nutrifos® Polyphosphates Nutrifos 088 Sodium Tripolyphosphate Nutrifos B-90 (Blend of STP & SHMP) Nutrifos B-75 (Blend of STP & SHMP) Nutrifos H-30 (Blend of STP, SHMP & SAPP) Nutrifos L-50 (Blend of STP & TSPP) Nutrifos SK Sodium Potassium Tripolyphosphate	STP SKTP	Pentasodium triphosphate Sodium triphosphate Triphosphonic acid, pentasodium salt Trisodium dipotassium triphosphate	$Na_5P_3O_{10}$ $Na_3K_2P_3O_{10}$
Katch® Fish Phosphate (Polyphosphate Blend)			
Sodium Hexametaphosphate	SHMP	Graham's salt Sodium phosphate glass	$Na_{n+1}P_nO_{(3n+1)}$ n=13 - 18
Sodium Trimetaphosphate	STMP	Trisodium metaphosphate	$(NaPO_3)_3$
Sodium Aluminum Phosphates Levn-Lite® SALP Stabil-9® (Blend of SALP & AMCP) Pan-O-Lite® (Blend of SALP & MCP)	SALP		$Na_3Al_2H_{15}(PO_4)_8$
H.T.® Monocalcium Phosphate Monohydrate	MCP	Calcium phosphate, monobasic Calcium phosphate, primary Calcium acid phosphate Calcium biphosphate	$Ca(H_2PO_4)_2 \cdot H_2O$
Py-Ran® Anhydrous Monocalcium Phosphate	AMCP		$Ca(H_2PO_4)_2$
Dicalcium Phosphate, Anhydrous	DCPA	Calcium phosphate, dibasic Calcium phosphate, secondary	$CaHPO_4$
Dicalcium Phosphate, Dihydrate	DCPD		$CaHPO_4 \cdot 2\ H_2O$
Tricalcium Phosphate	TCP	Calcium phosphate, tribasic Calcium hydroxyapatite	$Ca_{10}(OH)_2(PO_4)_6$
Calcium Pyrophosphate	CPP	Cal pyro Tetracalcium pyrophosphate (soft calcium pyrophosphate)	$Ca_2P_2O_7$
Monopotassium Phosphate	MKP	Acid potassium phosphate Potassium phosphate, monobasic	KH_2PO_4
Tetrapotassium Pyrophosphate	TKPP	Potassium pyrophosphate, tetrabasic Tetrapotassium diphosphate Potassium diphosphate	$K_4P_2O_7$
Monoammonium Phosphate	MAP	Ammonium biphosphate Ammonium phosphate, monobasic	$NH_4H_2PO_4$
Diammonium Phosphate	DAP	Ammonium phosphate, dibasic	$(NH_4)_2HPO_4$
Phosphoric Acid 75%, 80%, or 85%		Acid orthophosphoric Acid monophosphoric	H_3PO_4

[illegible] solution at 10% conc. [illegible] = g/100g saturated solution at 25°C [3] NV = Neutralizing Value [4] [illegible] = Degree Rate of Reaction [5] MW = Molecular Weight [6] G = Granular, FG = Free Granular, P =

pH[1]	Solubility[2]	NV[3]	DRR[4]	MW[5]	Grade[6]
4.6	48	70		120.0	G, P
9.0	11			142.0	G, P
9.0	13			178.0	G
12.0	13			164.0	G
12.0	18			354.2	G, P
					P P P
4.2 - 4.8	13	72		221.9	
			21 - 25 22 - 26 24 - 30 34 - 38 37 - 41 41 - 45		P P P P P P P
10.2	6			265.9	G, P
9.8	13			369.9	G, P
9.6 9.0 7.1 - 7.3 10.0 10.0	15 >15 13 > 6 37			400.1	G G P P G, P
9.6	15				G
6.9	> 60				P, Plate, Crush
6.7	23			305.9	P
3.4	(Slight)	100 92 100	24	897.8	P P-Reg., P-HiCal P
4.6	(Slight)	80	70	252.1	Fine Medium Coarse
4.6	(Slight)	80	62	234.1	FG
7.5	(Insoluble)			136.1	P-FCC, P-USP
7.5	(Insoluble)	33	18	172.1	P-FCC, P-USP
7.3	(Insoluble)			1004.7	Conditioner, NF, Polymer
6.0	(Insoluble)			254.1	P
4.6	21	65		136.1	G
10.5	> 60			330.3	60% Solution
4.6	28	62		115.0	G, P
8.0	41			132.1	G, P
1.6		172		98.0	Liquid

Typical Nutrient Data for Solutia Food Phosphates

Calories/Gram	Fat (g)	Sodium (%)	Carbohydrates (g)	Protein (g)	Calcium (%)	Iron (ppm)	Phosphorus (%)	Potassium (%)
0	0	19.1	0	0	–	–	25.8	0.2
0	0	32.3	0	0	–	5	21.8	–
0	0	25.8	0	0	–	< 5	17.3	–
0	0	42	0	0	–	3	18.8	–
0	0	19	0	0	–	1.4	7.9	–
0	0	29.4	0	0	–	–	24.2	–
0	0	30.4	0	0	–	–	25.6	–
0	0	23.4	0	0	–	10	29.6	0.01
0	0	20.7	0	0	–	12	27.9	0.1
0	0	34.5	0	0	–	10	23.2	–
0	0	31.1	0	0	–	15	25.3	.
0	0	31	0	0	–	16	25.7	–
0	0	30	0	0	–	16	26.2	–
0	0	27.1	0	0	–	14	26.3	0.04
0	0	32.8	0	0	–	12	24.3	–
0	0	17.2	0	0	–	5	23.2	19.5
0	0	31	0	0	–	16	25.7	–
0	0	23.4	0	0	–	21	29.4	–
0	0	22.5	0	0	–	50	30.4	–
0	0	7.4	0	0	1.3	50	26.9	0.01
0	0	4.6	0	0	reg. 9.8/hical >10.8	200	reg. 24.5/hical 26.1	–
0	0	5.9	0	0	4.3	100	26.4	–
0	0	0.05	0	0	17.6	400	24.4	–
0	0	0.05	0	0	17.5	400	25.8	–
0	0	0.04	0	0	28.7	350	22.3	–
0	0	0.11	0	0	23.2	300	18.1	–
0	0	0.03	0	0	37.9	400	17.6	–
0	0	0.2	0	0	31	260	24.4	–
0	0	–	0	0	–	20	22.7	28.7
0	0	0.04	0	0	–	–	17.8	44.8
0	0	–	0	0	–		18.8	47.3
0	0		0	0		4	26.9	.
0	0	.	0	0		< 5	23.4	.
0	0		0	0	–	< 5	23.7 (75%), 25.4 (80%), 27.0 (85%)	

Table H • Phosphoric Acid Typical Analysis and Physical Properties

Characteristics	75%	80%	85%
Appearance	a clear colorless liquid	a clear colorless liquid	a clear colorless liquid
Odor	no foreign odor	no foreign odor	no foreign odor
Specific Gravity @ 25°C	1.575	1.633	1.692
P_2O_5, %	54.39	58.20	61.92
% Equivalent H_3PO_4	75.1	80.35	85.5
Lbs/gallon	13.17	13.66	14.15
Lbs P_2O_5/gallon	7.16	7.95	8.76
Melting Point, °C	-17.5	+4.6	+21.1

Additional Typical Properties and Nutritional Data for Solutia Food Grade Phosphoric Acid:

Color, APHA	10	10	20
Turbidity, APHA	1	1	1
Arsenic as As, ppm	<3	<3	<3
Fluoride as Fl, ppm	<10	<10	<10
Heavy Metal as Pb, ppm	<10	<10	<10
Calories per Gram	0	0	0
Fat (g)	0	0	0
Carbohydrates (g)	0	0	0
Protein (g)	0	0	0
Iron, ppm	<5	<5	<5
Phosphorus, %	23.7	25.4	27.0

Table I • Relative Sourness of Phosphoric Acid and Other Food Acids

Acid Used	R	P	pK
Tartaric acid crystals (99.5%)	100	0.722	3.02
Citric acid crystals (91%)	100	0.773	3.06
Citric acid solution (50%)	100	0.425	3.06
Acetic acid (56%)	70	0.356	4.76
Lactic acid (44%)	100	0.266	3.86
Phosphoric acid (75%)	100	1.000	2.12

R = relative sourness of 0.01 Normal solution of the acid.
P = pounds of 75% phosphoric acid required to give same sourness as one pound of acid used.

Regulatory Information

Solutia food phosphates and phosphoric acid, including the components of blends, meet the specifications of the Food Chemicals Codex (FCC), as well as other codex compendia used by other countries. Solutia food phosphates and phosphoric acid are approved as Kosher (U), and confirmatory letters are available upon request. Many of the phosphates and some grades of phosphoric acid also meet specifications defined by the U.S. Pharmacopeia and the National Formulary.

Solutia food grade phosphates and phosphoric acid are approved for use by the Food and Drug Administration (FDA) in Title 21 in the Code of Federal Regulations (CFR). In Parts 182 and 184, they are identified as substances Generally Recognized As Safe (GRAS). Under Part 182, they are listed with functional groupings as follows:

- Subpart B: Multiple Purpose GRAS Food Substances
- Subpart F: Dietary Supplements
- Subpart G: Sequestrants

  Subpart I: Nutrients

(Note – Not all phosphates are identified under every classification.)

Applications in the Meat and Poultry industry are regulated by the U.S. Department of Agriculture (USDA) and are listed in Title 9 of the CFR. Specific approvals are as follows:

- Part 318.7: Use in Meat Products
- Part 381.147: Use in Poultry Products

The USDA limits the use of phosphates in these products to 0.5% by weight of the final product. The USDA specifically prohibits the use of phosphates in fresh meat and poultry products. Meat and poultry products processed with phosphates should be labeled appropriately, and the label must be approved by the USDA. Only clear solutions may be injected into meat and poultry. Letters issued by the Proprietary Mix Committee of the USDA regarding the use of Solutia food phosphates and blends are available upon request. These provide information on use and proper labeling.

Current regulations by the FDA in the U.S. limit the level of phosphates in seafoods to Good Manufacturing Practice (GMP) and must be labeled accordingly. Solutia recommends phosphate levels should not exceed 0.5% by weight of the final product. Lower levels, however, are generally sufficient for functionality. Current Compliance Guides issued by the FDA limit the amount of water that can be added to seafood products.

Non-food uses of various phosphates in USDA-inspected plants are listed in Miscellaneous Publication Number 1419, "List of Proprietary Substances and Nonfood Compounds." These include such applications as cleaners and egg washing.

Many food phosphates are also approved for use as indirect ingredients and other applications. Specific references follow:

- 21 CFR 172.892: Use of various phosphates in preparation of modified food starches
- 21 CFR 173.310: Use of phosphates and polyphosphates in boiler water
- 21 CFR 173.315: Use of phosphates in washing or to assist in lye peeling of fruits and vegetables
- 21 CFR 175: Subpart B – Substances for use only as components of adhesives; Subpart C – Substances for use as components of coatings
- 21 CFR 176: Indirect Food Additives – Paper and Paperboard Components.

Since regulation of alcoholic beverages is the responsibility of the Bureau of Alcohol, Tobacco and Firearms, the approval of ammonium phosphates for treatment of wine and alcoholic juices is listed in 27 CFR 24.246

Many phosphates are included in the Standards of Identity of many standardized foods, including processed cheese, processed cheese food, processed cheese spread, evaporated milk, baking powder, phosphated flour, self-rising flour, enriched self-rising flour, self-rising white corn meal, self-rising yellow corn meal, and bread, rolls and buns. Certain seafood products are described by a Standard of Identity as well. Limitations are set for some products. Details are listed in 21 CFR Parts 130-169.

In addition, approvals for use in pet foods and animal feeds are listed in 21 CFR Part 582.

Food products containing food phosphates must be appropriately labeled, and attention is directed to Nutrition Labeling and Education Act (NLEA) of 1990. To assist with nutritional labeling requirements, "Nutrient Data" is listed in Table G on page 32.

Packaging Guide

Table J – Food Phosphates

Chemical Description	Solutia Product	Solutia Package Size*
1. Calcium Phosphates		
Anhydrous Monocalcium Phosphate	Py-Ran	50 Lb. Bag
Dicalcium Phosphate Anhydrous	DCPA	50 Lb. Bag/350 Lb. Drum
Dicalcium Phosphate Dihydrate	DCPD	50 Lb. Bag/225 Lb. Drum
Monocalcium Phosphate Monohydrate	H.T. MCP	50 Lb. Bag
Spray-Dried Grade 200	MCP Fines	50 Lb. Bag
Spray Dried Grade 110	MCP Regular	50 Lb. Bag
Spray-Dried Grade 130	MCP Granular	50 Lb. Bag
Tricalcium Phosphate	TCP	50 Lb. Bag
Tetracalcium Pyrophosphate Normal	TCPP	50 Lb. Bag
2. Sodium Phosphates		
Disodium Phosphate Anhydrous	DSPA	50 Lb. Bag
Disodium Phosphate Dihydrate	DSPD	50 Lb. Bag
Monosodium Phosphate Anhydrous	MSP	50 Lb. Bag
Sodium Acid Pyrophosphates		
Slowest Reacting Grade	SAPP RD-1	50 Lb. Bag
Second Slowest Grade	SAPP 26	50 Lb. Bag
Baking Powder Grade	SAPP 28	50 Lb. Bag
Fast Reacting Grade	SAPP 37	50 Lb. Bag
Doughnut Grade	SAPP 40	50 Lb. Bag
Fastest Reacting Grade	SAPP 43	50 Lb. Bag
Food Grade (Non-Leavening)	SAPP NL	50 Lb. Bag
Sodium Hexametaphosphate	SHMP	50 Lb. Bag
Sodium Tripolyphosphate	Nutrifos 088, Nutrifos BC	50 Lb. Bag
Sodium Tripolyphosphate Powder	Nutrifos STP Powder	50 Lb. Bag
STP/SHMP Blend	Nutrifos B-90	50 Lb. Bag
STP/SHMP Blend	Nutrifos B-75	50 Lb. Bag
Polyphosphate Blend	Nutrifos H-30	50 Lb. Bag
Sodium Potassium Tripolyphosphate	Nutrifos SK	50 Lb. Bag
STP/TSPP Blend	Nutrifos L-50	50 Lb. Bag
Sodium Polyphosphate Blend	Katch Fish Phosphate	50 Lb. Bag
Tetrasodium Pyrophosphate	TSPP	50 Lb. Bag
Trisodium Phosphate Anhydrous	TSPA	50 Lb. Bag
Trisodium Phosphate Decahydrate	TSP Crystalline	50 Lb. Bag
DSPA/IMP Blend	Emulsi-Phos 440	50 Lb. Bag
TSPA/IMP Blend	Emulsi-Phos 660	50 Lb. Bag
TSPA/IMP Blend	Emulsi-Phos 990	50 Lb. Bag
3. Sodium Aluminum Phosphates		
Sodium Aluminum Phosphate (SALP)	Levn-Lite	50 Lb. Bag
SALP + MCP Blend	Pan-O-Lite	50 Lb. Bag
SALP + AMCP Blend	Stabil-9	50 Lb. Bag
4. Ammonium Phosphates		
Monoammonium Phosphate	MAP Granular	50 Lb. Bag
	MAP Powder	50 Lb. Bag
Diammonium Phosphate	DAP Regular	50 Lb. Bag
	DAP Powder 2% TCP	50 Lb. Bag
5. Potassium Phosphates		
Monopotassium Phosphate	MKP	50 Lb. Bag
Tetrapotassium Pyrophosphate	TKPP (60% solution)	Bulk T.T.
6. Acidulants		
Phosphoric Acid	75%, 80%, 85%	Bulk
Adipic Acid	Adipic Acid	50 Lb. Bag

* Solutia can provide some products in bulk hopper trucks and semi-bulk supersacks

Glossary of Abbreviations

AMCP	Monocalcium Phosphate Anhydrous
DAP	Diammonium Phosphate
DCPA	Dicalcium Phosphate Anhydrous
DCPD	Dicalcium Phosphate Dihydrate
DMP	Leverage
DMPT	Mag-nificent
DSPA	Disodium Phosphate Anhydrous
DSPD	Disodium Phosphate Dihydrate
Emulsi-Phos 440	DSP & IMP
Emulsi-Phos 660	TSP & IMP
Emulsi-Phos 990	TSP & IMP
H.T. MCP	Monocalcium Phosphate Monohydrate
IMP	Insoluble Metaphosphate
Katch Fish Phosphate	Polyphosphate Blend
Leverage	DMP
Levn-Lite	SALP
Mag-nificent	DMPT
MAP	Monoammonium Phosphate
MCP	Monocalcium Phosphate
MKP	Monopotassium Phosphate
MSP	Monosodium Phosphate
Nutrifos STP Powder	STP
Nutrifos 088	STP
Nutrifos BC	STP
Nutrifos STP Powder	STP
Nutrifos B-90	STP & SHMP
Nutrifos B-75	STP & SHMP
Nutrifos H-30	Polyphosphate Blend
Nutrifos L-50	STP & TSPP
Nutrifos SK	SKTP
Pan-O-Lite	SALP & MCP
Py-Ran	AMCP
SALP	Sodium Aluminum Phosphate
SAPP	Sodium Acid Pyrophosphate
SHMP	Sodium Hexametaphosphate
SKTP	Sodium Potassium Tripolyphosphate
Stabil-9	SALP & AMCP
STP	Sodium Tripolyphosphate
STMP	Sodium Trimetaphosphate
TCP	Tricalcium Phosphate
TCPP	Tetracalcium Pyrophosphate
TKPP	Tetrapotassium Pyrophosphate
TSPA	Trisodium Phosphate Anhydrous
TSPC	Trisodium Phosphate Crystalline (Decahydrate)
TSPP	Tetrasodium Pyrophosphate

Glossary of Terms

Absorbant
A material which physically removes soluble or dispersed substances (e.g., colors, ions) from a solution or dispersion, and holds them at its surface.

Acid
A chemical substance (e.g., phosphoric acid) whose properties include the ability to react with bases or alkalis in water solutions to form salts.

Aerating
Supply of air or gas to bakery products; high-aerating emulsifiers increase the amount of trapped air and create a lighter baked product.

Bacteriophage
A virus capable of replicating in a bacterial cell; can destroy bacterial cultures used in cheese fermentation.

Brine
A concentrated solution of sodium chloride with other ingredients used for treating meat or poultry. Polyphosphates are an important component.

Buffer
A substance that stabilizes pH; used in foods and pharmaceuticals.

CFR
The Code of Federal Regulation which lists regulations published by Federal regulatory agencies; FDA is listed in Title 21 and USDA in Title 9.

Carbon Dioxide
The gas produced by the action of acid with baking soda; also by yeast during the fermentation of carbohydrates.

Casein
The major protein present in milk (about 80%).

Chelating Agent
A special type of sequestering agent that reacts with metallic ions in water and with other substances. Many are organic compounds, but polyphosphates and other materials are also very effective. (See Sequestering Agent.)

Chelation
Holding or trapping a metal ion between two atoms of a single molecule; often used as a synonym for sequester.

Clarification
A process for clearing a turbid solution by removing dispersed insoluble particles or color bodies.

Coagulant
A material which has the ability to cause small particles in a dispersion to agglomerate, which can then be removed.

Color Development
(Red meat color) Forms from the reaction of nitrite with myoglobin, an iron-containing protein. Processing conditions often do not allow sufficient time for full color to develop. The addition of pyrophosphate lowers the pH and thus accelerates the color development while maintaining suitable emulsion conditions in such products as frankfurters, sausages, etc.

Comminuted
Material which has been chopped or ground to small particle sizes (e.g., hamburger, sausages).

Cryoprotection
Protecting various properties during freezing (e.g., meat texture, water retention).

Cure
Imparting a unique flavor and/or color to a food, especially as applied to meats, and which generally also results in increased shelf life.

Denaturation
A process in which a protein structure is changed by treatment with a chemical, heat, radiation, shear, etc.

Dispersing Agent
A material that increases the stability of particles in a liquid (e.g., minimizes settling or agglomeration).

Double Acting
A leavening system that provides leavening action during mixing, is dormant during bench holding, and is reactivated and generates carbon dioxide during baking.

Dough Rate of Reaction (DRR)
The rate of carbon dioxide released during mixing and in the holding period of the bakery product. The rate number is the percentage of CO_2 released at a given time compared with the total available CO_2 from the bicarbonate.

Emulsification
The process of dispersing one liquid into another liquid with which it is immiscible or insoluble. In process cheese and meats, phosphates will cause solubilization of proteins which then form a coating around fat particles, making the modified fats disperse or become miscible with the water.

Glossary of Terms

Emulsifier
Substances which modify the surface tension of components in a dispersion and enable the formation of a uniform single phase dispersion or emulsion.

Emulsion
A homogeneous, uniform system formed by initially incompatible liquid phases (e.g., oil and water, air and batter).

Esterification
The process of forming an ester by the reaction of an acid and an alcohol.

FCC
The Food Chemicals Codex: A publication listing properties and tests for food additives. Although it is published in the U.S., many other countries also use it as a standard.

FDA
The U.S. Food and Drug Administration which is responsible for implementing federal legislation for regulating the food and drug industries in the U.S.

Flow Conditioner
Substances added to finely divided powdered or crystalline products to minimize caking, lumping or agglomeration.

Gelation
The process of converting a liquid to a non-flowing phase. Starches in cereal products absorb water from the batter to undergo gelatinization.

GRAS
The abbreviation used to refer to Generally Recognized As Safe – listing in the CFR of approved food additives. There are two lists – the second listing is identified as Reaffirmed As Generally Recognized As Safe. This refers to materials which have been re-evaluated as safe. These listing are found in Title 21, Parts 182 and 184, respectively.

Hydrophilic
Water-loving. A descriptive term applied to materials which are preferentially wet by water rather than non-aqueous materials.

Hydrophobic
Water-hating. The opposite of hydrophilic and applied to materials which are preferentially wet by non-aqueous materials.

Inorganic
Substances which are generally comprised of elements other than carbon (e.g., salts, minerals).

Isoelectric
A property at which proteins exhibit no electrical charge and will generally precipitate.

Isotonic
Compositions in which the electrolytes are present at the same concentrations as in body fluids.

Leavening
The process of expanding dough or batter by generating a gas (e.g., carbon dioxide by the fermentation of carbohydrate with yeast, or chemically by the neutralization of bicarbonates by acids).

Leavening Acid
A dry powder which provides acid when dissolved or solubilized in water and then reacts with sodium bicarbonate to generate carbon dioxide.

Meat Binding
The process of adhering meat pieces together into a cohesive whole.

Meltability
The melting characteristics of process cheese under various cooking conditions.

Mineral Supplementation
The addition of substances (e.g., calcium phosphates) to foods to increase their nutritional characteristics.

NF
National Formulary, a compendium listing materials approved for use in over-the-counter drugs and which includes required specifications and test methods.

Neutralize
A process in which acidic or alkaline material react. If equal molar quantities are used, the composition will contain no free acid or base and will have a neutral pH of 7.

Neutralizing Value
The parts of soda neutralized by 100 parts of leavening acid.

Nucleation
Formation of many small bubbles in the batter when mixing. The bubbles expand in size during baking producing a fine cell structure.

Nutrient
A substance metabolized by microorganisms as part of their growth cycle.

Available Literature

Included with all the products from Solutia comes our commitment to serve your information needs. For the products described in this brochure, the following information can be requested:

- Material Safety Data Sheets
- Specification Sheets
- Kosher Certification
- Nutritional Data Sheets

In addition, here's a sampling of the literature you can obtain regarding Solutia Food Phosphates:

- Leavening Phosphates by Solutia
- Leavening Agent Calculator
- Solutia Phosphoric Acid: A Guide to Applications, Handling and Storage
- Katch® Fish Phosphates by Solutia
- Nutrifos® Polyphosphates for Meat, Poultry and Seafood Applications
- Adipic Acid
- Dicalcium Phosphate Dihydrate - Dentifrice Code 260

For copies of available literature, contact your Solutia sales representative or technical specialist. Some literature is also available in other languages. Please refer to the listing of sales offices on the back cover.

Applications Index

Applications are summarized in Table F on pages 28-29.

Product Index

"Functions of Solutia Food Phosphates" are summarized in Table A on pages 4-5.

"Properties of Solutia Food Phosphates" are summarized in Table G on pages 30-31.

Technical/Customer Services

Solutia employs a staff of food scientists who have worked with the food industry for many years. Through cooperative studies and application research, we have developed new products to meet industry needs. A computer software program has been developed for Solutia customers to assist them with calculations and application development. This program provides interactive and accessible technical information in computer software format to increase efficiency. Please contact us today for assistance at 1-800-244-6169 (Food Phosphates Group) or by FAX at 314-674-7005.

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SOLUTIA™

Applied Chemistry, Creative Solutions™

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www.solutia.com

Material Safety Data Sheet

A. FMC and Astaris – Disodium Phosphate, Disodium Phosphate Anhydrous, Dihydrate

B. Astaris – Sodium Hexametaphosphate

C. Astaris – Trisodium Phosphate Anhydrous

Material Safety Data Sheet

A. FMC and Astaris – Disodium Phosphate
B. Astaris – Sodium Hexametaphosphate
C. Astaris – Trisodium Phosphate Anhydrous

MATERIAL SAFETY DATA

1078

FMC

DISODIUM PHOSPHATE

7558 -79 -4

U.S./CANADA VERSION EFFECTIVE: 07/20/93 PRINTED: 06/14/96

PRINTED FOR..... INDEPENDENT CHEMICAL CORP
79-51 COOPER AVE
GLENDALE NY 11385

1. CHEMICAL PRODUCT/COMPANY IDENTIFICATION

PRODUCT NAME.....: DISODIUM PHOSPHATE
SYNONYMS.....: DISODIUM ORTHOPHOSPHATE; DISODIUM HYDROGEN PHOSPHATE; SODIUM PHOSPHATE, DIBASIC; DSP; DISODIUM MONOPHOSPHATE
INFORMATION PROVIDED BY..: FMC CORPORATION
1735 MARKET STREET
PHILADELPHIA PA 19103

EMERGENCY PHONE NUMBERS
CHEMTREC.....: (800) 424-9300
MEDICAL.....: (303) 595-9048 CALL COLLECT
PLANT/OTHER.....: CHEMTREC: (800) 424-9300 TRANSPORTATION

2. COMPOSITION/INFORMATION ON INGREDIENTS

CAS # AND COMPONENTS.....: 7558-79-4
DISODIUM PHOSPHATE

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW.....: PRODUCT IS NOT CONSIDERED HAZARDOUS BY KNOWN GOVERNMENTAL DEFINITIONS. HOWEVER, CONTINUOUS CONTACT MAY CAUSE SKIN IRRITATION.

HEALTH EFFECTS.....: MINIMALLY TO MODERATELY IRRITATING TO UNWASHED EYES AND MINIMALLY TO MILDLY IRRITATING TO WASHED EYES IN RABBITS. SKIN IRRITATION FROM CONTINUOUS CONTACT HAS BEEN REPORTED DURING MANUFACTURING WHEN PROTECTIVE MEASURES FOR CONTACT OR PERSONAL HYGIENE PROCEDURES ARE NOT FOLLOWED.
HUMAN INDUSTRIAL EXPERIENCE HAS SHOWN NO SIGNIFICANT INHALATION HAZARD OR SKIN IRRITATION WHEN EXPOSURES ARE PROPERLY CONTROLLED. EXPOSURE MONITORING INDICATES THAT THE AMOUNT OF RESPIRABLE DUST IN THE PRODUCT IS LOW.
THERE HAVE BEEN NO MEDICAL CONDITIONS REPORTED AS BEING AGGRAVATED BY EXPOSURE.

4. FIRST AID MEASURES

EYES.....: FLUSH EYES WITH LARGE AMOUNTS OF WATER. IF IRRITATION OCCURS AND PERSISTS, OBTAIN MEDICAL ATTENTION.

SKIN.....: WASH WITH PLENTY OF SOAP AND WATER. GET MEDICAL ATTENTION IS IRRITATION OCCURS AND PERSISTS.

INHALATION.....: REMOVE TO FRESH AIR. IF BREATHING DIFFICULTY

(CONTINUED) PAGE 01

4. FIRST AID MEASURES

	OR DISCOMFORT OCCURS AND PERSISTS, OBTAIN MEDICAL ATTENTION.
INGESTION:	DRINK PLENTY OF WATER. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. IF ANY DISCOMFORT PERSISTS, OBTAIN MEDICAL ATTENTION.
NOTES TO PHYSICIAN:	LARGE DOSES MAY CAUSE NAUSEA, VOMITING AND DIARRHEA. SYSTEMIC ORAL TOXICITY IS EXTREMELY RARE AND HAS CONSISTED OF ACIDOSIS AND HYPOCALCEMIC TETANY.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA:	PRODUCT IS NONCOMBUSTIBLE
SPECIAL FIREFIGHTING PROCEDURES:	NOT APPLICABLE
DEGREE OF FIRE AND EXPLOSION HAZARD:	NONE
HAZARDOUS DECOMPOSITION PRODUCTS:	NONE

6. ACCIDENTAL RELEASE MEASURES

PROCEDURE FOR RELEASE OR SPILL:	MATERIAL SHOULD BE SWEPT UP FOR SALVAGE OR DISPOSAL.

7. HANDLING AND STORAGE

HANDLING:	ANIMAL STUDIES AND MANUFACTURING EXPERIENCE INDICATE THAT EXPOSURE TO THE PRODUCT MAY RESULT IN EYE AND SKIN IRRITATION UNDER NORMAL CONDITIONS OF USE. IN THE EVENT OF CONTACT, IMMEDIATELY FLUSH EYES WITH WATER; WASH OFF SKIN.
VENTILATION:	CONTROL MEASURES SUCH AS LOCAL EXHAUST VENTILATION MAY BE REQUIRED WHERE EXCESSIVE AIRBORNE DUST LOADING MAY BE PRESENT.
STORAGE:	THE PRODUCT SHOULD BE STORED IN A CLEAN DRY AREA TO MAINTAIN PRODUCT QUALITY AND TO PREVENT POSSIBLE CONTAMINATION BY OTHER CHEMICALS.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

CONTROL MEASURES:	PREVENTION OF EYE AND SKIN CONTACT MAY BE REQUIRED UNDER NORMAL USE CONDITIONS. HOWEVER, SEVERE AGITATION OR DISPERSION INTO THE WORK ENVIRONMENT MAY REQUIRE ENCLOSURE OF THE PROCESS AND LOCAL EXHAUST VENTILATION AT THE SOURCE TO PREVENT RELEASE INTO AIR. IF WORK ENVIRONMENT CONTROLS ARE NOT IMPLEMENTED, THEN PERSONAL

(CONTINUED) PAGE 02

MATERIAL SAFETY DATA

DISODIUM PHOSPHATE

FMC

7558 -79 -4

U.S./CANADA VERSION EFFECTIVE: 07/20/93 PRINTED: 06/14/96

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

PROTECTION FOR INHALATION, SKIN AND EYE MAY BE REQUIRED.

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT	
RESPIRATORY	USE APPROVED DUST RESPIRATORY PROTECTION IF RELEASE OF THE PRODUCT INTO THE WORK AREA IS EXPECTED.
EYES	WEAR CHEMICAL GOGGLES, WHEN AIRBORNE DUST IS EXPECTED.
GLOVES	USE IMPERVIOUS GLOVES WHEN CONTINUOUS CONTACT IS EXPECTED.
SPECIAL CLOTHING AND EQUIPMENT	USE LONG SLEEVE WORK SHIRT TO REDUCE EXPOSED SKIN AREA.
FOOTWEAR	NO SPECIAL REQUIREMENT

9. PHYSICAL AND CHEMICAL PROPERTIES

MELTING/FREEZING POINT	-H20,180*C
BOILING POINT	NOT APPLICABLE
VAPOR PRESSURE	NON-VOLATILE
VAPOR DENSITY (AIR=1)	NON-VOLATILE
ROOM TEMPERATURE APPEARANCE AND STATE	WHITE GRANULES OR POWDER
ODOR	NONE
SPECIFIC GRAVITY (H20=1)	BULK DENSITY 0.8 G/ML
SOLUBILITY IN H20 % BY WT	12 @ 25*C
% VOLATILES	NON-VOLATILE
EVAPORATION RATE (BUTYL ACETATE=1)	NON-VOLATILE
PH (AS IS)	NOT APPLICABLE
PH (1% SOLUTION)	9
ODOR THRESHOLD	NOT APPLICABLE
DENSITY (G/ML)	CA 0.8
PARTITION COEFFICIENT N-OCTANOL/WATER	NOT AVAILABLE
FLASH POINT	NON COMBUSTIBLE
AUTOIGNITION TEMPERATURE	NON COMBUSTIBLE
FLAMMABLE LIMITS (AIR) UPPER	NOT APPLICABLE
FLAMMABLE LIMITS (AIR) LOWER	NOT APPLICABLE
EXPLOSIVE PROPERTIES	NONE
OXIDIZING PROPERTIES	NONE
SOLUBILITY - FAT SOLUBILITY (SOLVENT - OIL)	NOT AVAILABLE

10. STABILITY AND REACTIVITY

STABILITY	PRODUCT IS STABLE.
HAZARDOUS POLYMERIZATION	WILL NOT OCCUR

(CONTINUED) PAGE 03

MATERIAL SAFETY DATA

DISODIUM PHOSPHATE

FMC

7558 -79 -4

U.S./CANADA VERSION EFFECTIVE: 07/20/93 PRINTED: 06/14/96

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID.....	NOT APPLICABLE
MATERIALS TO AVOID.....	NOT APPLICABLE
MAJOR CONTAMINANTS THAT CONTRIBUTE TO INSTABILITY	NONE
INCOMPATIBILITY.....	NONE
HAZARDOUS DECOMPOSITION PRODUCTS	NONE
SENSITIVITY TO MECH IMPACT	NONE
SENSITIVITY TO STATIC DISCHARGE	NONE

11. TOXICOLOGICAL INFORMATION

EYE CONTACT.....	MINIMALLY IRRITATING TO UNWASHED EYES; PRACTICALLY NONIRRITATING TO WASHED EYES (RABBIT). SOURCE: FMC REPORT I86-0931 DATE: 1986
SKIN CONTACT.....	MILD IRRITANT SOURCE: RTECS DATE: 1981-82
SKIN ABSORPTION.....	NO PUBLISHED DATA
INHALATION.....	NO PUBLISHED DATA
INGESTION.....	NO SIGNIFICANT HAZARD EXPECTED SOURCE: FED. REG. 44 (244): 74845 DATE: 1979
ACUTE EFFECTS FROM OVEREXPOSURE	NO HUMAN DATA AVAILABLE. ANIMAL EYE IRRITATION STUDIES NOTE THIS MATEIAL IS A MINIMAL IRRITANT TO UNWASHED EYES AND NON-IRRITATANT TO WASHED EYES; IT IS A MILD SKIN IRRITANT.
CHRONIC EFFECTS FROM OVEREXPOSURE (EFFECTS CONSIDERED INCLUDE: SENSITIVITIES, CARCINOGENICITY, TERATOGENICITY, MUTAGENICITY, SYNERGISTIC PRODUCTS, AND ANY MEDICAL CONDITIONS GENERALLY RECOGNIZED AS BEING AGGRAVATED BY EXPOSURE.)	HUMAN INDUSTRIAL EXPERIENCE HAS SHOWN NO SIGNIFICANT INHALATION HAZARD OR SKIN IRRITATION WHEN GOOD PERSONAL HYGIENE PRACTICES ARE FOLLOWED.

(CONTINUED) PAGE 04

MATERIAL SAFETY DATA

DISODIUM PHOSPHATE

FMC

7558 -79 -4

U.S./CANADA VERSION EFFECTIVE: 07/20/93 PRINTED: 06/14/96

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE.....: INORGANIC PHOSPHATES IN CONTACT WITH THE SOIL, SUB-SURFACE OR SURFACE WATERS MAY BE TAKEN UP BY PLANTS AND UTILIZED AS ESSENTIAL NUTRIENTS. PHOSPHATES MAY ALSO FORM PRECIPITATES, USUALLY WITH CALCIUM OR MAGNESIUM. THE RESULTANT COMPOUNDS ARE INSOLUBLE IN WATER AND BECOME A PART OF THE SOIL OR SEDIMENT. THE TERM BIODEGRADABILITY, AS SUCH, IS NOT APPLICABLE TO INORGANIC COMPOUNDS.

ENVIRONMENTAL EFFECTS....: AQUATIC TOXICITY DATA
96 HR LC50 > 100 MG/L, NON-TOXIC (RAINBOW TROUT, INLAND SILVERSIDES AND MYSID SHRIMP) FMC STUDIES I89-1085, -1086 & -1087
48 HR EC50 > 100 MG/L, NON-TOXIC (DAPHNIA MAGNA) FMC STUDY I89-1088

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD....: THIS PRODUCT DOES NOT PRESENT A DANGER OR HAZARD FOR DISPOSAL. EXCEPT FOR FOOD APPLICATIONS, SALVAGE AND RETURN TO CONTAINER, PROCESS OR RECYCLE FOR OTHER USES. MAY BE DISPOSED OF IN LANDFILLS ACCORDING TO APPLICABLE REGULATIONS.

14. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME.	NONE; NOT REGULATED
IATA	NONE; NOT REGULATED
IMDG	NONE; NOT REGULATED
DOT CLASSIFICATION	NOT REGULATED
DOT LABELS	NOT REQUIRED
DOT MARKING	NOT REQUIRED
DOT PLACARD	NOT REQUIRED
UN NUMBER	NONE
HAZARDOUS SUBSTANCE/RQ	NOT LISTED
49 STCC NUMBER	NONE
PRECAUTIONS TO BE TAKEN IN TRANSPORTATION	NONE
OTHER SHIPPING INFORMATION	NONE

15. REGULATORY INFORMATION

OSHA
EXPOSURE LIMITS

SUBSTANCE(S)	DISODIUM PHOSPHATE
OSHA PEL-TWA	NOT APPLICABLE
STEL	NOT APPLICABLE
CEILING	NOT APPLICABLE

(CONTINUED) PAGE 05

MATERIAL SAFETY DATA

DISODIUM PHOSPHATE

FMC

7558 -79 -4

U.S./CANADA VERSION EFFECTIVE: 07/20/93 PRINTED: 06/14/96

15. REGULATORY INFORMATION

SKIN DESIGNATION.:	NOT APPLICABLE
ACGIH TLV-TWA.....:	NOT APPLICABLE
STEL.....:	NOT APPLICABLE
CEILING.....:	NOT APPLICABLE
SKIN DESIGNATION.:	NOT APPLICABLE
TARGET ORGAN EFFECTS.....:	NOT APPLICABLE
CARCINOGENIC POTENTIAL...:	DISODIUM PHOSPHATE
REGULATED BY OSHA.....:	NO
LISTED ON NTP REPORT...:	NO
IARC GROUP 1, 2A, 2B...:	NO
U.S. EPA REQUIREMENTS	
RELEASE REPORTING	
CERCLA (40 CFR 302)	
LISTED SUBSTANCE(S)....:	NOT LISTED
RQ.....:	NOT APPLICABLE
CATEGORY.....:	NOT APPLICABLE
RCRA WASTE NO....:	NOT APPLICABLE
UNLISTED SUBSTANCE(S)..:	NOT APPLICABLE
RQ.....:	NOT APPLICABLE
CHARACTERISTIC...:	NOT APPLICABLE
RCRA WASTE NO....:	NOT APPLICABLE
SARA TITLE III SEC 313	
(40 CFR 372).....:	NOT LISTED
LISTED TOXIC CHEMICAL..:	NOT LISTED
INVENTORY REPORTING	
SARA TITLE III SEC 311/312	
(40 CFR 370)	
SUBSTANCE(S).....:	NOT LISTED
HAZARD CATEGORY.....:	NOT APPLICABLE
PLANNING THRESHOLD.....:	NOT APPLICABLE
EMERGENCY PLANNING	
SARA TITLE III SEC 302-303	
(40 CFR 355)	
LISTED SUBSTANCE(S)....:	NOT APPLICABLE
RQ.....:	NOT APPLICABLE
PLANNING THRESHOLD.....:	NOT APPLICABLE
U.S. TSCA STATUS.....:	LISTED IN INVENTORY
CANADA	
INGREDIENT DISCLOSURE LIST	
SUBSTANCE(S).....:	NOT LISTED
CONTROLLED PRODUCT.....:	NO
HAZARD SYMBOLS.....:	NOT APPLICABLE
CLASS & DIVISION.....:	NOT APPLICABLE
PRODUCT IDENTIFICATION NO:	NOT APPLICABLE
DOMESTIC SUBSTANCE LIST..:	LISTED
CEPA PRIORITY LIST.....:	NOT LISTED
CARCINOGENICITY	
ACGIH APPENDIX A.....:	NO
A1 - CONFIRMED HUMAN...:	NOT LISTED

(CONTINUED) PAGE 06

15. REGULATORY INFORMATION

A1 - SUSPECTED HUMAN...	NOT LISTED
IARC GROUP 1 OR 2.....	NOT LISTED
LABEL LANGUAGE (US/CANADA)	
HEALTH.....	NOT HAZARDOUS BY OSHA NOR CANADIAN WHMIS DEFINITION.
PHYSICAL.....	NOT APPLICABLE
HANDLING AND STORAGE...	STORE CLEAN DRY AREA. FOR FOOD APPLICATIONS STORE AWAY FROM POSSIBLE CONTAMINATION.
FIRST AID.....	IN CASE OF EYE OR SKIN CONTACT , FLUSH WITH PLENTY OF WATER. IF IRRITATION PERSISTS, OBTAIN MEDICAL ASSISTANCE.
STATE REGULATIONS.....	CONTAINS CHEMICALS FROM CALIFORNIA "PROP 65" LISTS OF CARCINOGENS AND REPRODUCTIVE TOXINS: PPM MAXIMUM ARSENIC 3, CADMIUM 2 AND LEAD 0.7.

16. OTHER INFORMATION

PRODUCT USES.....	BOILER WATER CONDITIONER, CATTLE FEED SUPPLEMENT PIGMENTS, DETERGENTS, TEXTILE WEIGHTING AND DYEING, BUFFER, EMULSIFIER, PRECIPITANT FOR CALCIUM. ALSO IN EVAPORATED MILK, PROCESS CHEESE, PRECOOKED MEATS, PHARMACEUTICALS, AND LAXATIVES. MAY BE USED TO TREAT DRINKING WATER UP TO 14.3 MG/L.
NFPA 704	
HEALTH.....	0
FLAMMABILITY.....	0
REACTIVITY.....	0
SPECIAL HAZARD.....	NONE
(DEGREE OF HAZARD 0 = NO HAZARD 4 = SEVERE HAZARD)	

THE CONTENTS AND FORMAT OF THIS MSDS ARE IN ACCORDANCE WITH OSHA HAZARD COMMUNICATION AND CANADA"S WORKPLACE HAZARDOUS MATERIAL INFORMATION SYSTEM (WHMIS)

POTENTIAL HEALTH EFFECTS

Likely Routes of Exposure: skin contact and inhalation

EYE CONTACT: No more than slightly irritating based on toxicity studies. The dry powder may cause foreign body irritation in some individuals.

SKIN CONTACT: No more than slightly toxic or slightly irritating based on toxicity studies. Prolonged contact with the dry powder may cause drying or chapping of the skin.

INHALATION: Inhalation of the dust may cause coughing and sneezing.

INGESTION: Is not toxic if swallowed based on toxicity studies. No significant adverse health effects are expected to develop if only small amounts (less than a mouthful) are swallowed. Swallowing large amounts may cause abdominal discomfort and diarrhea.

Refer to Section 11 for toxicological information.

4. FIRST AID MEASURES

IF IN EYES OR ON SKIN, immediate first aid is not likely to be required. However, this material can be removed with water. Wash heavily contaminated clothing before reuse.

IF INHALED, immediate first aid is not likely to be required. However, if symptoms occur, remove to fresh air. Remove material from eyes, skin and clothing.

IF SWALLOWED, immediate first aid is not likely to be required. A physician or Poison Control Center can be contacted for advice. Wash heavily contaminated clothing before reuse.

5. FIRE FIGHTING MEASURES

FLASH POINT: not combustible

HAZARDOUS PRODUCTS OF COMBUSTION: not applicable

EXTINGUISHING MEDIA: not applicable

UNUSUAL FIRE AND EXPLOSION HAZARDS: none

6. ACCIDENTAL RELEASE MEASURES

In case of spill, sweep, scoop or vacuum all material, contaminated soil and other contaminated material and place in clean, dry containers for removal. If possible, complete cleanup on a dry basis. After all practical dry cleanup has been done, residual contamination can be flushed with plenty of water.

Refer to Section 13 for disposal information and Sections 14 and 15 for reportable

quantity information.

7. HANDLING AND STORAGE

Handling:

HANDLE IN ACCORDANCE WITH GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES. THESE PRACTICES INCLUDE AVOIDING UNNECESSARY EXPOSURE AND REMOVAL OF MATERIAL FROM EYES, SKIN, AND CLOTHING.

STORAGE: Product is slightly hygroscopic and should be stored in a dry area to prevent moisture pickup and caking.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE PROTECTION: This product does not cause significant eye irritation or eye toxicity requiring special protection. Use good industrial practice to avoid eye contact.

SKIN PROTECTION: Although this product does not present a significant skin concern, minimize skin contamination by following good industrial practice. Wearing protective gloves is recommended. Wash hands and contaminated skin thoroughly after handling.

RESPIRATORY PROTECTION: Avoid breathing dust. Use NIOSH/MSHA approved respiratory protection equipment when airborne exposure is excessive. Consult the respirator manufacturer to determine appropriate type equipment for a given application. Observe respirator use limitations specified by NIOSH/MSHA or the manufacturer. Respiratory protection programs must comply with 29 C.F.R. 1910.134.

VENTILATION: Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits (see below). The use of local mechanical exhaust ventilation is preferred at sources of air contamination such as open process equipment.

AIRBORNE EXPOSURE LIMITS:

OSHA and ACGIH have not established specific exposure limits for this material. However, OSHA and ACGIH have established limits for particulates not otherwise regulated (PNOR) and particulates not otherwise classified (PNOC) which are the least stringent exposure limits applicable to dusts.

OSHA PEL	ACGIH TLV
15 mg/m3 (total dust) 8-hr. TWA	10 mg/m3 (inhalable) 8-hr. TWA
5 mg/m3 (respirable) 8-hr. TWA	3 mg/m3 (respirable) 8-hr. TWA

9. PHYSICAL AND CHEMICAL PROPERTIES

Chemical Formula:	Na2HPO4
Appearance:	white granules or powder

Odor:	none	
pH:	9.0 (as a 1% solution)	
Solubility in Water:	(g./100 g. H2O):	1.7 @ 0 degrees C
		11.5 @ 25 degrees C
		51.7 @ 40 degrees C
		78.8 @ 60 degrees C
		102.4 @ 100 degrees C

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

STABILITY: Product is stable under normal conditions of storage and handling. Store in a cool, dry place to maintain product performance.

MATERIALS TO AVOID: none known

HAZARDOUS DECOMPOSITION PRODUCTS: none

HAZARDOUS POLYMERIZATION: will not occur

11. TOXICOLOGICAL INFORMATION

The dry powder or granules may cause foreign body irritation in some individuals. Prolonged contact with the dry powder may cause drying or chapping of the skin. Due to the high alkalinity of this product, prolonged contact with the eyes or skin may cause slight irritation. Inhalation of dust has been reported to produce a mild drying effect on the respiratory tract membranes of exposed workers. Excessive inhalation of dust may be annoying and can mechanically impede respiration.

Sodium phosphates have been used as therapeutic agents in medicinal preparations for their laxative effects. These phosphate salts are incompletely absorbed from the intestinal tract. Due to their osmotic activity, they draw water into the intestine and produce purging.

Data from Solutia single-dose (acute) animal studies with this material are given below:

Oral - rat LD50: 5,950 mg/kg; practically nontoxic
Dermal - rabbit LD50: >7,940 mg/kg; practically nontoxic
Eye Irritation - rabbit: 4.2/110.0; slightly irritating
Skin Irritation - rabbit: 0.0/8.0 (24-hr. exp.); nonirritating
DOT skin corrosion - rabbit (4-hr. exp.): not corrosive

This product (in anhydrous and hydrated forms) has produced no genetic changes in standard tests using bacterial cells.

12. ECOLOGICAL INFORMATION

The following data have been classified using the criteria adopted by the European Economic Community (EEC) for aquatic organism toxicity. A legend summarizing the classification scheme appears below.

This product (in anhydrous and hydrated forms) has produced no genetic changes in standard tests using bacterial cells.

No algal toxicity data was available for this material.

Legend for Aquatic Organism Toxicity (Journal of the European Communities, Annex VII A, Section 5.2.1)

Values	Classifications
LC50 or EC50 < or = 1.0 mg/L	Very Toxic
LC50 or EC50 > 1.0 mg/L and < or = 10 mg/L	Toxic
LC50 or EC50 > 10 mg/L and < or = 100 mg/L	Harmful
LC50 or EC50 > 100 mg/L	Practically Nontoxic

No biodegradation data was available for this material.

13. DISPOSAL CONSIDERATIONS

This material when discarded is not a hazardous waste as that term is defined by the Resource, Conservation and Recovery Act (RCRA), 40 CFR 261. Dry material may be landfilled or recycled in accordance with local, state and federal regulations. Consult your attorney or appropriate regulatory officials for information on such disposal.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT Classification: (contains	Environmentally hazardous substance, solid, n.o.s.
	sodium phosphate, dibasic), 9, UN3077, III *
US DOT Label:	Class 9 *
US DOT Reportable Quantity: of sodium	Packages of 5,000 lbs or more contain a 5,000 lb. RQ
	phosphate, dibasic

IMDG Code: See US DOT

IATA/ICAO: See US DOT

* Applies only to packages containing an RQ quantity, and for shipments by water within the US Coastal Waterway.

15. REGULATORY INFORMATION

TSCA Inventory:
Listed as phosphoric acid, disodium salt

SARA Hazard Notification:
Hazard Categories Under Title III Rules (40 CFR 370): not applicable
Section 302 Extremely Hazardous Substances: not applicable
Section 313 Toxic Chemical(s): not applicable

CERCLA Reportable Quantity: 5,000 lb. RQ of sodium phosphate, dibasic

Release of more than 5,000 lbs. of this product into the environment, must be reported to the National Response Center (800-424-8802 or 202-426-2675).

Refer to Section 11 for OSHA Hazardous Chemical(s) and Section 13 for RCRA classification.

16. OTHER INFORMATION

Reason for revision: Routine review and conversion to the 16 section format. Also added new name and logo. Supersedes MSDS dated 2/03/92.

This material is certified to ANSI/NSF Standard 60 by NSF® International for use in potable water systems.

Dspa.997

ASTARIS

Material Safety Data Sheet

Responsible Care®
A Public Commitment

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: DISODIUM PHOSPHATE ANHYDROUS

Reference Number: AST10007 Date: December 21, 2000

Chemical Family: Phosphate Salts

Chemical Name: Phosphoric Acid, Disodium Salt

Company Information:

ASTARIS LLC
622 Emerson Road - Suite 500
St. Louis, Missouri 63141

Emergency telephone: In USA call CHEMTREC: 1-800-424-9300
In Canada call CANUTEC: 1-613-996-6666

General Information: 1-800-244-6169

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	% by weight
Disodium Phosphate Anhydrous	7558-79-4	100

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance and Odor: White granules or powder with no odor

WARNING STATEMENTS

NO SIGNIFICANT HAZARDS ASSOCIATED WITH THIS MATERIAL

POTENTIAL HEALTH EFFECTS

Likely Routes of Exposure: Skin contact and inhalation

EYE CONTACT: No more than slightly irritating based on toxicity studies. The dry powder may cause foreign body irritation in some individuals.

SKIN CONTACT: No more than slightly toxic or slightly irritating based on toxicity studies. Prolonged contact with the dry powder may cause drying or chapping of the skin.

INHALATION: Inhalation of the dust may cause coughing and sneezing.

INGESTION: Is not toxic if swallowed based on toxicity studies. No significant adverse health effects are expected to develop if only small amounts (less than a mouthful) are swallowed. Swallowing large amounts may cause abdominal discomfort and diarrhea.

Refer to Section 11 for toxicological information.

4. FIRST AID MEASURES

IF IN EYES OR ON SKIN, immediate first aid is not likely to be required. However, this material can be removed with water. Remove material from eyes, skin and clothing. Wash heavily contaminated clothing before reuse.

IF INHALED, immediate first aid is not likely to be required. However, if symptoms occur, remove to fresh air. Remove material from skin and clothing.

IF SWALLOWED, immediate first aid is not likely to be required. A physician or Poison Control Center can be contacted for advice. Remove material from skin and clothing. Wash heavily contaminated clothing before reuse.

5. FIRE FIGHTING MEASURES

FLASH POINT: Not combustible

HAZARDOUS PRODUCTS OF COMBUSTION: Not applicable

EXTINGUISHING MEDIA: Not applicable

UNUSUAL FIRE AND EXPLOSION HAZARDS: None

6. ACCIDENTAL RELEASE MEASURES

In case of spill, sweep, scoop or vacuum all material, contaminated soil and other contaminated material and place in clean, dry containers for removal. If possible, complete cleanup on a dry basis. After all practical dry cleanup has been done, residual contamination can be flushed with plenty of water.

Refer to Section 13 for disposal information and Sections 14 and 15 for reportable quantity information.

7. HANDLING AND STORAGE

Handling:

HANDLE IN ACCORDANCE WITH GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES. THESE PRACTICES INCLUDE AVOIDING UNNECESSARY EXPOSURE AND REMOVAL OF MATERIAL FROM EYES, SKIN, AND CLOTHING.
STORAGE: Product is slightly hygroscopic and should be stored in a dry area to prevent moisture pickup and caking.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE PROTECTION: This product does not cause significant eye irritation or eye toxicity requiring special protection. Use good industrial practice to avoid eye contact.

SKIN PROTECTION: Although this product does not present a significant skin concern, minimize skin contamination by following good industrial practice. Wearing protective gloves is recommended. Wash hands and contaminated skin thoroughly after handling.

RESPIRATORY PROTECTION: Avoid breathing dust. Use NIOSH/MSHA approved respiratory protection equipment when airborne exposure is excessive. Consult the respirator manufacturer to determine appropriate type equipment for a given application. Observe respirator use limitations specified by NIOSH/MSHA or the manufacturer. Respiratory protection programs must comply with 29 C.F.R. 1910.134.

VENTILATION: Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits (see below). The use of local mechanical exhaust ventilation is preferred at sources of air contamination such as open process equipment.

AIRBORNE EXPOSURE LIMITS:

OSHA and ACGIH have not established specific exposure limits for this material. However, OSHA and ACGIH have established limits for particulates not otherwise regulated (PNOR) and particulates not otherwise classified (PNOC) which are the least stringent exposure limits applicable to dusts.

OSHA PEL	ACGIH TLV
15 mg/m3 (total dust) 8-hr. TWA	10 mg/m3 (inhalable) 8-hr. TWA
5 mg/m3 (respirable) 8-hr. TWA	3 mg/m3 (respirable) 8-hr. TWA

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure limits legislated for the province in which the substance will be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Chemical Formula:	Na_2HPO_4	
Appearance:	White granules or powder	
Odor:	None	
pH:	9.0 (as a 1% solution)	
Solubility in Water:	(g./100 g. H2O):	1.7 @ 0 degrees C
		11.5 @ 25 degrees C
		51.7 @ 40 degrees C
		78.8 @ 60 degrees C

102.4 @ 100 degrees C

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

STABILITY: Product is stable under normal conditions of storage and handling. Store in a cool, dry place to maintain product performance.

MATERIALS TO AVOID: None known

HAZARDOUS DECOMPOSITION PRODUCTS: None

HAZARDOUS POLYMERIZATION: Will not occur

11. TOXICOLOGICAL INFORMATION

The dry powder or granules may cause foreign body irritation in some individuals. Prolonged contact with the dry powder may cause drying or chapping of the skin. Due to the high alkalinity of this product, prolonged contact with the eyes or skin may cause slight irritation. Inhalation of dust has been reported to produce a mild drying effect on the respiratory tract membranes of exposed workers. Excessive inhalation of dust may be annoying and can mechanically impede respiration.

Sodium phosphates have been used as therapeutic agents in medicinal preparations for their laxative effects. These phosphate salts are incompletely absorbed from the intestinal tract. Due to their osmotic activity, they draw water into the intestine and produce purging.

Data from Astaris single-dose (acute) animal studies with this material are given below:

Oral - rat LD50: 5,950 mg/kg; practically nontoxic
Dermal - rabbit LD50: >7,940 mg/kg; practically nontoxic
Eye Irritation - rabbit: 4.2/110.0; slightly irritating
Skin Irritation - rabbit: 0.0/8.0 (24-hr. exp.); nonirritating
DOT skin corrosion - rabbit (4-hr. exp.): not corrosive

This product (in anhydrous and hydrated forms) has produced no genetic changes in standard tests using bacterial cells.

12. ECOLOGICAL INFORMATION

This product (in anhydrous and hydrated forms) has produced no genetic changes in standard tests using bacterial cells.

Rainbow trout, Inland silversides and Mysid shrimp: 96 hr. LC50 >100 mg/L, non-toxic. [FMC I89-1085, 1086 & 1087]
Daphnia magna: 48 hr. EC50 >100 mg/L, non-toxic. [FMC I89-1088]

No algal toxicity data was available for this material.

CHEMICAL FATE INFORMATION: Inorganic compounds in contact with the soil, sub-surface or surface waters may be taken up by plants and utilized as essential nutrients. Phosphates may also form precipitates, usually with calcium or magnesium. The resultant compounds are insoluble in water and become a part of the soil or sediment. The term biodegradability, as such, is not applicable to inorganic compounds.

13. DISPOSAL CONSIDERATIONS

This material when discarded is not a hazardous waste as that term is defined by the Resource, Conservation and Recovery Act (RCRA), 40 CFR 261. Dry material may be landfilled or recycled in accordance with local, state and federal regulations. Consult your attorney or appropriate regulatory officials for information on such disposal.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT

Proper Shipping Name:	Environmentally hazardous substance, solid, n.o.s. (contains sodium phosphate, dibasic
Hazard Class	9
Hazard Identification Number:	UN3077
Packing Group::	III
Transport Label:	Class 9

Canadian TDG

Not regulated for transport

- Applies only to packages containing an RQ quantity, and for shipments by water within the US Coastal Waterway

15. REGULATORY INFORMATION

TSCA Inventory: Listed

DSL Inventory: Listed

WHMIS Classification Not Controlled

SARA Hazard Notification
Hazard Categories Under Title III Rules (40 CFR 370): Not applicable
Section 302 Extremely Hazardous Substances: Not Applicable
Section 313 Toxic Chemical(s): Not Applicable

CERCLA Reportable Quantity: 5,000 lb. RQ of sodium phosphate, dibasic

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

Refer to Section 11 for OSHA Hazardous Chemical(s) and Section 13 for RCRA classification.

16. OTHER INFORMATION

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	1	0	0	
Suggested HMIS Rating	1	0	0	A

Reason for revision: New Company Supersedes MSDS dated: Not Applicable

Product Use: Food Ingredient

ASTARIS

Material Safety Data Sheet

Responsible Care®
A Public Commitment

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: DISODIUM PHOSPHATE DIHYDRATE

Reference Number: AST 10008 Date: June 23, 2000

Chemical Family: Phosphate Salts

Chemical Name: Phosphoric Acid, Disodium Salt Dihydrate

Synonyms: DSPD, DSP, DUO, DSP Dihydrate, Dibasic Sodium Phosphate

Company Information:

ASTARIS LLC
622 Emerson Road - Suite 500
St. Louis, Missouri 63141

Emergency telephone: In USA call CHEMTREC: 1-800-424-9300
In Canada call CANUTEC: 1-613-996-6666

General Information: 1-800-244-6169

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	% by weight
Disodium Phosphate Dihydrate	10028-24-7	98+

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance and Odor: White crystals with no odor

WARNING STATEMENTS

NO SIGNIFICANT HAZARDS ASSOCIATED WITH THIS MATERIAL

POTENTIAL HEALTH EFFECTS

Likely Routes of Exposure: Skin contact and inhalation

EYE CONTACT: No more than slightly irritating based on toxicity studies of the anhydrous form of this material. The dry material may cause foreign body irritation in some individuals.

SKIN CONTACT: No more than slightly toxic or slightly irritating based on toxicity studies of the anhydrous form of this material. Prolonged contact with the dry material may cause drying or chapping of the skin.

INHALATION: Inhalation of the dust may cause coughing and sneezing.

INGESTION: Is not toxic if swallowed based on toxicity studies of the anhydrous form of this material. No significant adverse health effects are expected to develop if only small amounts (less than a mouthful) are swallowed.

Refer to Section 11 for toxicological information.

4. FIRST AID MEASURES

IF IN EYES OR ON SKIN, immediate first aid is not likely to be required. However, this material can be removed with water. Remove material from eyes, skin and clothing. Wash heavily contaminated clothing before reuse.

IF INHALED, immediate first aid is not likely to be required. However, if symptoms occur, remove to fresh air.

IF SWALLOWED, immediate first aid is not likely to be required. A physician or Poison Control Center can be contacted for advice.

5. FIRE FIGHTING MEASURES

FLASH POINT: Not combustible

HAZARDOUS PRODUCTS OF COMBUSTION: Not applicable

EXTINGUISHING MEDIA: Not applicable

UNUSUAL FIRE AND EXPLOSION HAZARDS: Not applicable

6. ACCIDENTAL RELEASE MEASURES

In case of spill, sweep, scoop or vacuum and remove. Flush residual spill area with water.

Refer to Section 13 for disposal information and Sections 14 and 15 for reportable quantity information.

7. HANDLING AND STORAGE

HANDLING:

HANDLE IN ACCORDANCE WITH GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES. THESE PRACTICES INCLUDE AVOIDING UNNECESSARY EXPOSURE AND REMOVAL OF MATERIAL FROM EYES, SKIN, AND CLOTHING.

Emptied container retains product residue. Observe all labeled safeguards until container is cleaned, reconditioned, or destroyed.

STORAGE: Product is slightly hygroscopic and should be stored in a dry area to prevent moisture pickup and caking.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE PROTECTION: This product does not cause significant eye irritation or eye toxicity requiring special protection. Use good industrial practice to avoid eye contact.

SKIN PROTECTION: Although this product does not present a significant skin concern, minimize skin contamination by following good industrial practice. Wearing protective gloves is recommended. Wash hands and contaminated skin thoroughly after handling.

RESPIRATORY PROTECTION: Avoid breathing dust. Use NIOSH/MSHA approved respiratory protection equipment when airborne exposure is excessive. Consult the respirator manufacturer to determine appropriate type equipment for a given application. Observe respirator use limitations specified by NIOSH/MSHA or the manufacturer. Respiratory protection programs must comply with 29 C.F.R. 1910.134.

VENTILATION: Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits (see below). The use of local mechanical exhaust ventilation is preferred at sources of air contamination such as open process equipment.

AIRBORNE EXPOSURE LIMITS: OSHA and ACGIH have not established specific exposure limits for this material. However, OSHA and ACGIH have established limits for particulates not otherwise classified (PNOC) which are the least stringent exposure limits applicable to dusts.

OSHA PEL	ACGIH TLV
15 mg/m3 (total dust) 8-hr TWA	10 mg/m3 (inhalable) 8-hr TWA
5 mg/m3 (respirable) 8-hr TWA	3 mg/m3 (respirable) 8-hr TWA

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure limits legislated for the province in which the substance will be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Chemical Formula: $Na_2 HPO_4 \cdot 2H_2O$
Appearance: White crystals
Odor: None

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

STABILITY: Product is stable under normal conditions of storage and handling. Store in a cool, dry place to maintain product performance.

MATERIALS TO AVOID: none known

HAZARDOUS DECOMPOSITION PRODUCTS: None

HAZARDOUS POLYMERIZATION: Will not occur

11. TOXICOLOGICAL INFORMATION

The dry crystals may cause foreign body irritation in some individuals. Prolonged contact with the dry material may cause drying or chapping of the skin. Due to the high alkalinity of this product, prolonged contact with the eyes or skin may cause slight irritation. Inhalation of dust has been reported to produce a mild drying effect on the respiratory tract membranes of exposed workers. Excessive inhalation of dust may be annoying and can mechanically impede respiration.

Sodium phosphates have been used as therapeutic agents in medicinal preparations for their laxative effects. These phosphate salts are incompletely absorbed from the intestinal tract. Due to their osmotic activity, they draw water into the intestine and produce purging.

Data from Astaris single-dose (acute) animal studies with this material are given below:

Oral - rat LD50: 5,950 mg/kg; practically nontoxic
Dermal - rabbit LD50: > 7,940 mg/kg; practically nontoxic
Eye Irritation - rabbit: 4.2/110.0; slightly irritating
Skin Irritation - rabbit: 0.0/8.0 (24-hr. exp.); nonirritating
DOT skin corrosion - rabbit (4-hr. exp.): not corrosive

This product (in anhydrous and hydrated forms) has produced no genetic changes in standard tests using bacterial cells.

12. ECOLOGICAL INFORMATION

Astaris has not conducted environmental toxicity and biodegradation studies with this material. However, data for Disodium Phosphate Anhydrous has been developed and is considered representative for Disodium Phosphate Dihydrate.

This product (in anhydrous and hydrated forms) has produced no genetic changes in standard tests using bacterial cells.

ECOTOXICALOGICAL INFORMATION:

No data available for the product. (Disodium Phosphate) 96 hr. LC50>100mg/L, non-toxic (Rainbow trout, Inland silversides and Mysid shrimp). [FMC 189-1085, 1086 & 1087] 48 hr. EC50>100 mg/L, non-toxic (Daphnia magna) [FMC 189-1088]

No biodegradation data was available for this material.

13. DISPOSAL CONSIDERATIONS

This material when discarded is not a hazardous waste as that term is defined by the Resource, Conservation and Recovery Act (RCRA), 40 CFR 261. Dry material may be landfilled or recycled

in accordance with local, state and federal regulations. Consult your attorney or appropriate regulatory officials for information on such disposal.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT

Proper Shipping Name:	Environmentally hazardous substance, solid n.o.s. (contains sodium phosphate, dibasic)[1]
Hazard Class	9[1]
Hazard Identification Number:	UN3077[1]
Packing Group:	III[1]
Transport Label:	Class 9[1]

[1] Applies only to packages of 5000 lbs or more

Canadian TDG

Proper Shipping Name:	Environmentally hazardous substance, solid n.o.s. (contains sodium phosphorous, dibasic)[2]
Hazard Class	9[2]
Hazard Identification Number:	UN3077[2]
Packing Group::	III[2]
Transport Label:	Class 9[2]

[2] Applies only to packages of 230 kg or more

Reportable Quantity/ Reportable Limit

US DOT RQ: 5,000 lb. Sodium phosphate dibasic
Package size containing reportable amount: 5,000 lb.

Canadian RL: 230 kg Sodium phosphate dibasic

Package size containing reportable amount: 230kg

15. REGULATORY INFORMATION

TSCA Inventory:	Listed
DSL Inventory:	Listed
WHMIS Classification	D2(B) - Materials Causing Other Toxic Effects

SARA Hazard Notification
Hazard Categories Under Title III Rules (40 CFR 370): Immediate
Section 302 Extremely Hazardous Substances: Not Applicable
Section 313 Toxic Chemical(s): Not Applicable

CERCLA Reportable Quantity: 5,000 lb. RQ of sodium phosphate, dibasic

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

Release of more than 5,000 lbs. of this product into the environment, must be reported to the National Response Center (800-424-8802 or 202-426-2675).

Refer to Section 11 for OSHA Hazardous Chemical(s) and Section 13 for RCRA classification.

16. OTHER INFORMATION

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	1	0	0	
Suggested HMIS Rating	1	0	0	E

Reason for revision: New Company Supersedes MSDS dated: Not Applicable

Product Use: Food Ingredient

MATERIAL SAFETY DATA SHEET

Sodium Hexametaphosphate

MSDS Ref. No: AST10053
Date Approved: 07/11/2000
Version: US/Canada
Revision No: New MSDS

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Sodium Hexametaphosphate
MOLECULAR FORMULA: $Na_2OP_2O_5$
SYNONYM(s): SHMP; glassy Sodium Phosphate; Sodium Polyphosphates, glassy; Metaphosphoric Acid, Sodium Salt; Sodium Acid Metaphosphate; Graham's Salt
GENERAL USE: Food ingredient, cleaning compound.

MANUFACTURER
ASTARIS LLC
622 Emerson Road - Suite 500
St. Louis, MO 63141
General Information: (800) 244-6169

Emergency Telephone Numbers:
CHEMTREC (800) 424-9300
Emergency Phone (613) 996-6666
In Canada, call CANUTEC

2. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Wt.%
Sodium Polyphosphate, Glassy	68915-31-1	100

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
IMMEDIATE CONCERNS:
Appearance and Odor: White powder, granules, or glass plates with no odor

WARNING STATEMENTS:

NO SIGNIFICANT HAZARDS ASSOCIATED WITH THIS MATERIAL.

POTENTIAL HEALTH EFFECTS:
Likely Routes of Exposure: Skin contact and inhalation

EYE CONTACT: No more than slightly irritating based on toxicity studies. The dry material may cause foreign body irritation in some individuals.

SKIN CONTACT: No more than slightly toxic or slightly irritating based on toxicity studies. Prolonged contact with the dry material may cause drying or chapping of the skin.

INHALATION: Inhalation of dust may cause coughing and sneezing.

MATERIAL SAFETY DATA SHEET

Sodium Hexametaphosphate

INGESTION: Not toxic if swallowed based on toxicity studies. No significant adverse health effects are expected to develop if only small amounts (less than a mouthful) are swallowed.

Refer to Section 11 for toxicological information.

4. FIRST AID MEASURES

EYES:
Immediate first aid is not likely to be required. However, this material can be removed with water. Remove material from eyes.

SKIN:
Immediate first aid is not likely to be required. However, this material can be removed with water. Remove material from skin and clothing. Wash heavily contaminated clothing before reuse.

INGESTION:
Immediate first aid is not likely to be required. A physician or Poison Control Center can be contacted for advice.

INHALATION:
Immediate first aid is not likely to be required. However, if symptoms occur, remove to fresh air.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA:
Not applicable

HAZARDOUS COMBUSTION PRODUCTS:
Not applicable

FIRE / EXPLOSION HAZARDS:
None known

FLASH POINT:
Non-combustible

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES:
In case of spill; sweep, scoop or vacuum and remove. Flush residual spill area with water.

Refer to Section 13 for disposal information and Sections 14 & 15 for reportable quantity information.

MATERIAL SAFETY DATA SHEET

Sodium Hexametaphosphate

MSDS Ref. No: AST10053
Date Approved: 07/11/2000
Version: US/Canada
Revision No: New MSDS

7. HANDLING AND STORAGE

HANDLING:
HANDLE IN ACCORDANCE WITH GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES. THESE PRACTICES INCLUDE AVOIDING UNNECESSARY EXPOSURE AND REMOVAL OF MATERIAL FROM EYES, SKIN, AND CLOTHING.

STORAGE:
Store in a cool, dry place to maintain product performance.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE:
This product does not cause significant eye irritation or eye toxicity requiring special protection. Use good industrial practice to avoid eye contact.

SKIN:
Although this product does not present a significant skin concern, minimize skin contamination by following good industrial practice. Wearing protective gloves is recommended. Wash hands and contaminated skin thoroughly after handling.

RESPIRATORY:
Avoid breathing dust. Use NIOSH/MSHA approved respiratory protection equipment when airborne exposure limits are exceeded (see below). Consult the respirator manufacturer to determine the appropriate type of equipment for a given application. Observe respirator use limitations specified by NIOSH/MSHA or the manufacturer. Respiratory protection programs must comply with 29 C.F.R. 1910.134.

VENTILATION:
Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits (see below). The use of local mechanical exhaust ventilation is preferred at sources of air contamination such as open process equipment.

AIRBORNE EXPOSURE LIMITS:
OSHA and ACGIH have not established specific exposure limits for this material. However, OSHA and ACGIH have established limits for particulates not otherwise classified (PNOC) which are the least stringent exposure limits applicable to dusts.

OSHA PEL: 15 mg/m³ (total dust) 8 hr. TWA; 5 mg/m³ (respirable) 8 hr. TWA.
ACGIH TLV: 10 mg/m³ (Inhalable) 8 hr. TWA; 3 mg/m³ (respirable) 8 hr. TWA

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure limits legislated for the province in which the substance will be used.

MATERIAL SAFETY DATA SHEET

Sodium Hexametaphosphate

MSDS Ref. No: AST10053
Date Approved: 07/11/2000
Version: US/Canada
Revision No: New MSDS

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR: None
APPEARANCE: White powder, granules, or glass plates
pH: (as a 1% solution): SHMP: 7.0; SHMP Long chain: 5.6 - 6.8
MELTING POINT: 628°C (1162°F)
SOLUBILITY IN WATER: Infinitely soluble, but dissolves slowly
DENSITY: (Bulk) (lb./cu. ft.): Powder: 78 - 84; Granular (crushed): 77 - 81

COMMENTS:
NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

STABILITY:
Solutions of this product will hydrolyze to form orthophosphate and other shorter chain phosphates. Dissolution is impacted by temperature and pH of the system.

POLYMERIZATION:
Will not occur

HAZARDOUS DECOMPOSITION PRODUCTS:
None known

INCOMPATIBLE MATERIALS:
None known

11. TOXICOLOGICAL INFORMATION

SKIN EFFECTS:
Skin Irritation (rabbit - 24 hr. exposure): 0.0/8.0; non-irritating

EYES:
Eye Irritation - rabbit: 1.3/110.0; slightly irritating

DERMAL LD_{50}:
>7940 mg/kg (rabbit); practically non-toxic

ORAL LD_{50}:
6600 mg/kg (rat); practically non-toxic

MATERIAL SAFETY DATA SHEET

Sodium Hexametaphosphate

ACUTE EFFECTS FROM OVEREXPOSURE:
The dry material may cause foreign body irritation in some individuals. Excessive inhalation of dust may be annoying and can mechanically impede respiration. Prolonged contact with the dry powder may cause drying or chapping of the skin.

Rats fed this material in their diet for one month showed decreased growth, increased kidney, lung and spleen weight, and kidney damage.

CHRONIC EFFECTS FROM OVEREXPOSURE:
Rats fed this material for two years showed decreased weight gain, increased kidney weight, and kidney changes. No increase in tumors was reported.

REPRODUCTIVE EFFECTS:
No adverse effects in reproductive capacity were reported in a multigeneration study using rats fed this material.

COMMENTS:
Data from Astaris single-dose (acute) animal studies with this material are given above.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION:
Astaris has not conducted environmental toxicity or biodegradation studies with this product.

Astaris has not conducted biodegradation studies with this product since when dissolved/hydrolyzed in water it yields completely mineralized materials.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD:
This material, when discarded, is not a hazardous waste as that term is defined by the Resource, Conservation and Recovery Act (RCRA), 40 CFR 261. Dry material may be landfilled or recycled in accordance with local, state and federal regulations. Consult your attorney or appropriate regulatory officials for information on such disposal.

14. TRANSPORT INFORMATION

U.S. DOT (DEPARTMENT OF TRANSPORTATION)
PROPER SHIPPING NAME: Not regulated for transportation

CANADA TRANSPORT OF DANGEROUS GOODS
PROPER SHIPPING NAME: Not regulated for transportation

MATERIAL SAFETY DATA SHEET

Sodium Hexametaphosphate

COMMENTS:
The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)
SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355):
Not listed

SECTION 311 HAZARD CATEGORY (40 CFR 370): Not applicable

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372): Not listed

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)
CERCLA RQ: Not applicable

TSCA (TOXIC SUBSTANCE CONTROL ACT)
TSCA STATUS (40 CFR 710): Listed

CANADA
WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM):
Hazard Classification: Not controlled
Domestic Substance List: Listed

COMMENTS:
This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

Refer to Section 11 for OSHA/HPA Hazardous Chemical(s) and Section 13 for RCRA classification.

16. OTHER INFORMATION

MATERIAL SAFETY DATA SHEET

Sodium Hexametaphosphate

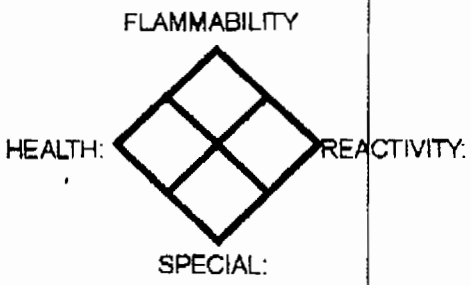
MSDS Ref. No: AST10053
Date Approved: 07/11/2000
Version: US/Canada
Revision No: New MSDS

HMIS RATING

HEALTH:	1
FLAMMABILITY	0
REACTIVITY:	0
PROTECTION:	F

Key
4 = Severe
3 = Serious
2 = Moderate
1 = Slight
0 = Minimal

NFPA RATING



Reason for Revision: New Company

Supersedes MSDS dated: Not applicable

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ASTARIS
Quality Products. Exceptional Response.

PRODUCT DATA SHEET

PRODUCT: Trisodium Phosphate Anhydrous (TSPa)
Granular & Powder

NSF

GRADE: FCC

CODE: 208 (granular)
218 (powder)

GENERAL DESCRIPTION: White, free-flowing, granular product

FORMULA: Na_3PO_4

MOLECULAR WEIGHT: 164.0

CAS NO.: 7601-54-9

DATE EFFECTIVE: February 7, 2001

CHARACTERISTICS	SPECIFICATION LIMITS			
Assay, % (ignited basis)	97.0	Minimum		
P_2O_5, % (ignited basis)	42.0	Minimum		
Alkalinity, % Na_2O	36.0 - 39.0			
Loss on ignition, %	2	Maximum		
Insolubles, %	0.2	Maximum		
Arsenic (as As), mg/kg	3	Maximum		
Fluoride, mg/kg	50	Maximum		
Heavy metals (as Pb), mg/kg	10	Maximum		
	Granular		Powder	
Sizing, USSS:				
Thru 20 mesh, %	90	Min.	100	Min.
Thru 100 mesh, %	25	Max.	90	Min.
Bulk Density, lb/ft^3	37 - 47		65 (Typical)	
g/cc	0.6 - 0.75		1.0 (Typical)	

NOTE: Specification Limits are subject to change from time to time. Please contact us for current data sheet.

Production Location: Lawrence, KS
Packaging: 50 lb. multiwall bags; 2000 lb. super sacks
Labeling Requirements: Product label required by law.
Shipping Classification: Trisodium Phosphate
Handling Precautions:

DANGER! CAUSES EYE BURNS. CAUSES SKIN IRRITATION. Do not get in eyes, on skin, or clothing. Avoid breathing dust. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.
FIRST AID: IF IN EYES, immediately flush with plenty of water for at least 15 minutes. Call a physician.
IF ON SKIN, immediately flush with plenty of water. Remove contaminated clothing. Wash clothing before reuse.

This Product Data Sheet is subject to the terms and conditions on the reverse side hereof.

TRISODIUM PHOSPHATE, ANHYDROUS (TSPa), FCC GRADE, GRANULAR or POWDER

Astaris FCC Grade Trisodium Phosphate, Anhydrous complies with the specifications of the current Food Chemicals Codex for Sodium Phosphate, Tribasic. Trisodium Phosphate Anhydrous (TSPa) and Trisodium Phosphate Crystalline (TSPc) are generally interchangeable in their applications if allowance is made for the differences in contained water. TSPa offers high concentration and low bulk since one pound of TSPa is equivalent to approximately 2.33 pounds of TSPc.

Key Properties:

- Strongly alkaline salt
- Emulsifying agent.
- Protein modifier
- Buffer capacity

Applications:

- Process Cheese and Cheese Products: TSP is used to make a soft process cheese that melts & flows easily at 75-80°C. The TSP sequesters the calcium from the cheese protein causing the protein to dissolve and emulsify the system.
- Quick Cooking Cereals: The high alkalinity of TSP is advantageous when quicker cooking rates are desirable in cooked breakfast cereals. Increased pH also makes the product more creamy or yellow in color giving a richer appearance.
- Generally Recognized As Safe (GRAS) when added directly to human food under 21 CFR 182.1778, 182.6778, and 182.8778. Food Grade Sodium Phosphate (mono-, di-, tri-) is generally recognized as safe when used in accordance with good manufacturing practice.
- Approved for use as a boiler water additive under 21 CFR 173.310. Steam from boiler water treated with TSP is allowed to contact edible products in official meat, poultry, and food processing establishments under USDA jurisdiction.
- USDA approved as a general cleaning agent, or for use with steam cleaning or recirculating devices in all departments of official meat, poultry and food processing establishments under USDA jurisdiction. Before using this compound, food products and packaging materials must be removed from the room or carefully protected. After using this compound, equipment and utensils must be thoroughly rinsed with potable water.
- USDA approved for use in meat, poultry and food processing plants under USDA jurisdiction as a water conditioning compound for entire potable water systems; dosage not to exceed 20 ppm calculated as PO_4.
- USDA approved as a hog scalding and tripe denuding agent in official meat processing establishments. Treatment must be followed by thorough rinsing with potable water to remove the added substance.
- Potable Water Treatment: Astaris trisodium phosphate anhydrous conforms to the requirements of ANSI / NSF Standard 60 and meets or exceeds ANSI / AWWA Standard B505-88. Used for corrosion & scale control. Maximum Use Level = 17 mg/L.

FOR MORE COMPLETE INFORMATION ON PROPERTIES AND SAFE HANDLING OF THIS MATERIAL, SEE THE ASTARIS MATERIAL SAFETY DATA SHEET (MSDS).

Corporate Offices:

622 Emerson Road
Suite 500
P.O. Box 411160
St. Louis, Missouri 63141-1160
314-983-7500

For order assistance, please call our Customer Service Department Toll Free: 1-800-244-6169

ASTARIS

Material Safety Data Sheet

Responsible Care®
A Public Commitment

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: TRISODIUM PHOSPHATE ANHYDROUS

Reference Number: AST10064 Date: April 17, 2000

Chemical Family: Phosphate Salts

Chemical Name: Phosphoric Acid, Trisodium Salt

Synonyms: TSP, TSPA; Trisodium Orthophosphate; Sodium Phosphate, Tribasic

Company Information:

ASTARIS LLC
622 Emerson Road - Suite 500
St. Louis, Missouri 63141

Emergency telephone: In USA call CHEMTREC: 1-800-424-9300
In Canada call CANUTEC: 1-613-996-6666

General Information: 1-800-244-6169

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	% by weight
Trisodium Phosphate Anhydrous	7601-54-9	97

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance and Odor: White, free-flowing granular product with no odor

WARNING STATEMENTS

DANGER!
CAUSES EYE IRRITATION
MAY CAUSE RESPIRATORY TRACT IRRITATION

POTENTIAL HEALTH EFFECTS

Likely Routes of Exposure: Skin contact and inhalation

EYE CONTACT: This product causes eye burns based on toxicity studies. Injury may be permanent.

SKIN CONTACT: This product may cause pain, redness, swelling, and blisters based on physical properties. No more than slightly toxic based on toxicity studies.

INHALATION: Inhalation of the dust may cause coughing and sneezing.

INGESTION: This product may cause severe nausea, vomiting, abdominal discomfort, and burning sensation based on toxicity studies.

Refer to Section 11 for toxicological information.

4. FIRST AID MEASURES

IF IN EYES, immediately flush with plenty of water for at least 15 minutes. If easy to do, remove any contact lenses. Get medical attention. Remove material from eyes, skin and clothing.

IF ON SKIN, immediate first aid is not likely to be required. However, this material can be removed with water. Wash heavily contaminated clothing before reuse.

IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

IF SWALLOWED, do not induce vomiting. Rinse mouth with water. Get medical attention. Contact a Poison Control Center. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

5. FIRE FIGHTING MEASURES

FLASH POINT: Not combustible

HAZARDOUS PRODUCTS OF COMBUSTION: Not applicable

EXTINGUISHING MEDIA: Not applicable

UNUSUAL FIRE AND EXPLOSION HAZARDS: None known

6. ACCIDENTAL RELEASE MEASURES

In case of spill, sweep, scoop or vacuum and remove. Flush residual spill area with water.

Refer to Section 13 for disposal information and Sections 14 & 15 for reportable quantity information.

7. HANDLING AND STORAGE

HANDLING:
Do not get in eyes, on skin, or on clothing
Avoid breathing dust
Keep container closed
Use only with adequate ventilation
Wash thoroughly after handling
Do not taste or swallow

Emptied container retains product residue. Observe all labeled safeguards until container is cleaned, reconditioned, or destroyed. The reuse of this material's container for non-industrial purposes is prohibited and any reuse must be in consideration of the data provided in this MSDS.

STORAGE: Store in a cool, dry place to maintain product performance. Sealed containers should be kept free of water because of its corrosivity when wet.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE PROTECTION: Where there is potential for eye contact, wear goggles and have eye flushing equipment immediately available.

SKIN PROTECTION: Wear appropriate protective clothing and chemical resistant gloves to prevent skin contact. Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application. Wash immediately if skin is contaminated. Launder contaminated clothing and clean protective equipment before reuse. Provide a safety shower at any location where skin contact can occur. Wash thoroughly after handling.

RESPIRATORY PROTECTION: Avoid breathing dust. Use NIOSH/MSHA approved respiratory protection equipment when airborne exposure is excessive. Consult the respirator manufacturer to determine appropriate type equipment for a given application. Observe respirator use limitations specified by NIOSH/MSHA or the manufacturer. Respiratory protection programs must comply with 29 C.F.R. 1910.134.

VENTILATION: Provide natural or mechanical ventilation to minimize exposure. The use of local mechanical exhaust ventilation is preferred at sources of air contamination such as open process equipment. Consult NFPA Standard 91 for design of exhaust systems.

AIRBORNE EXPOSURE LIMITS: OSHA and ACGIH have not established specific exposure limits for this material. However, OSHA and ACGIH have established limits for particulates not otherwise classified (PNOC) which are the least stringent exposure limits applicable to dusts.

OSHA PEL	ACGIH TLV
15 mg/m3 (total dust) 8-hr TWA	10 mg/m3 (inhalable) 8-hr TWA
5 mg/m3 (respirable) 8-hr TWA	3 mg/m3 (respirable) 8-hr TWA

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure limits legislated for the province in which the substance will be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Chemical Formula:	Na_3PO_4
Appearance:	White, free-flowing granular product
Odor:	None
pH:	11.5 - 12.0 (as a 1% solution @ 25 degrees C)
Bulk Density:	49-63 lbs./cu. ft.

Solubility in Water (g/100 g H2O): 5.4 @ 0 degrees C
14.5 @ 25 degrees C
23.3 @ 40 degrees C
54.3 @ 60 degrees C
94.6 @ 100 degrees C

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

STABILITY: Product is stable under normal conditions of storage and handling.

MATERIALS TO AVOID: This material could be corrosive to aluminum surfaces because of high pH.

HAZARDOUS DECOMPOSITION PRODUCTS: None known

HAZARDOUS POLYMERIZATION: Will not occur

11. TOXICOLOGICAL INFORMATION

This material has been defined as a hazardous chemical under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Due to the high pH, skin contact with this material may result in irritation.

Data from laboratory studies conducted by Astaris and from the scientific literature with this material are summarized below.

Oral - rat LD50 - 4,150 mg/kg; slightly toxic
Dermal - rabbit LD50 - > 7,940 mg/kg; practically nontoxic
Eye Irritation - rabbit - (4-hr exp.); corrosive
Skin Irritation - rabbit: - 2.2/8.0; slightly irritating

This material produced no mutagenic effects in standard assays using fruit flies.

12. ECOLOGICAL INFORMATION

The following data have been classified using the criteria adopted by the European Economic Community (EEC) for aquatic organism toxicity.

Invertebrate: 50-hr EC50 Daphnia magna: 177 mg/L; Practically Nontoxic
Warmwater fish: 96-hr LC50 Bluegill sunfish: 220 mg/L; Practically Nontoxic
Coldwater fish: 96-hr LC50 Rainbow trout: 120 mg/L; Practically Nontoxic

No definitive algal data was available for this material.

No definitive biodegradation data was available for this material.

13. DISPOSAL CONSIDERATIONS

This material when discarded is not a hazardous waste as that term is defined by the Resource, Conservation and Recovery Act (RCRA), 40 CFR 261. Dry material may be landfilled or recycled in accordance with local, state and federal regulations. Consult your attorney or appropriate regulatory officials for information on such disposal.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT

Proper Shipping Name:	Environmentally hazardous substance, solid, n.o.s. *(contains sodium phosphate, tribasic),
Hazard Class	9
Hazard Identification Number:	UN3077
Packing Group:	Packing Group III
Transport Label:	Class 9

Canadian TDG

Proper Shipping Name:	Sodium Phosphate Tribasic *
Hazard Class	9.2
Hazard Identification Number:	NA9148
Packing Group:	Packing Group III

US DOT RQ: 5000 lbs sodium phosphate tribasic
Package size containing reportable amount: 5000 lbs

Canadian TDG RL: 230 kg sodium phosphate tribasic
Package size containing reportable amount: 230 kg

* Applies ONLY to containers which contain an RQ or RL

15. REGULATORY INFORMATION

TSCA Inventory: Listed

DSL Inventory: Listed

WHMIS Classification: D2(B) - Materials Causing Other Toxic Effects

SARA Hazard Notification

Hazard Categories Under Title III Rules (40 CFR 370):	Immediate
Section 302 Extremely Hazardous Substances:	Not Applicable
Section 313 Toxic Chemical(s):	Not Applicable

CERCLA Reportable Quantity:

Release of 5000 or more of this product into the environment in a 24 hour period requires notification to the National Response Center (800-424-8802 or 202-426-2675). Since local, state, and federal laws vary, consult your attorney or appropriate regulatory officials for information relating to spill reporting.

Refer to Section 11 for OSHA Hazardous Chemical(s) and Section 13 for RCRA classification.

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

16. OTHER INFORMATION

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	3	0	0	
Suggested HMIS Rating	3	0	0	G

Reason for revision: New Company Supersedes MSDS dated: Not Applicable

Product Use: Industrial and household cleaners, water conditioner, photo developer bath ingredient, paint remover, denture cleaners, emulsifier and pH control agent for foods. May be used to treat drinking water up to 17.3 mg/L.

ASTARIS
Quality Products. Exceptional Response.

PRODUCT DATA SHEET

PRODUCT: Disodium Phosphate, Anhydrous (DSPa)
Granular & Powder

NSF.

GRADE: FCC

CODE: 108 (Granular)
118 (Powder)

GENERAL DESCRIPTION: White, odorless, free flowing powder.

FORMULA: Na_2HPO_4

MOLECULAR WEIGHT: 141.98

CAS NO.: 7558-79-4

DATE EFFECTIVE: January 8, 2001

CHARACTERISTICS	SPECIFICATION LIMITS	
Assay, Na_2HPO_4, %	98	Minimum
Pyrophosphate, %	2.0	Maximum
pH, 1% Solution	8.7 - 9.6	
Loss on Drying, %	5	Maximum
Insoluble Substances, %	0.2	Maximum
Arsenic (as As), mg/kg	3	Maximum
Fluoride (as F), ppm	50	Maximum
Heavy Metals (as Pb), mg/kg	10	Maximum

	Granular	Powder
Sizing, USSS:		
Thru 20 Mesh, %	95 Minimum	99 Minimum
Thru 100 Mesh, %	25 Maximum	90 Minimum

NOTE: Specification Limits are subject to change from time to time. Please contact us for current data sheet.

Production Location:	Lawrence, KS
Packaging:	50 lb. multiwall bags, super sacks
Labeling Requirements:	Product label required by law.
Shipping Classification:	Sodium Phosphate
Handling Precautions:	No precautionary statement required on label.

Handle in accordance with good industrial hygiene and safety practices. These include avoiding unnecessary exposure and removal of material from eyes, skin, and clothing.

DISODIUM PHOSPHATE, ANHYDROUS (DSPa), FCC GRADE, POWDER

Astaris Disodium Phosphate, Anhydrous is a white, powdered product which complies with the specifications of the current Food Chemicals Codex for Sodium Phosphate, Dibasic (anhydrous).

Key Properties:

- Alkalinity
- Buffering agent
- Protein modifier
- Stabilizer
- Emulsifying agent
- 24 month Shelf-life

Applications:

- Cereal and Pasta Products: DSP is added to adjust the pH of these products to maintain quality color in final product and as it also accelerates the cook time is especially useful in quick cooking cereals.
- Spray Dried Milk Products: DSP is commonly used during production of spray dried cheese and nonfat milk powders. DSP protects the milk proteins from heat dehydration allowing the proteins to remain dispersed during the spray drying process, which assists in the solubility of the powders upon reconstitution with water. DSP also stabilizes the emulsion to enhance flavor, body, and appearance of the final product.
- Fluid Milk Products: DSP prevents heat coagulation in condensed and evaporated milk/cream, sterilized milk/cream/soups, and UHT processed milk products. Storage life is maximized due to retardation of age gelation of the milk proteins.
- Process Cheese Products: DSP helps to buffer the pH of the processed cheese and interacts with milk proteins to promote emulsification.
- Instant Pudding and No-Bake Cheesecake: The addition of DSP, when used in conjunction with a gel inducer, will accelerate the set of the gel at room temperature.
- Disodium phosphate (DSP) is listed as a sequestrant in 21 CFR 182.6290.
- Disodium hydrogen phosphate (DSP) is specifically approved as an adhesive and/or coating component for food packaging in 21 CFR 175.105 and 175.300. It is also classified as a stabilizer when migrating from food-packaging materials under 21 CFR 181.29.
- Sodium Phosphate (mono-, di-, and tribasic; MSP, DSP and TSP) is approved as GRAS (generally recognized as safe) as a multiple purpose food substance, dietary supplement and nutrient by the FDA under 21 CFR 182.1778, 182.5778 and 182.8778. Food Grade Sodium Phosphate is generally recognized as safe when used in accordance with good manufacturing practice.
- Sodium Phosphate (mono-, di-, tri-) has approval as a boiler water additive in 21 CFR 173.310.
- Potable Water Treatment: Astaris disodium phosphate conforms to the requirements of ANSI / NSF Standard 60 and meets or exceeds ANSI / AWWA Standard B505-88. Used for corrosion & scale control. Maximum Use Level 15 mg/L.

FOR MORE COMPLETE INFORMATION ON PROPERTIES AND SAFE HANDLING OF THIS MATERIAL, SEE THE ASTARIS MATERIAL SAFETY DATA SHEET (MSDS).

Corporate Offices:

622 Emerson Road
Suite 500
P.O. Box 411160
St. Louis, Missouri 63141-1160
314-983-7500

For order assistance, please call our Customer Service Department Toll Free: 1-800-244-6169

ASTARIS™ Quality Products. Exceptional Response.

Material Safety Data Sheet

Responsible Care® A Public Commitment

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: DISODIUM PHOSPHATE ANHYDROUS

MSDS Number: 007558794 Date: 09/17/97

Chemical Name: phosphoric acid, disodium salt

Synonyms: DSP; sodium phosphate, dibasic.

SOLUTIA INC., 10300 OLIVE BOULEVARD, P.O. BOX 66760, ST. LOUIS, MO 63166-6760

FOR CHEMICAL EMERGENCY, SPILL LEAK, FIRE, EXPOSURE, OR ACCIDENT Call CHEMTREC - Day or Night - 1-800-424-9300 Toll free in the continental U.S., Hawaii, Puerto Rico, Canada, Alaska, or Virgin Islands. For calls originating elsewhere: 703-527-3887 (collect calls accepted)

For additional non-emergency information, call: 314-674-6661

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	% by weight
disodium phosphate anhydrous	7558-79-4	100

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance and Odor: white granules or powder with no odor

WARNING STATEMENTS

NO SIGNIFICANT HAZARDS ASSOCIATED WITH THIS MATERIAL

Abstracts of Articles, Patents, and Studies

Especially Relevant Records for Review

Record
10 of 11 – Soymilk, fortified
18 of 31 – Milk
20 of 31 – Milk, shelf-stable
22 of 31 – Cheese, process
24 of 31 – UHT sterilization
25 of 31 – Cheese, parmesan
30 of 31 – Cheese, buffering
31 of 121 – Soymilk, yogurt
37 of 121 – Soymilk, heat-stable
85 of 121 – Frozen desserts, whey protein
90 of 121 – Milk, buffalo, heat stability
94 of 121 – Milk, acid set gels
97 of 121 – Soymilk, stabilization
99 of 121 – Milk, skim UHT concentration
101 of 121 – Cheese, cottage
104 of 121 – Yogurt
105 of 121 – Cheese, cottage
119 of 121 – Yogurt

of Yersinia enterocolitica at levels equivalent to those observed in a complex Trypticase soy broth-0.6% yeast extract medium was developed. The defined medium contained 4 amino acids (L-methionine, L-glutamic acid, glycine and L-histidine), inorganic salts, N-2-hydroxyethylpiperazine-N'-2-ethanesulphonic acid (HEPES) buffer, and potassium gluconate as the carbon source. Methionine was required for growth by most strains of Y. enterocolitica used thus, it was not possible to determine whether it was also required for the synthesis of YST. The other 17 amino acids commonly found in proteins did not stimulate the synthesis of YST when added to the defined medium. Yield of YST observed with other carbon sources fermented by Y. enterocolitica ranged from 4- to 26-fold lower than that obtained with potassium gluconate. The divalent cations Ca-2-+ and Mn-2-+ had no effect on the synthesis of YST; however, concn. of Fe-2-+ greater than 10muM inhibited synthesis of the enterotoxin. Addition of a mixture of pyrimidines containing thymine, cytosine and uracil, each at a concn. of 2.0mM, stimulated the synthesis of YST by 10 to 15%, whereas a mixture of adenine and guanine, each at a similar concn., inhibited the synthesis of YST. Vitamins had no effect on the amounts of YST produced by Y. enterocolitica strains grown in the defined medium. Vigorous aeration was necessary for the production of maximal levels of YST. The enterotoxin was not detected in culture supernatants of Y. enterocolitica strains grown in the defined medium at greater than 30 degree C.

DE: YERSINIA-; MICROBIOLOGICAL-TECHNIQUES; FOOD-SAFETY; ENTEROTOXINS-; MEDIA-; TOXINS-; BACTERIA-

UD: 9401

Record 10 of 11 - FSTA Current 1990-12/97

AN: 92-08-J0106

TI: Stabilization of soy milk fortified with calcium gluconate.

AU: Rasyid-F; Hansen-PMT

AD: Dep. of Food Sci. & Tech., Ohio State Univ., Columbus, OH 43210, USA

PY: 1991

SO: Food-Hydrocolloids; 4 (5) 415-422, 15 ref.

NU: ISSN: 0268-005X

LA: En (English)

SC: J Fruits-vegetables-and-nuts

AB: High-calcium soy milk was prepared by adding calcium gluconate as a calcium source, sodium hexametaphosphate (SHMP) as a sequestering agent, and calcium-D-saccharic acid as a stabilizing agent, so that the calcium content of soy milk was increased to the same or higher levels than that of bovine milk. The addition of these substances resulted in a soy milk with a high content of calcium and satisfactory heat stability of the final beverage. SHMP and calcium-D-saccharic acid were effective in reducing the calcium ion activity of soy milk. The findings suggest that there was a synergistic effect between the sequestering agent and the stabilizing agent.

DE: STABILIZERS-; CALCIUM-; FOODS-ENRICHMENT; SOY-PRODUCTS; STABILIZATION-; CA-; SOYMILK-; VEGETABLE-PRODUCTS; MINERALS-

UD: 9208

Record 11 of 11 - FSTA Current 1990-12/97

AN: 90-03-V0032

TI: Yoghurt like food, and yoghurt like foods manufactured with use of a coagulant.

AU: Takenawa-S; Ueda-M; Takeda-H

PY: 1989

SO: United-States-Patent

PN: US 4 842 873 (US4842873)

PC: US

PA: Fujisawa Pharmaceutical Co. Ltd.

PPR: JP 86-100142 (860428) [Fujisawa Pharmaceutical, Osaka, Japan]

PPD: 860428

PPA: Fujisawa Pharmaceutical, Osaka, Japan

TT: Patent

LA: En (English)

SC: V Patent-literature

AB: To produce an unfermented yoghurt-like food, soy milk is coagulated with protease and a coagulant for tofu selected from the group consisting of glucono-delta-lactone, calcium sulphate, calcium gluconate, calcium lactate, magnesium sulphate, magnesium chloride, calcium pantothenate and calcium glycerophosphate.

Disodium Phosphate

Record 1 of 31 - FSTA Current 1990-2001/03

AN: 2001-01-P0129
TI: Effects of ingredients on the functionality of fat-free process cheese spreads.
AU: Swenson-BJ; Wendorff-WL; Lindsay-RC
AD: Correspondence (Reprint) address, W. L. Wendorff, Dep. of Food Sci., Univ. of Wisconsin, Madison, WI 53706, USA. E-mail wlwendor@facstaff.wisc.edu
PY: 2000
SO: Journal-of-Food-Science; 65 (5) 822-825, 22 ref.
NU: 0022-1147
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Effects of emulsifying salts and hydrocolloids, cook time, cook temp. and pH on firmness, meltability and spreadability of fat-free processed cheese spreads were studied. Incorporation of disodium phosphate and trisodium citrate produced properties closest to those of a full-fat reference cheese, with trisodium citrate providing the most meltability. In all cases, incorporation of hydrocolloids resulted in increased firmness, decreased melt, with varying results on spreadability. Increases in cook time generally produced softer, more meltable cheeses, while increases in cook temp. decreased firmness and increased meltability and spreadability.
DE: CHEESE-; COOKING-; FATS-; FUNCTIONAL-PROPERTIES; GUMS-; PH-; SALTS-; SPREADS-; TEMPERATURE-; CHEESE-SPREADS; FATS-LOW-FOODS; HYDROCOLLOIDS-; TEMP-
UD: 200101

Record 2 of 31 - FSTA Current 1990-2001/03

AN: 2001-01-L0042
TI: Food grade starch phosphates obtained by microwave radiation - structure and functionality.
AU: Lewandowicz-G; Szymanska-G; Voelkel-E; Walkowski-A
AD: Cent. Lab. Przemysu Ziemniaczanego, ul. Zwierzyniecka 18, 60-814 Poznan, Poland. Tel. (48 61) 8668045. Fax (48 61) 8417610. E-mail lewal@man.poznan.pl
PY: 2000
SO: Polish-Journal-of-Food-and-Nutrition-Sciences; 9/50 (3) 31-37, 29 ref.
DT: Journal-Article
LA: En (English)
LS: pl (Polish)
SC: L Sugars-syrups-starches-and-candy
AB: The possibility of applying microwave heating to obtain food grade starch phosphates was examined. Efficiency of 3 phosphorylating salts (monosodium phosphate, disodium phosphate and sodium tripolyphosphate), applied in both conventional and microwave heating, were compared using potato, waxy corn and wheat starches, and tapioca; physical properties of food grade starch phosphates obtained were investigated. Experimental starch samples were examined by determining their rheological properties, content of phosphate groups, molecular mass distribution and crystal structure. Sodium tripolyphosphate applied in both conventional and microwave processing showed the best efficiency in potato starch phosphorylation compared to monosodium and disodium phosphates. Microwave heating increased starch phosphorylation and degradation actions as compared to conventional processing. Starch

phosphorylation, and physical properties of the starch phosphates produced were dependent on the origin of the starch, being related mainly to crystal structure and amylose content. Phosphates with optimal physical properties were obtained from potato starch. Starch phosphates with adequate physical properties could also be produced using tapioca and waxy corn starches as raw material. It is suggested that application of microwaves for production of starch phosphates needs further investigation aimed at decreasing the degradation phenomena.
DE: HEATING-; MICROWAVES-; PHOSPHATES-; PHYSICAL-PROPERTIES; STARCH-; PHOSPHORYLATION-
UD: 200101

Record 3 of 31 - FSTA Current 1990-2001/03

AN: 2000-03-P0421
TI: Application of ultrafiltered sweet buttermilk in the manufacture of reduced fat process cheese.
AU: Raval-DM; Mistry-VV
AD: Correspondence (Reprint) address, V. V. Mistry, Minnesota-South Dakota Dairy Foods Res. Cent., Dairy Sci. Dep., South Dakota State Univ., Brookings, SD 57007-0647, USA
PY: 1999
SO: Journal-of-Dairy-Science; 82 (11) 2334-2343, 35 ref.
NU: ISSN: 0022-0302
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Reduced-fat Cheddar cheeses, manufactured from pasteurized milk or from pasteurized milk supplemented with 5% ultrafiltered sweet buttermilk, were used to manufacture reduced-fat processed cheeses (48% moisture, 14.8% fat). A 1:1 blend of 8- and 16-wk-old reduced-fat Cheddar cheese and disodium phosphate and trisodium citrate (1:1 blend) at 0.50, 1.25 or 2.00% (w/w) were used for each cheese treatment. Processed cheeses with added buttermilk had lower fat contents than did controls (14.48 vs. 15.10%) and had harder bodies because of compositional differences between Cheddar cheeses. Ash and pH were not affected by buttermilk but increased with emulsifying salts. Hardness decreased with emulsifying salts. At similar levels of emulsifying salts processed cheeses made with added buttermilk had lower free oil and meltability than did control cheeses but had higher apparent viscosity. Meltability increased in cheeses containing buttermilk by increasing emulsifying salts up to 1.25%. Microstructure studies revealed a finer dispersion of fat in reduced-fat processed cheeses from the buttermilk treatment at 0.50 and 1.25% emulsifying salts.
DE: BUTTERMILK-; CHEESE-VARIETIES; FATS-; FATS-LOW-FOODS; PROCESSED-CHEESE
UD: 200003

Record 4 of 31 - FSTA Current 1990-2001/03

AN: 1999-12-P1749
TI: An alternate technology for manufacture of buffalo milk pizza cheese.
AU: Patel-HG; Upadhyay-KG
AD: Correspondence (Reprint) address, K. G. Upadhyay, Dep. of Dairy Tech., Sheth MC Coll. of Dairy Sci., Gujarat Agric. Univ., Anand Campus, Anand 388 110, India
PY: 1999
SO: Journal-of-Food-Science-and-Technology,-India; 36 (3) 235-238, 22 ref.
NU: ISSN: 0022-1155
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: An alternative method for stretching the curd during manufacture of Mozzarella cheese from buffaloes' milk is described. The method involves addition of emulsifying salts (trisodium citrate and disodium hydrogen phosphate) to curd before heating at lower temp. than normally used (65-70 degree C). Physical and sensory properties of experimental cheese were evaluated and compared with those for control cheese produced by a conventional stretching method. Results showed that experimental cheese had

improved melting characteristics, flavour and texture compared with control cheese; no changes were observed in physical appearance. Recovery of milk constituents was higher using the experimental stretching method. Best results were obtained using a 1-1.5% mixture of trisodium citrate and disodium phosphate (1:1 or 2:1) and heating at 65-70 degree C for 10-15 min prior to moulding. It is concluded that the curd stretching method described could be successfully applied to commercial production of Mozzarella cheese from buffaloes' milk.
DE: BUFFALOES-; CHEESE-VARIETIES; CHEESEMAKING-; EMULSIFIERS-; PROCESSING-; SENSORY-PROPERTIES; BUFFALO-CHEESE; BUFFALO-MOZZARELLA-CHEESE; STRETCHING-
UD: 199912

Record 5 of 31 - FSTA Current 1990-2001/03

AN: 1999-08-P1095
TI: Reduced sodium content process cheese and method for making it.
AU: Henson-LS
PY: 1999
SO: United-States-Patent
PN: US 5 871 797 (US5871797)
PC: US
PA: FMC Corp.
PPR: US 561510 (19951121) [FMC, Philadelphia, PA, USA]
PPD: 19951121
PPA: FMC, Philadelphia, PA, USA
DT: Patent
LA: En (English)
SC: P Milk-and-dairy-products
AB: A reduced sodium processed cheese is described which contains selected phosphate salts (disodium phosphate, dipotassium phosphate and/or tripotassium phosphate, and dicalcium phosphate and/or tricalcium phosphate). A formulation containing these phosphates is also described together with a method for production of the reduced sodium processed cheese from a natural cheese. [From En summ.]
DE: CHEESE-VARIETIES; CHEESEMAKING-; PATENTS-; SODIUM-; PROCESSED-CHEESE; SODIUM-LOW-FOODS
UD: 199908

Record 6 of 31 - FSTA Current 1990-2001/03

AN: 1999-08-P0970
TI: Heat resistance of Bacillus cereus spores: effects of milk constituents and stabilizing additives.
AU: Mazas-M; Lopez-M; Martinez-S; Bernardo-A; Martin-R
AD: Correspondence (Reprint) address, A. Bernardo, Dep. de Higiene y Tec. de los Alimentos, Univ. de Leon, 24071 Leon, Spain. Tel. 34 87 291182. Fax 34 87 291284. E-mail dhtaba@unileon.es
PY: 1999
SO: Journal-of-Food-Protection; 62 (4) 410-413, 19 ref.
NU: ISSN: 0362-028X
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Heat resistance of Bacillus cereus spores (ATCC 7004, 4342 and 9818) heated in different types of milk (skim, whole and conc. skim milk), skim milk containing stabilizing additives (sodium citrate, monopotassium phosphate or disodium phosphate, 0.1%) and cream was investigated. Thermal resistance experiments were performed at temp. of 92-115 degree C under continuous monitoring of pH. For strain 4342 no significant differences (P less than 0.05) in D values were detected. For strains 7004 and 9818, higher D values of approx. 20% were obtained in whole and conc. skim milk than those calculated in skim milk. Of the stabilizing additives tested, only sodium citrate and sodium phosphate increased the heat resistance of strain 9818. However, when the menstruum pH was measured at the treatment temp. different pH values were found between the heating media. The differences in heat resistance observed could be due to a pH effect rather than to the difference in the substrates in which spores were heated. In contrast, when cream (fat

content 20%) was used, lower D values were obtained, especially for strains 7004 and 9818. z values were not significantly modified by the milk composition, with an average z value of 7.95 plus/minus 0.20 degree C for strain 7004, 7.88 plus/minus 0.10 degree C for strain 4342 and 9.13 plus/minus 0.16 degree C for strain 9818.
DE: BACILLUS-; BACTERIAL-SPORES; CREAM-; FOOD-SAFETY-DAIRY-PRODUCTS; MILK-; STABILIZERS-; THERMOPHYSICAL-PROPERTIES; BACILLUS-CEREUS; HEAT-RESISTANCE; SKIM-MILK
UD: 199908

Record 7 of 31 - FSTA Current 1990-2001/03

AN: 1999-05-M0453
TI: Gas production of chemical leavening agents and effects on textures of cookies.
AU: Seong-Yeon-Yang; Sang-Yong-Kim; Kyu-Seob-Jang; Deok-Kun-Oh
AD: Correspondence (Reprint) address, Sang-Yong Kim, R&D Cent., Tong Yang Confectionery Co., 30-10 Munbai-dong, Yongsan-gu, Seoul 140-715, Korea
PY: 1997
SO: Korean-Journal-of-Food-Science-and-Technology; 29 (6) 1131-1137, 28 ref.
NU: ISSN: 0367-6293
DT: Journal-Article
LA: Ko (Korean); Non-English
LS: en (English)
SC: M Cereals-and-bakery-products
AB: The relationship between production of leavening gases, texture and sensory properties of cookies made using different baking powders was investigated. Baking powders were divided into 3 groups, depending on their rate of production of leavening gases: fast-acting group such as potassium bicarbonate, tartaric acid, aluminium ammonium sulphate and fumaric acid; a slow-acting group such as ammonium bicarbonate, sodium bicarbonate, glucono-delta-lactone, and ammonium chloride; and a double-acting group such as anhydro monocalcium phosphate, disodium dihydrogenpyrophosphate and aluminium potassium sulphate. Leavening rate of ammonium bicarbonate, which was the highest of all baking powders used in the study, was 131.25%; however, sensory analysis showed that it left an unpleasant after-taste, due to the presence of residual ammonia. Glucono-delta-lactone was the only baking powder that produced cookies with no after-taste. Results indicated that the higher the leavening rate, the more peaks that were found in texture profile graphs, with ammonium bicarbonate showing the most peaks. It was found that the number of peaks correlated with brittleness of cookies (r-2 = 0.8176) which varied according to which baking powder was used in their manufacture. [From En summ. & tables.]
DE: BAKERY-ADDITIVES; BISCUITS-; FERMENTATION-; GASES-; SENSORY-PROPERTIES; TEXTURE-; BAKING-POWDERS; COOKIES-; LEAVENING-
UD: 199905

Record 8 of 31 - FSTA Current 1990-2001/03

AN: 1999-03-S0559
TI: Effect of initial mild curing, with additives, of hog and sheep sausages casings on their microbial quality and mechanical properties after storage at different temperatures.
AU: Bakker-WAM; Houben-JH; Koolmees-PA; Bindrich-U; Sprehe-L
AD: Correspondence (Reprint) address, J. H. Houben, Dep. of Sci. of Food of Animal Origin, Fac. of Vet. Med., Utrecht Univ., PO Box 80175, NL-3508 TD Utrecht, Netherlands. Tel. +31-30-2535367. Fax +31-30-2532365. E-mail houben@vvdo.vet.uu.nl
PY: 1999
SO: Meat-Science; 51 (2) 163-174, 24 ref.
NU: ISSN: 0309-1740
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: This study evaluated additives used in salted natural sausage casings made from hog and sheep small intestines by dry and slush curing procedures,

as affecting casing microbiological quality, mechanical properties and histological properties. Storage and transport procedures were also examined; storage for 6 months at 10-40 degree C was assessed. Additives studied were various food grade organic acids and bases and their sodium salts. Treatment (i) citric acid/trisodium citrate, (ii) lactic acid/sodium lactate and (iii) trisodium phosphate/disodium hydrogen phosphate were used as additives for casings used in storage studies. Dry and slush curing of casings with (i)-(iii) improved mechanical properties and hygiene of casings compared with control casings without additives. Dry and slush salting after curing with (i) and (ii) gave best results for microbiological quality of stored casings, as (iii) was less effective in reducing halophilic bacterial growth during prolonged storage. Overall, (i) gave best results, closely followed by (ii).
DE: CURING-; FOOD-SAFETY; MECHANICAL-PROPERTIES; MICROBIOLOGICAL-QUALITY; SAUSAGE-CASINGS; STORAGE-; CURING-AGENTS
UD: 199903

Record 9 of 31 - FSTA Current 1990-2001/03

AN: 1999-02-P0174
TI: Monitoring process cheese meltability using dynamic stress rheometry.
AU: Sutheerawattananonda-M; Bastian-ED
AD: Correspondence (Reprint) address, E. D. Bastian, Dep. of Food Sci. & Nutr., Univ. of Minnesota, St. Paul, MN 55108, USA
PY: 1998
SO: Journal-of-Texture-Studies; 29 (2) 169-183, 18 ref.
NU: ISSN: 0022-4901
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Meltability of processed Cheddar cheese made with added disodium phosphate (SDP) or trisodium citrate (TSC) at various moisture contents was determined with a Rheometrics dynamic stress rheometer using 25 mm parallel plate geometry. Slippage was controlled either by bonding ethyl-2-cyanoacrylate adhesive directly to the plates or using serrated plates. Results from serrated plates were more consistent and repeatable than the technique using adhesive. Transition temp. was defined as the lowest temp. at which tan delta = 1 and reflected a change in cheese properties such that elastic and viscous properties were equivalent. Moisture contents between 38.60 and 39.80% did not significantly influence the transition temp. of DSP and TSC processed cheese. Transition temp. of processed cheese containing TSC was lower than cheese containing DSP. Futhermore, Arrhenius plot of complex viscosity (eta*) vs. temp. indicated that the rate of change in viscosity of TSC process cheese was higher than that of DSP cheese.
DE: CHEESE-VARIETIES; MELTING-; MOISTURE-CONTENT; RHEOLOGICAL-PROPERTIES; SALTS-; PROCESSED-CHEESE; RHEOMETERS-
UD: 199902

Record 10 of 31 - FSTA Current 1990-2001/03

AN: 1998-02-P0367
TI: Effect of emulsifying salts on the chemical composition and buffering capacity of cow's and buffaloe's casein micelles.
AU: Ramadan-FAM
AD: Dairy Dep., Fac. of Agric., Cairo Univ., Cairo, Egypt
PY: 1997
SO: Egyptian-Journal-of-Dairy-Science; 25 (1) 65-73, 27 ref.
DT: Journal-Article
LA: En (English)
LS: ar (Arabic)
SC: P Milk-and-dairy-products
AB: Effects of emulsifying salts on the chemical composition and buffering capacity of casein micelles of different sizes (large, LCM; medium, MCM; and small, SCM) prepared from cows' milk or buffaloes' milk were investigated. Disodium phosphate (DSP) or trisodium citrate (TSC) were added to milk samples in order to produce final concn. of 0.005 or 0.01M. Samples were

centrifuged to obtain LCM, MCM and SCM fractions. Total N, Ca, P and buffering index of the casein micelle fractions were determined. There were significant differences in the Ca:N, P:N and Ca:P ratios of cows' and buffaloes' MCM treated with 0.01M DSP compared with the values in control samples (with no added emulsifiers). When TSC (0.005 or 0.01M) was added to cows' or buffaloes' milk, the Ca:N ratio in MCM increased significantly while Ca:P ratio in MCM decreased. Addition of emulsifying salts (0.005M) increased the ratio of Ca:N in SCM of both milks. Buffering index values for cows' MCM and SCM were higher than the values for buffaloes' MCM and SCM. Buffering index values for cows' LCM and MCM increased when milk was treated with 0.005M DSP or 0.01M TSC. Buffaloes' MCM had a higher buffering capacity than other casein micelles when buffaloes' milk was treated with DSP or TSC at 0.005 or 0.01M but buffering capacity of SCM was decreased. [From En summ.]
DE: BUFFALOES-; CASEIN-; MILK-; SALTS-; BUFFALO-MILK; CASEIN-MICELLES
UD: 199802

Record 11 of 31 - FSTA Current 1990-2001/03

AN: 1997-11-R0078
TI: Natural minced fish products quality as influenced by polyphosphates involvement.
AU: Gat'ko-NN
AD: Kirgizskii Tekh. Univ., Kirzigia
PY: 1996
SO: Izvestiya-Vysshikh-Uchebnykh-Zavedenii,-Pishchevaya-Tekhnologiya; No. 5/6, 30-31, 3 ref.
DT: Journal-Article
LA: Ru (Russian); Non-English
SC: R Fish-and-marine-products
AB: Studies showed that 1.0% hexametaphosphate could be added to fish mass in order to improve quality and increase nutritional value of fish mince products. Good results were also achieved using 1.0% disodium phosphate.
DE: FISH-PRODUCTS; PHOSPHATES-; SALTS-; POLYPHOSPHATES-
UD: 199711

Record 12 of 31 - FSTA Current 1990-2001/03

AN: 1997-11-C0113
TI: Thermal resistance of Bacillus cereus spores as affected by additives in the recovery medium.
AU: Gonzalez-I; Lopez-M; Mazas-M; Gonzalez-J; Bernardo-A
AD: Correspondence (Reprint) address, A. Bernardo, Dep. de Higiene y Tec. de los Alimentos, Fac. de Vet., Univ. de Leon, Campus de Vegazana s/n, 24071 Leon, Spain. Tel. 34 87 291182. Fax 34 87 291284
PY: 1997
SO: Journal-of-Food-Safety; 17 (1) 1-12, 27 ref.
DT: Journal-Article
LA: En (English)
SC: C Hygiene-and-toxicology
AB: Effects of the addition of starch, glucose, NaCl, sodium citrate, monopotassium phosphate and disodium phosphate to the recovery medium on apparent heat resistance of Bacillus cereus spores (ATCC 4342, 7004 and 9818) were investigated. Sodium citrate, monopotassium and disodium phosphate at concentrations of 0.1% were effective inhibitory agents for heat injured B. cereus spores especially for strain 9818, although only monopotassium and disodium phosphate caused a significant reduction (p less than 0.05) in D-values obtained for strain 9818. NaCl also had a marked effect on the recovery of heat injured spores. Concentrations as low as 0.5% caused a significant reduction in the recovery rates for strains 9818 and 7004. In all cases, increasing salt levels from 0.5 to 4% resulted in a progressive decrease in spore recovery. D-values gradually decreased as salt content increased, although the concentrations which produced statistically significant differences (p less than 0.05) varied among strains. Addition of starch at 0.1% resulted in a significant increase in the counts for strains 9818 and 7004. 0.1% glucose did not significantly modify the counts obtained. Neither of these compounds affected decimal reduction times. No statistical

significance (p greater than 0.05) differences were detected among z-Values for the spores of the 3 strains recovered in the presence of different additives assayed. Z-values ranged from 6.67 to 8.32, with a mean value of 7.56 plus/minus 0.46C.
DE: BACILLUS-; BACTERIA-; BACTERIAL-SPORES; FOOD-SAFETY; MICROBIOLOGICAL-TECHNIQUES; PHYSICAL-PROPERTIES; THERMOPHYSICAL-PROPERTIES; HEAT-RESISTANCE; MEDIA-; SPORES-
UD: 199711

Record 13 of 31 - FSTA Current 1990-2001/03

AN: 1997-05-N0004
TI: Emulsifying capacity of coconut proteins as a function of salt, phosphate, and temperature.
AU: Kwon-KS; Rhee-KC
AD: Food Analysis/Inspection Div., Pusan Office, Korea Food & Drug Administration, 123-7 Yongdang-dong, Nam-ku, Pusan 608-080, Korea
PY: 1996
SO: Journal-of-the-American-Oil-Chemists'-Society; 73 (12) 1669-1673, 23 ref.
DT: Journal-Article
LA: En (English)
SC: N Fats-oils-and-margarine
AB: Effects of pH on the nitrogen solubilities of proteins in defatted coconut flour (meal; CF) and coconut protein concentrate (CPC), prepared by ultrafiltration, were determined in water and 2% NaCl. Effects of temp., disodium phosphate and salt on emulsifying capacities (EC) of these products were also investigated using a model system. Between pH 4.0 and 5.0, nitrogen solubilities of CF and CPC in water were lower than those in salt solutions. In salt solutions, nitrogen solubility was lowest at pH 1, and increased steadily as pH increased from 3.0 to 6.0. CF had higher EC values than CPC at all salt and phosphate levels. Additionally, increased phosphate level generally increased the EC at both salt levels, but these increases were not significant at 0.9% phosphate level as compared to the 0.7% phosphate level (P less than 0.05). Although the emulsifying temp. of 40 degree C showed higher EC values than both 60 and 80 degree C at all salt and phosphate levels, the overall temp. effect was not significant (P greater than 0.05). However, EC decreased significantly with addition of salt at all phosphate levels.
DE: COCONUTS-; FRUITS-; FUNCTIONAL-PROPERTIES; PH-; PHYSICAL-PROPERTIES; PROTEINS-; PROTEINS-VEGETABLE; SEEDS-; SOLUBILITY-; VEGETABLE-PRODUCTS; EMULSIFYING-CAPACITY
UD: 199705

Record 14 of 31 - FSTA Current 1990-2001/03

AN: 1996-01-B0086
TI: Nutritional factors affecting nisin production by Lactococcus lactis subsp. lactis NIZO 22186 in a synthetic medium.
AU: Vuyst-L-de
AD: Dep. of Chem. Eng., Fac. of Applied Sci., Vrije Univ. Brussels, B-1050 Brussels, Belgium
PY: 1995
SO: Journal-of-Applied-Bacteriology; 78 (1) 28-33, 20 ref.
DT: Journal-Article
LA: En (English)
SC: B Biotechnology
AB: A minimal synthetic medium (SM8) for nisin-producing Lactococcus lactis subsp. lactis strains was designed. The medium consists of 8 growth-stimulating amino acids (glutamic acid, methionine, valine, leucine, threonine, arginine, isoleucine and histidine), 5 vitamins (biotin, calcium pantothenate, nicotinic acid, pyridoxine and riboflavin) and mineral salts (dihydrogen phosphate, disodium hydrogen phosphate, sodium chloride, magnesium sulphate and trisodium citrate). Nisin biosynthesis was strongly dependent on the presence of a sulphur source, either an inorganic salt (magnesium sulphate or sodium thiosulphate) or the amino acids methionine, cysteine or cystathionine. Serine, threonine and cysteine highly stimulated

nisin production without affecting the final cell yield, indicating their precursor role during nisin biosynthesis. [From En summ.]
DE: ADDITIVES-; ANTIBIOTICS-; BACTERIA-; BACTERIOCINS-; BIOTECHNOLOGY-; DRUGS-; FERMENTATION-; FERMENTATION-PRODUCTS; LACTOCOCCUS-; MICROBIOLOGICAL-TECHNIQUES; PRESERVATIVES-; MEDIA-; NISIN-
UD: 199601

Record 15 of 31 - FSTA Current 1990-2001/03

AN: 1995-10-P0033
TI: Effects of soluble calcium-to-protein ratio on age gelation of ultrafiltration or reverse osmosis concentrated, ultra-high temperature-treated milk.
AU: Je-Hong-Ryue
AD: Utah State Univ., Logan, UT 84322, USA
PY: 1995
SO: Dissertation-Abstracts-International,-B; 55 (7) 2461 Order no. DA9433766, 108pp.
DT: Thesis
LA: En (English)
SC: P Milk-and-dairy-products
AB: Reverse osmosis (RO) and ultrafiltration (UF) milk retentates were (UHT) processed and compared with respect to shelf life at room temp. Viscosity studies indicated that UHT-treated, RO retentate had more delayed age gelation than UF retentate at the same TS level (26%). When compared at a 6.4% protein level (2x RO vs. 2.7x where x = ratio of the feed vol. to concentrate vol.), the shelf life for both RO and UF retentates was approx. 6-8 months. Sodium hexametaphosphate (SHMP) and disodium phosphate (DSP) were incorporated at concn. of 1, 3, 5, 10 and 20mM prior to UHT processing of each sample to investigate effects on shelf life. SHMP at 1 and 3mM was effective in delaying age gelation, whereas all levels of DSP accelerated gelation. SHMP accelerated age gelation when added at concn. of 10 and 20mM. Use of SHMP at 1mM in RO retentates was more effective in delaying age gelation than the same SHMP level in 2 UF samples (22 and 26% TS). Analysis showed that RO/UHT treated samples had higher soluble Ca and ionic Ca levels than UF/UHT treated samples. A coeff. of determination of R-2 = 0.80 was observed between soluble Ca-to-protein ratio and shelf life. [From En summ.]
DE: DAIRY-PRODUCTS; GELATION-; MILK-; PHOSPHATES-; PROCESSING-; REVERSE-OSMOSIS; SALTS-; SHELF-LIFE; ULTRAFILTRATION-; UHT-MILK
UD: 199510

Record 16 of 31 - FSTA Current 1990-2001/03

AN: 1995-08-M0089
TI: Effect of vital gluten and disodium phosphate on the quality of flat bread and noodles from sprouted wheat flour.
AU: Sekhon-KS; Nagi-HPS; Narpinder-Singh; Savita-Sharma
AD: Correspondence (Reprint) address, H. P. S. Nagi, Dep. of Food Sci. & Tech., Punjab Agric. Univ., Ludhiana 141 004, India
PY: 1994
SO: Journal-of-Food-Science-and-Technology,-India; 31 (6) 505-507, 9 ref.
DT: Journal-Article
LA: En (English)
SC: M Cereals-and-bakery-products
AB: Effects of addition of vital gluten (2 or 4%) and disodium phosphate (0.15%) on quality of flat bread and noodles produced using flour from sprouted (germinated) wheat samples were studied. Addition of 4% vital gluten and 0.15% disodium phosphate was found to be beneficial for producing good quality flat bread from sprouted wheat. Good quality noodles could also be produced from moderately sprouted wheat with addition of 2% vital gluten and 0.15% disodium phosphate. Flours produced from highly sprouted wheats, however, required addition of extra gluten for the production of good quality noodles. [From En summ.]
DE: BREADMAKING-; CEREAL-PRODUCTS; CEREALS-; NOODLES-; PASTA-; PROCESSING-; WHEAT-
UD: 199508

Record 17 of 31 - FSTA Current 1990-2001/03

AN: 1995-07-P0066
TI: Effect of stabilizers and partially hydrogenated vegetable oils on the stability and quality of filled milk.
AU: Cordon-J; Jeon-IJ; Roberts-HA
AD: Correspondence (Reprint) address, I. J. Jeon, Call Hall, Kansas State Univ., Manhattan, KS 66506, USA. Tel. (913) 532-5654. Fax (913) 532-5681
PY: 1994
SO: Journal-of-Food-Processing-and-Preservation; 18 (1) 61-73, 14 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: The effect of stabilizers and emulsifiers on stability and sensory quality of vegetable oil filled milks was studied. 4 formulations were selected in a preliminary study from a total of 31 different combinations, generated by combining 9 vegetable oils with different emulsifiers/stabilizers. These were HTST pasteurized and evaluated for stability and sensory quality during storage at 2 degree C. The 4 formulations (cottonseed oil with Actoloid D22 Type C stabilizer (mono- and diglycerides, sodium caseinate, carrageenan and sodium citrate); sunflower HB95 oil with Actoloid D22 Type A stabilizer (mono- and diglycerides, sodium caseinate, soy protein, carrageenan and sodium citrate); canola oil with emulsifier M (mono- and diglyceride flakes); and canola oil with Actoloid D22 Type B stabilizer (mono- and diglycerides, soy protein, whey protein, carrageenan, sodium citrate and disodium phosphate)) were stable during storage and it is suggested that any of the formulations could be used effectively for replacing coconut oil-based formulations. However, the formulation with sunflower HB 95 oil/stabilizer A possessed the best sensory characteristics after 1 wk, whereas the formulation with canola oil/stabilizer B retained the best flavour and had least off-flavour after 3 wk of storage. Filled milk prepared using the latter formulation was similar in flavour quality to coconut oil-based filled milk. [From En summ.]
DE: ADDITIVES-; DAIRY-PRODUCTS; MILK-; OILS-; OILS-VEGETABLE; STABILIZERS-; VEGETABLE-PRODUCTS; VEGETABLE-OILS
UD: 199507

Record 18 of 31 - FSTA Current 1990-2001/03

AN: 1994-04-P0133
TI: Shelf-stable milk-containing beverage products.
AU: Wisler-JR; Cobos-P; Laudano-RJ
CA: Kraft General Foods Inc.
PY: 1993
SO: United-States-Patent; US 5 260 085, US 942265 (19920909) [Kraft General Foods, Northfield, IL, USA]
DT: Patent
LA: En (English)
SC: P Milk-and-dairy-products
AB: This aqueous, shelf-stable beverage of pH 6.3-6.5 contains water, milk solids, an acidic flavouring agent and a 2-component stabilizing system of monoglycerides and _10% by wt. of diglycerides, carrageenan or pectin; disodium phosphate and KOH. [From En summ.]
DE: BEVERAGES-; DAIRY-PRODUCTS; MILK-; PATENTS-; MILK-BEVERAGES
UD: 199404

Record 19 of 31 - FSTA Current 1990-2001/03

AN: 1993-11-T0071
TI: Method for producing a microwave browning composition.
AU: Hsu-CJ
CA: Nestec SA
PY: 1993
SO: United-States-Patent; US 5 196 219, US 587082 (19900924) [Nestec, Vevey, Switzerland]
DT: Patent
LA: En (English)

SC: T Food-additives-spices-and-condiments
AB: A browning agent which produces the desired golden brown surface on foods possessing a dough crust (e.g. meat or fruit pies) when they are heated in a microwave is described. The browning agent is manufactured by spray drying an aqueous solution of milk solids and a reducing sugar. The aqueous solution is subjected to enzymic hydrolysis to convert lactose to glucose and galactose; this results in the presence of Amadori rearrangement compounds in the spray dried powder. The spray dried powder may be reconstituted with water and then coated onto the dough crust. Sodium bicarbonate, trisodium phosphate or disodium phosphate may be added to the coating to enhance development of the brown colour after microwave heating. [From En Summ.]
DE: BAKERY-PRODUCTS; BROWNING-; PATENTS-; PIES-; BROWNING-AGENTS
UD: 199311

Record 20 of 31 - FSTA Current 1990-2001/03

AN: 1993-10-P0185
TI: Method of making a shelf-stable milk-containing beverage product.
AU: Wisler-JR; Cobos-P; Landano-RJ
CA: Kraft General Foods Inc.
PY: 1993
SO: United-States-Patent; US 5 202 145, US 710614 (19910605) [Kraft General Foods, Northfield, IL, USA]
DT: Patent
LA: En (English)
SC: P Milk-and-dairy-products
AB: Preparation of an aqueous shelf-stable milk beverage is described. Homogenized milk is mixed with a 2-component stabilizer system (a mixture of mono- and diglycerides with carrageenan or pectin); a buffered aqueous flavouring solution is added (containing acidic flavouring agent, disodium phosphate and potassium bicarbonate) to form a solution of pH 6.8-7.2; and the mixture is heated to degrade the bicarbonate to hydroxide and CO2, allowing the pH to fall to 6.3-6.5. [From En summ.]
DE: BEVERAGES-; DAIRY-PRODUCTS; MILK-; PATENTS-; MILK-BEVERAGES
UD: 199310

Record 21 of 31 - FSTA Current 1990-2001/03

AN: 1993-06-A0052
TI: Chemical reaction kinetics in relation to glass transition temperatures in frozen food polymer solutions.
AU: Kerr-WL; Lim-MH; Reid-DS; Hong-Chen
AD: Dep. of Food Sci., Univ. of California, Davis, CA 95616, USA
PY: 1993
SO: Journal-of-the-Science-of-Food-and-Agriculture; 61 (1) 51-56, 12 ref.
DT: Journal-Article
LA: En (English)
SC: A Food-sciences
AB: Hydrolysis of disodium-p-nitrophenyl phosphate (catalysed by alkaline phosphatase) in frozen sugar and maltodextrin solutions was studied, with emphasis on how rate of hydrolysis could be related to glass transition temp. (T'g). Reaction rates decreased with storage temp. and approached zero at temp. less than -15 degree C. Arrhenius plots of the data were non-linear, and slopes of the best-fitting lines differed from one solution to another. Data also did not fit the equation of Williams et al, (Journal of the American Chemical Society (1955) 77 3701-3706) that describes diffusional processes as a function of the temp. difference (T-T'g). However, when placed into similarly composed groups, log (rate) was linearly correlated with temp. difference (T-T'g).
DE: CARBOHYDRATES-; DEXTRINS-; FROZEN-FOODS; PHOSPHATES-; PROCESSED-FOODS; SALTS-; SUGAR-; HYDROLYSIS-; MALTODEXTRINS-
UD: 199306

Record 22 of 31 - FSTA Current 1990-2001/03

AN: 1992-11-P0119
TI: Processed cheese foods with added whey protein concentrates.

AU: Gupta-VK; Reuter-H
AD: Inst. fuer Verfahrenstechnik der Bundesanstalt fuer Milchforschung, Kiel, Federal Republic of Germany
PY: 1992
SO: Lait-; 72 (2) 201-212, 16 ref.
DT: Journal-Article
LA: En (English)
LS: fr (French)
SC: P Milk-and-dairy-products
AB: A technique for the manufacture of processed cheese was developed, in which 20% of cheese solids were replaced by whey protein concentrates (WPC). Among the different emulsifiers tested (a combination of trisodium citrate and disodium phosphate or trisodium citrate alone), only trisodium citrate was able to produce a smooth texture. Trisodium citrate at 2.5% and a moisture content of 45.2% resulted in processed cheese with the best sensory characteristics. Concentration of WPC by ultrafiltration to 26.1% DM and a low Ca content (0.7% of DM) improved incorporation of WPC into processed cheese. Processed cheese was prepared by mixing 25% of 6.5-7.5 month old and 55% of 2-3 month old grated Cheddar cheese, WPC equivalent to 20% of cheese DM, dry salt and water, and heating the mixture with thorough stirring, by indirect steam heating. At a temp. of approx. 49 degree C, 2.5% dry trisodium citrate was added. Heating was continued to a temp. of 82 degree C which was maintained for 3-4 min.
DE: CHEESE-VARIETIES; DAIRY-PRODUCTS; PROTEIN-CONCENTRATES; PROTEINS-MILK; WHEY-; CHEESES-SPECIFIC; PROCESSED-CHEESE; WHEY-PROTEIN-CONCENTRATES
UD: 199211

Record 23 of 31 - FSTA Current 1990-2001/03

AN: 1992-09-T0040
TI: [Manufacture of mayonnaise.]
AU: Kozin-VV; Rebrina-VV; Darchiev-BKh; Zverev-YuD
CA: Union of Soviet Socialist Republics, Moskovskii Institut Narodnogo Khozyaistva im. G. V. Plekhanova
PY: 1991
SO: USSR-Patent; SU 1 658 976 A1
DT: Patent
LA: Ru (Russian); Non-English
SC: T Food-additives-spices-and-condiments
AB: A method for manufacture of mayonnaise with improved storage stability involves the following: mustard powder is boiled in hot water; an emulsifier, pretreated with a solution of sodium bicarbonate or disodium phosphate (at 0.15 g salt/g protein), dried milk and sugar are added; the mixture is heated to 60-70 degree C, then cooled to 30-40 degree C; an emulsion of dried egg in water is added with vegetable oil and flavourings; and the resultant paste is stirred, to yield a coarse-disperse emulsion which is then homogenized. The ratio of the 2 Reynold's numbers involved (in the preparation of the initial emulsifier and in the homogenization process) is 1:1-3.5 (Re = 40 000-60 000).
DE: MAYONNAISE-; PATENTS-; SALAD-DRESSINGS; USSR-
UD: 199209

Record 24 of 31 - FSTA Current 1990-2001/03

AN: 1992-07-P0003
TI: Effects of phosphate and citrate on the gelation properties of casein micelles in renneted ultra-high temperature (UHT) sterilized concentrated milk.
AU: McMahon-D; Savello-PA; Brown-RJ; Kalab-M
AD: Dep. of Nutr. & Food Sci., Utah State Univ., Logan, UT 84322-8700, USA
PY: 1991
SO: Food-Structure; 10 (1) 27-36, 31 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Milk was concentrated to 3x (vol. reduction) by ultrafiltration. Disodium phosphate and sodium citrate were added, and milk concentrates were

homogenized. The concentrates were then heated at 135 degree C for 50 s in a laboratory UHT heating system. Rennet gels were made from heated and unheated milk concentrates and their curd firmness measured using a Formagraph. Gel microstructures were examined by EM. When rennet was added to unhomogenized milk concentrate before UHT heating, the resultant gel consisted of a strong protein network that encapsulated the fat globules. Pockets of milk serum were associated with the fat. Homogenization caused the fat droplets to be coated with casein micelles and become tied into the protein network as an integral part of the gel structure. The microstructure of UHT milk concentrate gels was different from gels made from unheated milk. Gelation of UHT milk proceeded more slowly and the gels were weaker. Much of the casein in such samples lost micellar identity and was present as a homogeneous mass around the fat droplets. Large areas in the gel lacked protein network, which weakened the UHT milk gels. Samples with disodium phosphate added did not gel after UHT treatment, even if high concn. of rennet were added. Samples with sodium citrate added formed only a weak rennet gel after UHT treatment.
DE: CITRIC-ACID; CONCENTRATES-; DAIRY-PRODUCTS; GELS-; MILK-; PHOSPHATES-; PROCESSING-; SALTS-; STERILIZATION-; STERILIZED-MILKS; STRUCTURE-; UHT-MILK
UD: 199207

Record 25 of 31 - FSTA Current 1990-2001/03

AN: 1992-05-P0117
TI: Grated hard Parmesan cheese and method for making same.
AU: Trecker-GW; Monckton-SP
CA: Kraft Inc.
PY: 1990
SO: United-States-Patent; US 4 960 605, US 389292 (19890803) [Kraft, Glenview, IL, USA]
DT: Patent
LA: En (English)
SC: P Milk-and-dairy-products
AB: Parmesan cheese is grated and, before or after it is dried to a moisture level of 19-24% by wt., disodium phosphate is added. The disodium phosphate dissolves into the cheese, causing particles to resist agglomeration and oil-off, even at temp. above ambient and at the moisture levels used.
DE: CHEESE-VARIETIES; COMMINUTION-; DAIRY-PRODUCTS; PATENTS-; CHEESES-SPECIFIC; PARMESAN-CHEESE; UNITED-STATES-OF-AMERICA
UD: 199205

Record 26 of 31 - FSTA Current 1990-2001/03

AN: 1991-07-M0054
TI: Color of pregelatinized pasta as influenced by wheat type and selected additives.
AU: Cole-ME; Johnson-DE; Cole-RW; Stone-MB
AD: USDA-WRRC, 800 Buchanan St., Albany, CA 94710, USA
PY: 1991
SO: Journal-of-Food-Science; 56 (2) 488-493, 30 ref.
DT: Journal-Article
LA: En (English)
SC: M Cereals-and-bakery-products
AB: A high temp. short time, twin-screw extrusion process was utilized to manufacture pregelatinized pasta on a pilot-plant scale. Effects of wheat type and selected additives on colour properties of dry and rehydrated pasta products were evaluated by instrumental means. Wheat type most strongly influenced instrumental colour values of pregelatinized pasta. Formulation of pasta with 1.0% disodium phosphate increased saturation index of dry pasta while addition of 5.0% wheat gluten increased lightness index of rehydrated pasta. Raising levels of glyceryl monostearate from 0.75 to 2.0% increased lightness of dry and rehydrated products.
DE: ADDITIVES-; CEREAL-PRODUCTS; COLOUR-; PASTA-; WHEAT-
UD: 199107

Record 27 of 31 - FSTA Current 1990-2001/03

AN: 1991-04-M0012
TI: High temperature-short time pasta, processing: effect of formulation on extrudate properties.
AU: Cole-ME; Johnson-DE; Cole-RW; Stone-MB
AD: USDA-WRRC, 800 Buchanan St., Albany, CA 94710, USA
PY: 1990
SO: Journal-of-Food-Science; 55 (6) 1651-1656, 36 ref.
DT: Journal-Article
LA: En (English)
SC: M Cereals-and-bakery-products
AB: Effects of wheat type and functional ingredients on selected characteristics of pregelatinized pasta manufactured by high temp.-short time twin-screw extrusion were evaluated by physicochemical methods. Although wheat type exerted minor influence on max. force, total organic matter, and water absorption index, both durum and hard wheats were suitable as raw materials for production of pregelatinized pasta. Most differences in quality characteristics of pasta supplemented with additives were attributable to effects of glyceryl monostearate. Neither disodium phosphate (1.0%) nor wheat gluten (5.0%) substantially affected physicochemical properties related to textural quality.
DE: ADDITIVES-; CEREAL-PRODUCTS; PASTA-
UD: 199104

Record 28 of 31 - FSTA Current 1990-2001/03

AN: 1991-01-S0045
TI: Prevention of warmed-over flavor in cooked beef: effect of phosphate type, phosphate concentration, a lemon juice/phosphate blend, and beef extract.
AU: Trout-GR; Dale-S
AD: CSIRO Meat Res. Lab., PO Box 12 Cannon Hill, 4170, Australia
PY: 1990
SO: Journal-of-Agricultural-and-Food-Chemistry; 38 (3) 665-669, 23 ref.
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: This study examined the effect of: 0.5% Lemophos (a commercial blend of lemon juice and sodium tripolyphosphate); 3.0% commercial beef extract; 5 different phosphates (0.5%) [disodium phosphate (Pi), tetrasodium pyrophosphate (PP), sodium tripolyphosphate (TPP), sodium tetrapolyphosphate (TTPP) and sodium hexametaphosphate (HMP)]; and 4 TPP concn. on the TBA reactive substances (TBARS) values and warmed-over flavour (WOF) of cooked ground beef during 6 days of refrigerated storage. [At 0.5% concn.] PP, TPP, TTPP and Lemophos completely inhibited WOF as determined by both TBARS values and sensory evaluation. With HMP, TBARS values increased slightly with increasing storage time; however, the WOF scores did not show a corresponding increase. Pi and beef extract slightly reduced TBARS values and WOF scores; the beef extract also partly masked the WOF. The min. TPP concn. required to inhibit WOF completely was 0.5%; 0.375% TPP prevented the increase in WOF scores but not the increase in TBARS values.
DE: BEEF-; CITRUS-JUICES; COOKING-; EXTRACTS-; FLAVOUR-; JUICES-; LEMONS-; MEAT-; PHOSPHATES-; PROCESSING-THERMAL; SENSORY-PROPERTIES; THERMAL-PROCESSES
UD: 199101

Record 29 of 31 - FSTA Current 1990-2001/03

AN: 1990-09-M0044
TI: Effect of phosphate and citrate on quick-cooking of rice.
AU: Bhaskar-G; Srivastav-PP; Das-H
AD: Dep. of Agric. Eng., Indian Inst. of Tech., Kharagpur 721 302, India
PY: 1989
SO: Journal-of-Food-Science-and-Technology,-India; 26 (5) 286-287, 7 ref.
DT: Journal-Article
LA: En (English)
SC: M Cereals-and-bakery-products
AB: Effect of phosphate and citrate on cooking time of the ' Pankaj' var. of raw and parboiled rice was studied. The process involved rinsing rice in

sodium bicarbonate followed by cooking in disodium phosphate and calcium citrate solution and finally drying in a cabinet dryer. Treated rice cooked faster (3.7x for raw rice and 1.2x for parboiled rice) than untreated rice. The process persumably caused loosening of the protein structure of raw rice thus increasing its rate of water uptake. The swelling, colour and appearance were slightly superior to those obtained from cooking untreated rice.
DE: ACIDS-; CEREALS-; CITRIC-ACID; COOKING-; PHOSPHATES-; RICE-; SALTS-
UD: 199009

Record 30 of 31 - FSTA Current 1990-2001/03

AN: 1990-06-P0117
TI: Effect of buffering salts on soft cheese quality.
AU: Ibrahim-MKE; Sabbour-MM; Mehriz-AM; Sadek-ZI
AD: Dep. of Dairying, Fac. of Agric., Cairo Univ., Cairo, Egypt
PY: 1989
SO: Egyptian-Journal-of-Dairy-Science; 17 (1) 63-73, 15 ref.
DT: Journal-Article
LA: En (English)
LS: ar (Arabic)
SC: P Milk-and-dairy-products
AB: Soft cheese was manufactured from reconstituted dried skim milk (12% SNF) standardized to 2% fat. Various concn. of buffering salts, (i) citric acid (CA) + sodium citrate, (ii) monosodium phosphate + disodium phosphate (DP) and (iii) CA + DP, were added to cheesemilk or pickling medium (whey) used for cheese ripening. Cheeses were analysed periodically during ripening for 2 months. Addition of buffering salts to cheesemilk increased moisture retention of cheeses, the order of effectiveness being (i) greater than (iii) greater than (ii). The soluble N/total N ratio increased during ripening, the increase being greatest when (iii) was added to either milk or whey, and least when (i) was added. Addition of buffering salts to cheesemilk increased titratable acidity and reduced pH of fresh cheese, whilst further increases in acidity during ripening were more pronounced in control than buffer-treated cheeses. Buffering salts varied in their effects on cheese body/texture and flavour, but addition to cheesemilk of (iii) at concn. (w/w) of 0.048 g CA + 0.182 g DP (pH 6.33) is recommended for improving sensory quality of cheese.
DE: CHEESE-VARIETIES; DAIRY-PRODUCTS; SALTS-; CHEESES-SPECIFIC; SOFT-CHEESE
UD: 199006

Record 31 of 31 - FSTA Current 1990-2001/03

AN: 1990-04-P0185
TI: Electrophoretic and chromatographic patterns of caseins of buffalo milk concentrate.
AU: Prasad-C; Balachandran-R
AD: Nat. Dairy Res. Inst., Karnal 132 001, Haryana, India
PY: 1989
SO: Indian-Journal-of-Dairy-Science; 42 (1) 82-86, 16 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Freshly-prepared sterilized conc. buffaloes' milk containing 25, 30 or 35% TS (stabilized with disodium phosphate/trisodium citrate/kappa-carrageenan) and raw buffaloes' milk were tested for electrophoretic mobility and elution profile of their caseins using PAGE and Sephadex G-100 column chromatography. The raw milk showed 3 bands of different mobility on PAGE and 3 fractions of elution vol. 15.0, 70.0 and 45.0 ml (17.31, 78.16 and 4.53%, resp.). Only the 1st 2 bands were present in caseins of the milk concentrates, but their mobility was greater than that of raw milk casein. The chromatographic elution profile showed 5 fractions in the 25% TS concentrate, peaks II and III of the raw milk casein each having fragmented into 2 peaks. The relative proportions of the 5 peaks, resp. were 35.53, 42.09, 9.54, 1.49 and 1.35%. Concn. to 30 and 35% TS resulted in progressive fusion of peak I with peak II and the disappearance of peaks IV and V.
DE: ANALYTICAL-TECHNIQUES; BUFFALOES-; CASEIN-; CHROMATOGRAPHY-;

CONCENTRATES-; CONCENTRATION-; DAIRY-PRODUCTS; ELECTROPHORESIS-; MILK-;
PROTEINS-; BUFFALO-MILK
UD: 199004

No.	Records	Request
1	23	tricalcium
2	3601	Phosphate
3	19	tricalcium Phosphate
* 4	121	Hexametaphosphate

Record 1 of 121 - FSTA Current 1990-2001/03

AN: 2001-03-S0452
TI: Study on water holding capacity of meat products.
AU: Lu-B; Zhang-J
AD: Coll. of Food Sci. & Tech., Wuxi Light Ind. Univ., Wuxi, Jiangsu 214036, China
PY: 2000
SO: Food-Science,-China; 21 (4) 23-26, 6 ref.
NU: 1002-6630
DT: Journal-Article
LA: Ch (Chinese); Non-English
LS: en (English)
SC: S Meat-poultry-and-game
AB: Effects of phosphates and sodium caseinate (SC) on the water holding capacity of meat products were studied. A meat product containing lean pork, fat and starch at a ratio of 70:20:5 and water at 20-40% of lean pork wt. was supplemented with sodium tripolyphosphate (STP), tetrasodium pyrophosphate (SPP), sodium hexametaphosphate (SHMP) and SC, separately or in combination. Highest water holding capacity was obtained using STP at 0.10-0.20%, SPP at 0.10-0.20% and SHMP at 0.05-0.15%. At higher levels, addition of these phosphates resulted in a lower water holding capacity. Orthogonal tests on the 3 factors showed that the combination was optimized at a STP:SPP:SHMP ratio of 2:2:1. Optimal level of SC was 2%, while the optimum water addition was 32%. This level of water gave the highest water holding capacity, with a product wt. of 129.55% and excellent sensory quality.
DE: CASEINATES-; FUNCTIONAL-PROPERTIES; PHOSPHATES-; PORK-; PORK-PRODUCTS; SODIUM-CASEINATE; WATER-HOLDING-CAPACITY
UD: 200103

Record 2 of 121 - FSTA Current 1990-2001/03

AN: 2000-11-P1721
TI: Compositions and method of treatment of whey.
AU: Giersch-GJ; Bohanon-LF
PY: 2000
SO: United-States-Patent
PN: US 6 077 358 (US6077358)
PC: US
PA: Hydrite Chemical Co.
PPR: US 216590 (19981218) [Hydrite Chem., Milwaukee, WI, USA]
PPD: 19981218
PPA: Hydrite Chem., Milwaukee, WI, USA
DT: Patent
LA: En (English)
SC: P Milk-and-dairy-products
AB: Use of a Ca chelating salt composition for improving concentration of whole cheese whey and recovery of lactose from cheese whey is described. This processing aid is composed of sodium hexametaphosphate with phosphate chain lengths of 12-14 or 21-28, or sodium hexametaphosphate (phosphate chain length = 12-28) blended with either tetrasodium or tetrapotassium pyrophosphate. When included during lactose recovery from cheese whey via a separation process followed by concentration using reverse osmosis, yield of lactose is increased.

Another improvement of this salt is the formation of scale that can be removed easily from processing equipment, including heat transfer equipment. A method for use of the hexametaphosphate salt is also included.
DE: ADDITIVES-; CONCENTRATION-; LACTOSE-; PATENTS-; WHEY-; CHEESE-WHEY; CHELATING-AGENTS
UD: 200011

Record 3 of 121 - FSTA Current 1990-2001/03

AN: 2000-09-J1844
TI: Compositions and processes for maintaining the fresh sensory attributes of freshly-cut apples.
AU: Gawad-KI; Gawad-HA
PY: 2000
SO: United-States-Patent
PN: US 6 054 160 (US6054160)
PC: US
PA: EPL Technologies Inc.
PPR: US 891885 (19970714) [EPL Technologies, Philadelphia, PA, USA]
PPD: 19970714
PPA: EPL Technologies, Philadelphia, PA, USA
DT: Patent
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: A composition and method for maintaining the sensory properties of freshly cut apple pieces during extended shelf life are described. The method involves dipping cut apple pieces in an aqueous solution containing GRAS substances that protect the apple pieces from deterioration by enzyme activity, oxidation, water migration and microbial effects during an extended shelf life period. The solution consists principally of L-cysteine, sorbitol and CaCl2; a chelator such as sodium hexametaphosphate may also be added. Packaging of the apple pieces in film with O2 and CO2 levels that will equilibriate to 0.5-5.0% and 7.0-37.0%, respectively, has a synergistic effect.
DE: APPLES-; PATENTS-; PRESERVATION-; SENSORY-PROPERTIES
UD: 200009

Record 4 of 121 - FSTA Current 1990-2001/03

AN: 2000-09-C1093
TI: Combined effect of hop resins and sodium hexametaphosphate against certain strains of Escherichia coli.
AU: Fukao-T; Sawada-H; Ohta-Y
AD: Food Res. Lab., Nippon-Shinyaku Co., 14 Nishinosho-Monguchi-cho, Kisshoin, Minami-ku, Kyoto-shi, Kyoto 601-8550, Japan. Tel. +81-75-321-9207. Fax +81-75-321-9028. E-mail t.fukao@po.nippon-shinyaku.co.jp
PY: 2000
SO: Journal-of-Food-Protection; 63 (6) 735-740, 35 ref.
NU: 0362-028X
DT: Journal-Article
LA: En (English)
SC: C Hygiene-and-toxicology
AB: The antimicrobial effect of hop resins used in combination with sodium hexametaphosphate, glycerol monocaprate, and lysozyme against Escherichia coli was investigated; influence of time of addition (lag or log phase) of hop resins and other compounds to E. coli was also studied. Results showed that initially when the 4 components were used separately antibacterial activity against E. coli was minimal. However, the combination of hop resins with sodium hexametaphosphate exhibited strong inhibition of E. coli although combinations of hop resins with

the other agents had no effect. Inhibitory activity was strongest when components were added at the beginning of growth of the bacteria, resulting in a prolonged lag phase; addition during the log phase depressed growth considerably. Addition of hop resins and sodium hexametaphosphate caused cell components with absorbances near 260 nm to leak out, possibly due to damage to bacterial cell membranes. The combined antimicrobial effect was also detected in mashed potatoes which were used as model food system. It is concluded that the combined use of hop resins and sodium hexametaphosphate may be useful for controlling E. coli.
DE: BACTERIA-; ESCHERICHIA-; FOOD-SAFETY; HOPS-; INHIBITION-; PHOSPHATES-; ANTIBACTERIAL-ACTIVITY; ESCHERICHIA-COLI; RESINS-; SODIUM-HEXAMETAPHOSPHATE
UD: 200009

Record 5 of 121 - FSTA Current 1990-2001/03

AN: 2000-07-B1156
TI: Purification and properties of an acid phosphatase from Lactobacillus curvatus DPC2024.
AU: Magboul-AAA; McSweeney-PLH
AD: Correspondence (Reprint) address, P. L. H. McSweeney, Dep. of Food Sci. & Tech., Univ. Coll., Cork, Republic of Ireland. Tel.+353-21-902011. Fax +353-21-270001. E-mail pmcs@ucc.ie
PY: 1999
SO: International-Dairy-Journal; 9 (12) 849-855, 20 ref.
NU: 0958-6946
DT: Journal-Article
LA: En (English)
SC: B Biotechnology
AB: Purification and characterization of an acid phosphatase from Lactobacillus curvatus DPC2024, isolated from a commercial Irish Cheddar cheese, is descibed. The enzyme was purified 223-fold from cell-free culture medium to electrophoretic homogeneity by anion-exchange (DEAE-Sephacel and MonoQ HR5/5), hydrophobic interaction and immobilized metal affinity chromatographies. Enzyme yield was 19.5% of initial activity and specific activity was 1675 U/mg. SDS-PAGE and gel filtration showed the enzyme to be a tetramer composed of monomers with mol. wt. of approx. 26 kDa. Optimum temp. and pH for activity on p-nitrophenol phosphate were 70 degree C and 4.5, respectively. The enzyme was stable for up to 100 min at 60 degree C, while the half-life of the enzyme at 70 degree C was approx. 45 min. 0.1mM NaF and 1.0mM ZnCl2 strongly inhibited phosphatase activity (88 and 87%, respectively). 1.0mM hexametaphosphate, tripolyphosphate or pyrophosphate inhibited enzyme activity slightly, while ascorbic acid had no effect. Substrates for the acid phosphatase included D-fructose-6-phosphate and alpha-glucose-6-phosphate. Bis(p-nitrophenyl)phosphate and UMP, however, were not hydrolysed. N-terminal sequence data showed the enzyme to have 65% homology with a L. plantarum DPC2739 acid phosphatase.
DE: ESTERASES-; LACTOBACILLUS-; LACTOBACILLUS-CURVATUS; PHOSPHATASES-
UD: 200007

Record 6 of 121 - FSTA Current 1990-2001/03

AN: 2000-06-S0796
TI: Time-dependent marinade absorption and retention, cooking yield, and palatability of chicken filets marinated in various phosphate solutions.
AU: Xiong-YL; Kupski-DR
AD: Dep. of Animal Sci., Univ. of Kentucky, Lexington, KT 40546, USA. E-mail ylxiong@pop.uky.edu

PY: 1999
SO: Poultry-Science; 78 (7) 1053-1059, 17 ref.
NU: 0032-5791
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: The time course of phosphate marinade absorption and its influence on cooking yield and sensory characteristics of chicken fillets were investigated. Water uptake by the fillets was rapid in the initia1 5 min, and was substantially slower from 15 to 30 min during tumble marination. Rate of marinade absorption increased markedly (P less than 0.05) by the presence of either high (3.2%) or low (1.6%) concn. of sodium phosphates in the order: pyrophosphate (PP) greater than tripolyphosphate (TPP) greater than hexametaphosphate (MHP). Sa1t (8% NaCl) also promoted (P less than 0.05) moisture absorption but tended to diminish the effects of phosphates. Percentage marinade retention at 24 h, which was also influenced by phosphates and salt, was well correlated (r-2 = 0.93) with marinade absorption. Cooking yields increased gradually (P less than 0.05) with marination time except for water-marinated control fillets and fillets treated with HMP and salt, which had reduced cooking yields as marination time increased. All phosphate solutions, whether containing NaCl or not, improved (P less than 0.05) cooking yield when compared to the water-marination control. A taste panel detected little differences, except for saltiness (P less than 0.10), between high- and low-level phosphate treatments, and considered TPP-treated fillets to be similar to PP-treated ones, but higher than HMP-treated fillets in juiciness, saltiness, and overall flavour intensity (P less than 0.10). [See also FSTA (2000) 32 5Sn762.]
DE: CHICKEN-MEAT; COOKING-; PHOSPHATES-; PROCESSING-; SALT-; SENSORY-PROPERTIES; SOAKING-; SORPTION-; ABSORPTION-; COOKING-PROPERTIES; MARINADES-; NACL-; TUMBLING-
UD: 200006

Record 7 of 121 - FSTA Current 1990-2001/03

AN: 2000-06-S0762
TI: Monitoring phosphate marinade penetration in tumbled chicken filets using a thin-slicing, dye-tracing method.
AU: Xiong-YL; Kupski-DR
AD: Dep. of Animal Sci., Univ. of Kentucky, Lexington, KT 40546, USA. E-mail ylxiong@pop.uky.edu
PY: 1999
SO: Poultry-Science; 78 (7) 1048-1052, 14 ref.
NU: 0032-5791
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: A simple dye-tracing method was developed to monitor kinetics of water penetration in chicken fillets subjected to rotary tumble marination. 860 chicken breast fillets were tumbled for 0, 5, 15 and 30 min in marinades containing 1.6 or 3.2% sodium polyphosphate (SPP), sodium tripolyphosphate (STPP) or hexametaphosphate (HMP) with or without 8% NaCl. Marinade penetration was monitored by tracing a dye (FD&C Blue No. 1) migrating into different 1ayers of the fillets using spectrophotometric measurement (absorbance at 627 nm). Marinades penetrated most rapidly in the initial 5 min, with SPP, STPP and HMP at a low level (1.6%) enhancing rate of penetration of unsalted water in the first 5 min by 196, 171 and 138%, respectively. However, the effect of phosphates was diminished when their concn. was high (3.2%) or when salt was present. Overall, low levels (1.6) of phosphates facilitated water penetration deep into the fillets, whereas high levels (3.2%) of

phosphates and salt improved water penetration in the surface layers of the fillets.
DE: CHICKEN-MEAT; MOISTURE-CONTENT; PHOSPHATES-; PROCESSING-; SALT-; SOAKING-; SORPTION-; ABSORPTION-; KINETICS-; MARINADES-; MOISTURE-; NACL-; TUMBLING-
UD: 200006

Record 8 of 121 - FSTA Current 1990-2001/03

AN: 2000-06-J1336
TI: Cell wall metabolism and induction of ripening capacity in a La France pear as influenced by 2,4-DP.
AU: Kondo-S; Takano-Y
AD: Sch. of Bioresources, Hiroshima Prefectural Univ., Shobara, Hiroshima 727-0023, Japan. E-mail s-kondo@bio.hiroshima-pu.ac.jp
PY: 2000
SO: Journal-of-the-American-Society-for-Horticultural-Science; 125 (2) 242-247, 22 ref.
NU: 0003-1062
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: Effects of the synthetic auxin 2,4-DP on fruit ripening of La France pear on Quince C (Cydonia oblonga Mill.) rootstock were investigated. A solution of 2,4-DP at 90 mul/l was applied 143, 151 and 159 days after full bloom (DAFB) to whole trees and physicochemical properties of treated fruit were compared with those of nonstored, nontreated fruit and stored, nontreated fruit (harvested 165 DAFB). Internal ethylene concn. in 2,4-DP-treated fruit increased more than in nonstored, nontreated fruit and the level was higher the earlier the application time. Fruit firmness decreased earliest for fruit treated with 2,4-DP at 143 DAFB, followed by 151 DAFB and then 159 DAFB-treated fruit. In the nonstored, nontreated fruit, firmness also showed a slight decrease with time. In all 2,4-DP treatments, water-soluble polyuronide (WSP) increased with ripening but hexametaphosphate-soluble polyuronide (HMP) and HCl-soluble polyuronide (HP) concn decreased. Most notably, WSP concn. increased earliest in fruit treated with 2,4-DP at 143 DAFB. Total concn. of neutral sugars from cell walls in each treatment decreased with time, and the levels in fruit treated with 2,4-DP at 143 DAFB were lowest at each sampling time. Arabinose concn. were high compared with other neutral sugars throughout fruit ripening for each treatment, while glucose concn. were high in nonripened fruit. At 193 DAFB, approx. 85% of the fruit treated with 2,4-DP at 143 DAFB reached edible conditions (firmness less than or equal0.4 N/mm-2) on the tree. Furthermore, approx. 85% of the fruit treated with 2,4-DP at 151 DAFB reached edible condition on 200 DAFB and close to 100% of the fruit treated with 2,4-DP at 159 DAFB reached edible condition on 207 DAFB. When ripened in a controlled room at 20 degree C and 90% RH after 2,4-DP treatment, the fruit treated earliest reached edible condition soonest. Results demonstrate that 2,4-DP treatment can be used as an effective method of producing good quality fruit ripened on the tree, and that 2,4-DP may be an adequate replacement for cold storage conditioning to induce ripening capacity.
DE: PEARS-; PHYSICAL-PROPERTIES; PLANT-GROWTH-REGULATORS; RIPENING-; AUXINS-; PHYSICOCHEMICAL-PROPERTIES
UD: 200006

Record 9 of 121 - FSTA Current 1990-2001/03

AN: 2000-06-H1405
TI: Control of browning of blackcurrant beverages.

AU: Cheng-JJ; Cui-CD; Ju-J
AD: Coll. of Food Sci., Northeast China Agric. Univ., Harbin, Heilongjiang 150030, China
PY: 1999
SO: Food-Science,-China; 20 (8) 41-44, 15 ref.
NU: 1002-6630
DT: Journal-Article
LA: Ch (Chinese); Non-English
SC: H Alcoholic-and-non-alcoholic-beverages
AB: In a study on the control of browning in blackcurrant (Ribes nigrum) beverages, pyrophosphate at 40-100 mg/l, tripyrophosphate at 40-200 mg/l, hexametaphosphate at 40-100 mg/l, vitamin C at 20-40mg/l and beta-cyclodextrin at 200-600 mg/l were added to blackcurrant juice, which was then stored at 37 degree C or room temp. (12-14 degree C). Determination of cyanidin and delphinidin concn. showed that treated blackcurrant juice had higher anthocyanin contents than controls, suggesting that the phosphates, vitamin C and beta-cyclodextrin had colour protecting effects. beta-Cyclodextrin at 600 mg/l had the most significant colour preserving activity. Blackcurrant juice containing beta-cyclodextrin at 600 mg/l had the highest anthocyanin concn. at both temp., and anthocyanin concn. was relatively stable during storage for 0-6 days.
DE: ASCORBIC-ACID; COLOUR-; DEXTRINS-; FRUIT-JUICES; PHOSPHATES-; STORAGE-; TEMPERATURE-; BLACKCURRANT-JUICES; CYCLODEXTRINS-; TEMP-; VITAMIN-C
UD: 200006

Record 10 of 121 - FSTA Current 1990-2001/03

AN: 2000-06-G0293
TI: Study on extraction of ant protein.
AU: Lu-XX; Li-ZL; Hong-T
AD: Dep. of Food Eng., Tianjin Commerce Coll., Tianjin 300400, China
PY: 1999
SO: Food-Science,-China; 20 (8) 49-50, 5 ref.
NU: 1002-6630
DT: Journal-Article
LA: Ch (Chinese); Non-English
LS: en (English)
SC: G Catering-speciality-and-multi-component-foods
AB: A procedure was tested for extracting protein from ants (Polyrhachis viciua Roger), using sodium, NaCl, sodium hexametaphosphate and HCl as solvents. Protein extraction rate was affected significantly by material to solvent ratio, pH, salt concn., temp. and extraction time. Conditions were optimized as: material to solvent ratio 1:20; pH 8.0; salt concn. 1%; temp. 25 degree C; and extraction time 2 h. Under these conditions, a protein extraction rate of 58.9% was achieved.
DE: EXTRACTION-; INSECTS-; PROTEINS-ANIMAL; ANIMAL-PROTEINS; ANTS-
UD: 200006

Record 11 of 121 - FSTA Current 1990-2001/03

AN: 2000-05-T0439
TI: Oil-in-water dispersions of beta-carotene and other carotenoids stable against oxidation prepared from water-dispersible beadlets having high concentrations of carotenoid.
AU: Cox-DJ; Kearney-DR; Kirksey-ST Jr; Taylor-MJ
PY: 1999
SO: United-States-Patent
PN: US 6 007 856 (US6007856)
PC: US

PA: Procter & Gamble Co.
PPR: US 908845 (19970808) [Procter & Gamble, Cincinnati, OH, USA]
PPD: 19970808
PPA: Procter & Gamble, Cincinnati, OH, USA
DT: Patent
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: Oil-in-water dispersions of beta-carotene and other carotenoids that are stable against oxidation, even in the presence of polyphosphates such as sodium hexametaphosphate, are described. The dispersions are typically prepared by contacting a water-dispersible beadlet (comprising _5% colloidal carotenoid) with the water phase to form carotenoid droplets that are in intimate contact with sufficient oil phase to make the carotenoid stable against oxidation, even in the absence of an effective antioxidant such as ascorbic acid. The carotenoid dispersions are especially useful for providing vitamin A fortification and colour in dilute juice beverages, and may be used in other oil/water food and beverage products where vitamin A fortification and/or colour are desired.
DE: CAROTENES-; CAROTENOIDS-; COLLOIDS-; COLOUR-; DISPERSIONS-; FOOD-ENRICHMENT; FRUIT-JUICE-BEVERAGES; PATENTS-; BETA-CAROTENE; FORTIFICATION-; FRUIT-BEVERAGES
UD: 200005

Record 12 of 121 - FSTA Current 1990-2001/03

AN: 2000-05-R0381
TI: Recovery of proteins from fish waste products by alkaline extraction.
AU: Batista-I
AD: Inst. de Investigacao das Pescas e do Mar, Av. Brasilia, P-1400 Lisbon, Portugal
PY: 1999
SO: European-Food-Research-and-Technology; 210 (2) 84-89, 12 ref.
NU: ISSN: 1438-2377
DT: Journal-Article
LA: En (English)
SC: R Fish-and-marine-products
AB: Effects of process variables (pH, type of extractant (sodium or calcium hydroxides), ratio of extracting media to raw material, extraction time, temp. and NaCl concn.) on extraction and recovery of proteins from hake (Merluccius spp.) and monkfish (Lophius spp.) waste were studied; influence of sodium hexametaphosphate concn. on recovery of soluble proteins present in the supernatant after isoelectric precipitation of the fish wastes was also studied. Min. solubility of proteins from hake waste was 17% at pH 5-6, while that for proteins from monkfish waste was 9% at pH 5.0. In both fish species, higher extraction yields were obtained with sodium hydroxide than with calcium hydroxide. Extracted protein percentage increased with increasing extraction time, with that of hake being higher than that of monkfish. Extraction yields increased with increase in ratio of extractant vol. to ground tissue wt. for both species, particularly for the sodium hydroxide extraction of hake proteins. Increasing temp. increased the amount of protein recovered by both extractants, though more so for calcium hydroxide. High NaCl concn. inhibited protein extraction at pH 11 and 2 to some extent; however, protein solubility increased at nearly neutral pH. Max. isoelectric protein precipitation occurred at pH 5 (pH of min. solubility) for both species. Recovery of proteins by precipitation with HCl was 80.6 and 62.9% of total protein in extracts from hake and monkfish, respectively. Recoveries of supernatant proteins by sodium hexametaphosphate, generated from NaOH-HCl and Ca

(OH)2-H3PO4 systems were similar, being 93.2 and 91.8% respectively with 0.38% Na6(PO3)6. Results indicated that a good yield of protein could be obtained from hake waste, providing optimum conditions are used for protein extraction and precipitation. Solubilization of monkfish protein was probably lower because of a higher connective tissue content.
DE: EXTRACTION-; FISH-; PROTEINS-ANIMAL; WASTES-; FISH-PROTEINS; HAKE-; LOPHIUS-; MERLUCCIUS-; MONKFISH-
UD: 200005

Record 13 of 121 - FSTA Current 1990-2001/03

AN: 1999-10-L0428
TI: Physicochemical and enzyme susceptibility characteristics of starch extracted from chemically pretreated Xanthosoma sagitifolium roots.
AU: John-JK; Sunitha-Rani-V; Raja-KCM; Moorthy-SN
AD: Correspondence (Reprint) address, K. C. M. Raja, Biochem. Processing & Waste Water Eng. Div., Reg. Res. Lab., CSIR, Trivandrum 695 019, India
PY: 1999
SO: Starch/Staerke-; 51 (2/3) 86-89, 15 ref.
NU: ISSN: 0038-9056
DT: Journal-Article
LA: En (English)
SC: L Sugars-syrups-starches-and-candy
AB: Effects of chemically pretreating tania (Xanthosoma sagitifolium) roots on the physicochemical properties and enzyme (alpha-amylase) susceptibility of extracted starch, were examined. Fresh samples of tania roots were pretreated with either sodium hexametaphosphate (SHMP), potassium metabisulphite (KMS), NaCl or aqueous NH3 at concn. of 1-5% (w/v) or glyceryl monostearate (GMS) at concn. of 0.025-0.125% (w/v). Starch was extracted from each pretreated sample and compared to a control obtained by direct water extraction. Chemically pretreated starch generally showed a decrease in amylose content compared with the control. Lipid content of starch decreased with NaCl and SHMP but increased with KMS, GMS and NH3 pretreatment. Pretreatment did not seem to affect starch viscosity. Amylose digestion studies showed that samples reheated with NaCl displayed a lower alpha-amylase digestibility. Amylase activity after 20 min incubation was highest in NH3 treated samples, but the overall pattern of alpha-amylase digestibility was not affected by pretreatment. X-ray diffraction data suggested some changes in crystallinity of pretreated starch granules, particularly for KMS treated samples.
DE: AMYLASES-; EXTRACTION-; PHYSICAL-PROPERTIES; STARCH-; VEGETABLES-SPECIFIC; ALPHA-AMYLASES; PHYSICOCHEMICAL-PROPERTIES; STARCHES-; TANIA-
UD: 199910

Record 14 of 121 - FSTA Current 1990-2001/03

AN: 1999-07-T0484
TI: Expanding the role of nisin.
CA: Flair-Flow Europe
AD: Correspondence address, E. J. Smid, Agrotech. Res. Inst. (ATO-DLO), Bornsesteeg 59, NL-6708 PD, PO Box 17, NL-6700 AA Wageningen, Netherlands. Tel. +31-317-475000. Fax +31-317-475347. E-mail E.J.SMID@ATO.DLO.NL
PY: 1999
SO: Flair-Flow-Reports; F-FE 318/99, 1p.
DT: Report
LA: En (English)

SC: T Food-additives-spices-and-condiments
AB: Progress is described in the ongoing `nisin plus' EU FAIR project whose aim is to expand the range of applications of nisin (E234) in assuring food safety and quality. This is being tackled using novel combinations of nisin with other biopreservatives and mild processes. The first year of the project focused on identification of suitable natural compounds and preservative treatments which would improve efficacy of nisin in laboratory systems. Results showed the following: low concn. of carvacrol and thymol in broth and solid media systematically improved nisin performance against Listeria monocytogenes and Bacillus cereus; cultures of lactic acid bacteria plus nisin overcame the short-term effect of nisin alone against L. monocytogenes; citric acid and sodium hexametaphosphate increased sensitivity of Gram-negative bacteria towards nisin and increased nisin effectiveness in suppressing germination of B. cereus spores; lactic acid increased effectiveness of nisin at low salt levels while acetic acid had the opposite effect at high salt levels; sucrose palmitates and stearates increased nisin activity and caused complete inhibition of B. cereus and Lactobacillus plantarum, but were ineffective against Salmonella spp.; and nisin and siderophores acted synergistically against Pseudomonas aeruginosa but not against S. typhimurium.
DE: BACTERIA-; BACTERIOCINS-; FOOD-SAFETY; INHIBITION-; PATHOGENS-; PRESERVATIVES-; LACTIC-ACID-BACTERIA; NISIN-; REPORT-
UD: 199907

Record 15 of 121 - FSTA Current 1990-2001/03

AN: 1999-07-S1109
TI: Calcium chelators and salt extracted myofibrillar protein injection into lean pre rigor beef muscle: effects on tenderness indices.
AU: Claus-JR; Jordan-ML; Eigel-WN; Marriott-NG; Shaw-DE
AD: Dep. of Food Sci. & Tech., Virginia Polytech. Inst. & State Univ., Blacksburg, VA 24061, USA
PY: 1998
SO: Journal-of-Muscle-Foods; 9 (4) 329-338, 18 ref.
NU: ISSN: 1046-0756
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: Effects of treatment of pre rigor longissimus muscle with Ca chelators or extracted myofibrillar proteins on tenderness characteristics of beef steak were investigated. Pre rigor beef longissimus muscles were removed within 40 min post mortem and injected (10% of muscle wt., within 2 h post mortem) with either a chelator (alginate, 3%; hexametaphosphate, 3% EDTA, 0.13%; or citrate, 0.13%), meat slurry (45%), or a myofibrillar meat extract (3.7% protein). Effects of each injection on physical and chemical properties of the beef were compared with a control and a water only injected treatment. Gross muscle shortening was not inhibited. Water only, meat extract and citrate treatments had shorter (P less than 0.05) sarcomeres than the control. Meat slurry, alginate, phosphate and EDTA treatments produced sarcomere lengths equivalent to the control. The control had the lowest (P less than 0.05) pH and percentage moisture. However, there were no differences in percentage cooking losses. Although variations in sarcomere length were apparent, treatments did not improve tenderness (P greater than 0.05) as measured by Warner-Bratzler shear. [From En summ.]
DE: ADDITIVES-; BEEF-; PROTEINS-ANIMAL; TENDERIZATION-; ANIMAL-PROTEINS; BEEF-STEAKS; CHELATING-AGENTS
UD: 199907

Record 16 of 121 - FSTA Current 1990-2001/03

AN: 1999-07-B0824
TI: Purification and characterization of an acid phosphatase from Lactobacillus plantarum DPC2739.
AU: Magboul-AAA; McSweeney-PLH
AD: Dep. of Food Sci. & Tech., Univ. Coll. Cork, Cork, Republic of Ireland. E-mail dydk6014@bureau.ucc.ie
PY: 1999
SO: Food-Chemistry; 65 (1) 15-22, 15 ref.
NU: ISSN: 0308-8146
DT: Journal-Article
LA: En (English)
SC: B Biotechnology
AB: An acid phosphatase isolated from Lactobacillus plantarum DCP2739 was purified and characterized (enzymic activity, thermal stability, temp./pH optima, effect of inhibitors and metal ions, N-terminal amino acid sequence), and its specificity on various substrates, including casein, was evaluated. Whole casein proved a poor substrate for this enzyme (which was tetrameric with an overall mol. wt. of approx. 110 kDa), as indicated by a low release of inorganic phosphate. Thus, this enzyme is unlikely to be involved in ripening activities in cheese. The enzyme, a non-specific phosphomonoesterase, was stable at a wide temp. range, optimally active at pH 3.5-5.0 and 40 degree C, strongly inhibited by NaF, hexametaphosphate, tripolyphosphate, pyrophosphate and orthophosphate, and unaffected by metal chelating agents, sulphydryl blockers and divalent metal ions.
DE: ESTERASES-; LACTOBACILLUS-; LACTOBACILLUS-PLANTARUM; PHOSPHATASES-
UD: 199907

Record 17 of 121 - FSTA Current 1990-2001/03

AN: 1999-04-S0575
TI: [Preparation of a meat product additive - a mixture of phosphates.]
AU: Li-ZC; Liu-C; Wu-JF
AD: Shaanxi Provincial Inst. of Animal Sci. & Vet. Med., Xianyang, Shaanxi 712039, China
PY: 1998
SO: Meat-Research; No. 2, 34-36, 3 ref.
NU: ISSN: 1001-8123
DT: Journal-Article
LA: Ch (Chinese); Non-English
SC: S Meat-poultry-and-game
AB: In tests on the development of a phosphate mixture for use as a meat product additive, sodium tripolyphosphate at 0.10-0.20%, sodium pyrophosphate at 0.10-0.20% and sodium hexametaphosphate at 0.05-0.15% were used in various combinations in production of ham. The highest sensory score was achieved for ham treated with sodium tripolyphosphate at 0.2% + sodium pyrophosphate at 0.2% + sodium hexametaphosphate at 0.1%. This produced a ham yield of 115%.
DE: HAM-; PHOSPHATES-
UD: 199904

Record 18 of 121 - FSTA Current 1990-2001/03

AN: 1999-02-L0086
TI: Effect of pretreatment of fresh Amorphophallus paeoniifolius on physicochemical properties of starch.
AU: Sunitha-Rani-V; John-JK; Moorthy-SN; Raja-KCM

AD: Correspondence (Reprint) address, K. C. M. Raja, EII, RRL, Trivandrum 695 019, India
PY: 1998
SO: Starch/Staerke-; 50 (2/3) 72-77, 19 ref.
NU: ISSN: 0038-9056
DT: Journal-Article
LA: En (English)
SC: L Sugars-syrups-starches-and-candy
AB: Fresh roots of [the tropical root crop] Amorphophallus paeoniifolius were separately pretreated with sodium hexametaphosphate (SHMP), potassium metabisulphite (KMS), NaCl and NH4OH at concn. of 1-5% (w/v) and with glyceryl monostearate (GMS) at 0.025-0.125%. Quality of starch extracted from pretreated roots was compared with that obtained from fresh roots by direct aqueous extraction. Starch samples prepared from chemically-pretreated roots showed characteristic changes in water-soluble amylose contents, swelling and solubility and alpha-amylase susceptibility. X-ray diffraction of starch samples from chemically pretreated roots, although resembling that of the control, showed noticeable shifts with respect to `d' spacing and Io/Imax values.
DE: PHYSICAL-PROPERTIES; STARCH-; VEGETABLES-SPECIFIC; AMORPHOPHALLUS-PAEONIIFOLIUS; PHYSICOCHEMICAL-PROPERTIES
UD: 199902

Record 19 of 121 - FSTA Current 1990-2001/03

AN: 1998-09-S1521
TI: [Effects of phosphates on the yield of chicken breast meat products.]
AU: Luo-X; Zhang-PZ; Li-HY
AD: Dep. of Food Sci., Shangdong Agric. Univ., Tai'an 271018, China
PY: 1997
SO: Meat-Research; No. 1, 14-16, 8 ref.
NU: ISSN: 1001-8123
DT: Journal-Article
LA: Ch (Chinese); Non-English
SC: S Meat-poultry-and-game
AB: In a study on the effects of phosphates on the output of chicken breast meat products, sodium pyrophosphate (SPP), sodium tripolyphosphate (STPP) and sodium hexametaphosphate (SHMP) were added to chicken breast meat at processing at various doses and combinations with 3 replicates. Results showed that effects of the 3 phosphates decreased in the order SHMP greater than SPP greater than STPP. Combination of the 3 phosphates was optimized as SPP 21.8:STPP 45.6:SHMP 32.6. The optimum total dose of the 3 phosphates in combination was 0.35%.
DE: CHICKEN-MEAT; PHOSPHATES-; CHICKEN-PRODUCTS
UD: 199809

Record 20 of 121 - FSTA Current 1990-2001/03

AN: 1998-09-J2179
TI: Quantification and characterization of pectins from cranberry (Vaccinium macrocarpon).
AU: Stueckrath-R; Pedrero-A; Tarabla-P; Trujillo-L
AD: Dep. de Ciencia y Tec. de los Alimentos, Univ. de Los Lagos, Casilla 933, Osorno, Chile. Fax. 56-64-239517
PY: 1998
SO: Alimentaria-; No. 293, 23-26, 13 ref.
NU: ISSN: 0300-5755
DT: Journal-Article
LA: Es (Spanish); Non-English

LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: Cranberries (Vaccinium macrocarpon) var. Stevens, Ben Lear and Pilgrim, normally grown in Chile for juice manufacture, were harvested at the normal time and analysed in quadruplicate for pectin contents. Pectins were (i) extracted from alcohol-insoluble solids and fractionated using water, ammonium oxalate and alkali, and were determined using a colorimetric method with m-hydroxydiphenol and calculation of results (as g galacturonic anhydride) from a calibration curve. Pectins were also (ii) extracted from freeze dried fruit and characterized with HCl at pH 2.5 and with the chelating agent sodium hexametaphosphate to determine degree of esterification. Total pectins contents (i) were 0.1574, 0.1170 and 0.1686% in var. Stevens, Ben Lear and Pilgrim, respectively. Protopectins predominated in all 3 var, ranging from 54-57% of total pectins. Concn. of total and protopectins in var. Ben Lear differed significantly (P _ 0.01) from concn. in the other var. Results by method (ii) showed that degree of esterification of extracted pectins ranged from 47.73% in Ben Lear to 57.54% in Stevens. It is suggested that the gelling mechanism in cranberries var. Ben Lear could make them suitable for development of other cranberry products as well as cranberry juice.
DE: CRANBERRIES-; PECTIC-SUBSTANCES; PECTINS-
UD: 199809

Record 21 of 121 - FSTA Current 1990-2001/03

AN: 1998-08-J1655
TI: Changes in the contents of dietary fibers and pectic substances during fermentation of Baik-kimchi.
AU: Soo-Kyung-Moon; Hong-Soo-Ryu
AD: Dep. of Food Sci., Inst. of Marine Ind., Gyeongsang Nat. Univ., Tongyeong 650-160, Korea
PY: 1997
SO: Journal-of-the-Korean-Society-of-Food-Science-and-Nutrition; 26 (6) 1006-1012, 22 ref.
DT: Journal-Article
LA: Ko (Korean); Non-English
LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: Changes in the levels of dietary fibre and pectic substances in baik-kimchies (watery Chinese cabbage pickles) during fermentation at 5 and 25 degree C were studied. Baik-kimchi fermented at 25 degree C showed greater changes in pH and acidity than those fermented at 5 degree C, during storage. Ripened baik-kimchi products fermented at 5 degree C could be prepared after 9-12 days of fermentation; these samples had a pH of 4.25-4.40 and an acidity of 0.34-0.53. Baik-kimchi products fermented at 25 degree C and ripened for 3 days had a pH of 4.02 and acidity of 0.54. pH and acidity of baik-kimchi juice changed more rapidly than those of baik-kimchi solids regardless of fermentation temp. Content of soluble dietary fibre (SDF) ranged from 3.06 to 4.87% in products fermented at 5 degree C and a wide variation in SDF levels was observed in samples fermented at 25 degree C (4.15-11.22%). Insoluble dietary fibre (IDF) levels increased from 21.66 to 28.42% in the solids of baik-kimchi during fermentation at 5 degree C, and ranged from 21.37 to 24.65% in samples fermented at 25 degree C. A notable amount of pectin was found in baik-kimchi juice. Contents of pectin in baik-kimchi solids decreased, and contents of sodium hexametaphosphate soluble pectin (HXSP) and HCl soluble pectin (HCISP) increased, with fermentation period. [From En summ.]
DE: FERMENTATION-; FERMENTED-FOODS; FIBRE-; PECTIC-SUBSTANCES; TEMPERATURE-; VEGETABLE-PRODUCTS; BAIK-KIMCHIES; DIETARY-FIBRE; TEMP-

UD: 199808

Record 22 of 121 - FSTA Current 1990-2001/03

AN: 1998-08-H1482
TI: Analysis of phloxine B and uranine in coffee by high-performance liquid chromatography and capillary zone electrophoresis after solid phase extraction cleanup.
AU: Alcantara-Licudine-JP; Ngoc-Lan-Bui; Kawate-MK; Qing-XLi
AD: Correspondence (Reprint) address, Qing X. Li, Dep. of Environmental Biochem., Univ. of Hawaii at Manoa, Honolulu, HI 96822, USA. Tel (808) 956-2011. Fax (808) 956-5037. E-mail gingl@hawaii.edu
PY: 1998
SO: Journal-of-Agricultural-and-Food-Chemistry; 46 (3) 1005-1011, 31 ref.
NU: ISSN: 0021-8561
DT: Journal-Article
LA: En (English)
SC: H Alcoholic-and-non-alcoholic-beverages
AB: A method was developed for the analysis of phloxine B and uranine, photoactive dyes being evaluated as fruit fly toxicants, in coffee cherries and green and roasted beans. Analytes were measured by HPLC and capillary zone electophoresis (CZE) using visible and fluorescence detectors after cleanup with disposable amino cartridges. A mixture of methanol/acetonitrile/n-butylamine (1:1:0.05) effectively extracted phloxine B and uranine from coffee cherries and green beans. The method yielded good recoveries of phloxine B (66-89%) and uranine (75-100%) at spike levels of 0.05-1.0 mug/g from coffee cherries. Good recoveries of phloxine B (82-95%) and uranine (95-110%) were obtained from green beans at spike levels of 0.25-1.0 mug/g. Addition of sodium hexametaphosphate in roasted beans prior to extraction with the above solvent mixture yielded good recoveries of phloxine B (72-77%) and uranine (79%) at spike levels of 0.5-1.0 mug/g. HPLC and CZE are adequate for determining levels of these analytes. Major advantages of CZE are short analysis time and use of inexpensive columns and aqueous buffer.
DE: COFFEE-; ELECTROPHORESIS-; FOOD-SAFETY-PLANT-FOODS; HIGH-PERFORMANCE-LIQUID-CHROMATOGRAPHY; INSECTICIDES-; CAPILLARY-ELECTROPHORESIS; COFFEE-BEANS; HPLC-
UD: 199808

Record 23 of 121 - FSTA Current 1990-2001/03

AN: 1998-07-P1150
TI: The ability of phosphates or kappa-carrageenan to coagulate whey proteins and the possible uses of such coagula in cheese manufacture.
AU: Dybing-ST; Smith-DE
AD: Correspondence (Reprint) address, D. E. Smith, Dep. of Food Sci. & Nutr., Univ. of Minnesota, St. Paul, MN 55108-6099, USA
PY: 1998
SO: Journal-of-Dairy-Science; 81 (2) 309-317, 37 ref.
NU: ISSN: 0022-0302
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: [A cheesemaking procedure for maximizing whey protein recovery in cheese was evaluated.] The method involved coagulation of whey proteins by food-grade phosphates or anionic polyelectrolytes and incorporation of the aggregates into casein coagula produced from concentrated ultrafiltration (UF) retentates. Ability of monosodium phosphate, tetrasodium pyrophosphate, sodium hexametaphosphate, monobasic calcium phosphate, or kappa-carrageenan to coagulate whey proteins to facilitate

this manufacturing procedure was evaluated in solutions of whey protein concentrate at various pH and heat treatments. Treatments that were selected to produce whey protein coagulates included 0.2% tetrasodium pyrophosphate, followed by 0.15% calcium chloride after 5 min in whey protein solutions at pH 6.4, 0.05% sodium hexametaphosphate in whey protein solutions at pH 2.5, or 0.05% kappa-carrageenan in whey protein solutions at pH 4.6. Treated whey protein solutions (13.3 ml) were combined with UF retentates prepared from whole milk with a concentration factor (by wt.) of 4.8x (66.7 ml), the mixtures were set with rennet, and the coagula were analysed after 20 and 30 min. Addition of solutions of treated whey protein to the UF retentate generally increased syneresis while reducing curd tension, coagulum hardness and protein recovery (calculated) in the coagula. [It is concluded that the whey protein treatments used in this study did not produce whey protein coagula that were recovered as cheese.]
DE: CARRAGEENANS-; CHEESEMAKING-; COAGULATION-; PHOSPHATES-; PROTEINS-MILK; WHEY-; WHEY-PROTEINS
UD: 199807

Record 24 of 121 - FSTA Current 1990-2001/03

AN: 1998-06-J1332
TI: Changes in pectic substances during the ripening of strawberry fruit.
AU: Inari-T; Takeuchi-T
AD: Gifu Women's Univ., 80 Taromaru, Gifu 501-25, Japan
PY: 1997
SO: Journal-of-Japanese-Society-of-Food-Science-and-Technology-(Nippon-Shokuhin-Kagaku-Kogaku-Kaishi); 44 (4) 319-324, 17 ref.
NU: ISSN: 1341-027X
DT: Journal-Article
LA: Ja (Japanese); Non-English
LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: The relationship between softness of fruits and changes of pectic substances during the ripening of strawberry fruit Hokouwase was studied. 4 pectin fractions were separated by sequential extraction from alcohol insoluble solids (AIS) into WP with water, PP with hexametaphosphate, HP with hydrochloric acid and KP with potassium hydroxide. The total amount of galacturonic acid in 4 separated pectin fractions decreased with ripening of strawberry fruits. WP which was low at the immature stage but increased with maturation. HP which was the most abundant at the immature stage decreased to the same amount as WP at ripe stages. WP, PP and HP were the high-methoxyl pectins throughout the maturation. The mol. wt. of 4 separated pectin fractions were estimated by Cellulofine gel permeation chromatography; WP and PP, 1 000 000, HP, 300 000 and KP, 10 000 at immature stages. These mol. wt. tended to decrease with maturation. The mol. wt. of HP was reduced to 250 000 at the greenish-white stage and to 100 000 at ripe stages. [From En summ.]
DE: PECTIC-SUBSTANCES; RIPENING-; STRAWBERRIES-
UD: 199806

Record 25 of 121 - FSTA Current 1990-2001/03

AN: 1998-06-C0693
TI: Influence of hexametaphosphate on Staphylococcus aureus cytoplasmic membrane.
AU: Matsuoka-A; Tsutsumi-M; Watanabe-T
AD: Food Sci. & Human Nutr., Kwassui Women's Junior Coll.:1-50, Higashiyamate-machi, Nagasaki 850, Japan

PY: 1997
SO: Journal-of-the-Food-Hygienic-Society-of-Japan-(Shokuhin-Eiseigaku-Zasshi); 38 (6) 441-445, 17 ref.
NU: ISSN: 0015-6426
DT: Journal-Article
LA: En (English)
SC: C Hygiene-and-toxicology
AB: Hexametaphosphate (HP), a long chain polyphosphate, shows antibacterial activity against a range of bacteria, including Staphylococcus aureus. In this study, influence of HP on the cytoplasmic membrane of S. aureus was examined using spheroplasts. In a 1.2 mol/l sucrose solution, HP stimulated the release of nucleic acids, nucleic acid-related substances and proteins from spheroplasts. Using cytoplasmic membranes isolated from cells, it was shown that HP caused cells to slowly release proteins in small amounts, and to rapidly release large quantities of Mg. Results indicate that HP is active against the cytoplasmic membrane of S. aureus. [From En summ. See FSTA (1996) 28 3C106 for part I.]
DE: CELLS-; FOOD-SAFETY; PHOSPHATES-; STAPHYLOCOCCUS-; POLYPHOSPHATES-
UD: 199806

Record 26 of 121 - FSTA Current 1990-2001/03

AN: 1998-05-S0740
TI: Gelation of chicken muscle myofibrillar proteins treated with protease inhibitors and phosphates.
AU: Gang-Liu; Youling-LXiong
AD: Dep. of Animal Sci., Food Sci. Sect., Univ. of Kentucky, Lexington, KY 40546, USA
PY: 1997
SO: Journal-of-Agricultural-and-Food-Chemistry; 45 (9) 3437-3442, 27 ref.
NU: ISSN: 0021-8561
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: Gelation of chicken pectoralis muscle myofibrils treated with soybean trypsin inhibitor, leupeptin, antipain, egg white, EDTA and ortho- (Pi), pyro- (PPi), tripoly- (TPP), or hexametaphosphate (HMP) was studied by dynamic rheological and differential scanning calorimetrical measurements at pH 6.0. Most myofibril samples exhibited 2 distinctive thermal transitions and a major rheological transition during heating from 25 to 80 degree C. The abrupt loss of shear moduli upon heating from 50 to 55 degree C was not prevented by proteinase inhibitors, indicating that gel weakening was unlikely to be caused by common endogenous proteinases. PPi, which destabilized myosin, interfered with myofibril gelation. TPP, which also destabilized myosin, markedly improved myofibril gelation in 0.3 or 0.4M NaCl but decreased the gelling ability in 0.6M NaCl. HMP, showing no effect on myosin denaturation, increased shear moduli of myofibril gels. The results may partially explain variations in functionality of poultry meat formulated with different phosphates when various levels of NaCl are used.
DE: CHICKEN-MEAT; ENZYME-INHIBITORS; GELATION-; PHOSPHATES-; PROTEINS-ANIMAL; ANIMAL-PROTEINS; PROTEINASES-INHIBITORS
UD: 199805

Record 27 of 121 - FSTA Current 1990-2001/03

AN: 1998-04-T0264
TI: Continuous, countercurrent extraction of pectin from sunflower heads.

AU: Wang-J; Wiesenborn-DP; Schwarz-JG; Chang-KC
AD: Correspondence (Reprint) address, D. P. Wiesenborn, Dep. of Agric. & Biosystems Eng., North Dakota State Univ., Fargo, ND 58105-5626, USA. Tel. (701) 231-7277. Fax (701) 231-1008. E-mail wiesenbo@plains.nodak.edu
PY: 1997
SO: Transactions-of-the-ASAE; 40 (6) 1649-1654, 18 ref.
NU: ISSN: 0001-2351
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: Sunflower heads are a promising source of low-methoxyl pectin. Continuous extraction of sunflower head pectin was conducted in a bench-scale screw-conveyor extractor using 0.75% sodium hexametaphosphate (SHMP) solution, achieving up to 50% recovery. The pH of SHMP solution and ratio of SHMP solution to washed sunflower heads (L/S ratio) markedly affected pectin recovery. A suitable range of pH of SHMP solution was 3.0-3.8. An L/S ratio of at least 32 was required under the conditions used in this study.
DE: EXTRACTION-; PECTIC-SUBSTANCES; SUNFLOWER-SEEDS; PECTINS-; SUNFLOWERS-
UD: 199804

Record 28 of 121 - FSTA Current 1990-2001/03

AN: 1998-04-T0262
TI: Effect of extraction conditions on the yield and physicochemical characteristics of sunflower pectin.
AU: Mitek-M; Kow-Ching-Chang; Wiesenborn-D
AD: Samodzielny Zaklad Tech. Owocow i Warzyw, SGGW, ul. Rakowiecka 26/30, 02-528 Warsaw, Poland. Tel. (48 22) 491924. Fax (48 22) 491375
PY: 1997
SO: Polish-Journal-of-Food-and-Nutrition-Sciences; 6/47 (4) 81-91, 24 ref.
DT: Journal-Article
LA: En (English)
LS: pl (Polish)
SC: T Food-additives-spices-and-condiments
AB: The objective of this study was to investigate the effect of particle size of sunflower head residues and extraction conditions on yield and chemical quality of sunflower pectin. Pectin was extracted with sodium hexametaphosphate (SHMP) and nitric acid solution. The highest yield was obtained for 60 mesh particle size, however, larger sizes (about 2 mm) can be used in industry to facilitate the filtration process. pH and time of SHMP extraction affected the yield of pectin, however, strong statistical interactions between the 3 factors (pH, temp. and time) existed only for the firmness of jellies prepared at pH 2.4. Each of the factors of acid extraction of sunflower pectin (pH, temp. time) had a strong effect on the yield, molecular mass and firmness of gels. There were no differences in moisture, ash and galacturonic acid content between SHMP- and acid-soluble pectin. The acid-soluble pectin had a higher degree of methylation (43.7%) than SHMP-soluble pectin (35.3%). The acid soluble-pectin, despite its higher yield (15.3%), compared to that of SHMP-soluble pectin (9%), had relatively poor gelling quality.
DE: PECTIC-SUBSTANCES; SUNFLOWER-SEEDS; PECTINS-; SUNFLOWERS-
UD: 199804

Record 29 of 121 - FSTA Current 1990-2001/03

AN: 1998-04-G0118

TI: Functional properties of acylated flax protein isolates.
AU: Wanasundara-PKJPD; Shahidi-F
AD: Correspondence (Reprint) address, F. Shahidi, Dep. of Biochem., Memorial Univ. of Newfoundland, St. John's, Nfld. A1B 3X9, Canada. Tel. (709) 737-8552. Fax (709) 737-4000. E-mail fshahidi@morgan.ucs.mun.ca
PY: 1997
SO: Journal-of-Agricultural-and-Food-Chemistry; 45 (7) 2431-2441, 47 ref.
NU: ISSN: 0021-8561
DT: Journal-Article
LA: En (English)
SC: G Catering-speciality-and-multi-component-foods
AB: Flaxseed protein isolates were prepared by sodium hexametaphosphate complexation and acylated with acetic or succinic anhydride to improve their functional properties. [These proteins may serve as a potential source of plant proteins for inclusion in food products.] The degree of acylation of free amino groups was lower when succinic anhydride was used in place of acetic anhydride. The colour of the acylated proteins became lighter as the degree of acylation was increased. Emulsification properties of protein preparations were improved due to acylation, particularly for succinylated products. While foaming properties of flax protein isolates were not improved by acylation, their solubility was markedly improved. Low degrees of acetylation improved fat binding capacity of flax protein isolates, but succinylation did not exhibit such an effect. Acylation also increased aromatic or surface hydrophobicity of the products, and the highest value was observed at the lowest degree of acetylation. The in vitro enzymic hydrolysis of the isolated proteins was reduced due to the acylation process.
DE: FUNCTIONAL-PROPERTIES; OILSEEDS-; PROTEINS-VEGETABLE; FLAX-SEEDS; MODIFICATION-; VEGETABLE-PROTEINS
UD: 199804

Record 30 of 121 - FSTA Current 1990-2001/03

AN: 1998-02-S0303
TI: Protein hydrolyzates from seal meat as phosphate alternatives in food processing applications.
AU: Shahidi-F; Synowiecki-J
AD: Dep. of Biochem., Memorial Univ. of Newfoundland, Nfld. A1B 3X9, Canada
PY: 1997
SO: Food-Chemistry; 60 (1) 29-32, 15 ref.
NU: ISSN: 0308-8146
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: Suitability of using seal protein hydrolysates (SPH) as a substitute for food grade phosphates for improving water binding properties of meat products was investigated. Mechanically separated seal meal (MSSM) was mixed with 3% NaCl (v/w). Tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), sodium hexametaphosphate (SHMP), or SPH was added to MSSM at concn. ranging from 0 to 5% (v/w) of meat; samples were then stored for 1 h at 4 degree C in sealed Mason jars. The jars were thermally processed at 95 degree C for 1 h and cooled for 30 min; samples were measured for drip vol. and pH. TSPP was most effective in increasing the pH of MSSM, while SHMP slightly decreased the pH. TSPP and STPP produced a min. drip vol. when used at the 2.5% (w/w) level and decreased drip vol. by approx. 72.7 and 66.4%, respectively, while SHMP decreased drip vol. by only 60%. Cooking loss of MSSM was min. at a phosphate concn. of 2.5-3%, which is

much higher than the 0.5% level permitted by the USDA. SPH was found to improve the water binding capability of MSSM in a similar way to that of phosphates, with drip vol. from MSSM containing 3% (w/w) SPH being 5.8% (v/w). Drip vol. resulting from use of SPH (54.7%) was lower than that for samples treated with TSPP, STPP and SHMP.
DE: MEAT-PRODUCTS; MEAT-SPECIFIC; PHOSPHATES-; PROTEINS-; PROTEIN-HYDROLYSATES; SEAL-MEAT
UD: 199802

Record 31 of 121 - FSTA Current 1990-2001/03

AN: 1998-02-J0282
TI: Calcium fortifications of soy milk yogurt formulated to low-fat plain yogurt composition.
AU: Yazici-F
AD: Ohio State Univ., Columbus, OH 43210, USA
PY: 1997
SO: Dissertation-Abstracts-International,-B; 57 (10) 5996-5997 Order No. DA9710689, 233pp.
NU: ISSN: 0419-4217
DT: Thesis
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: An attempt was made to develop a heat-stable and acceptable soy yoghurt product, and to fortify this product with Ca at the same level or higher than that in a reference low fat plain yoghurt. Sequestering agents, potassium citrate and sodium hexametaphosphate were used to alter Ca ion activity. An evaluation of fermentation properties of various soymilk samples was also undertaken. [From En summ.]
DE: CALCIUM-; FOOD-ENRICHMENT; SOY-PRODUCTS; CA-; SOY-YOGHURT
UD: 199802

Record 32 of 121 - FSTA Current 1990-2001/03

AN: 1998-01-S0103
TI: Effect of thermal processing and additives on the kinetics of oxytetracycline degradation in pork muscle.
AU: Fedeniuk-RW; Shand-PJ; McCurdy-AR
AD: Dep. of Applied Microbiol. & Food Sci., Univ. of Saskatchewan, Saskatoon, Sask. S7N 5A8, Canada. E-mail FEDENIUK@SASK.USASK.CA
PY: 1997
SO: Journal-of-Agricultural-and-Food-Chemistry; 45 (6) 2252-2257, 28 ref.
NU: ISSN: 0021-8561
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: The degradation of oxytetracycline (OTC) was observed at 60, 70, and 80 degree C in several different aqueous and tissue media. In aqueous media, the rate of OTC degradation (kobs) was found to be independent of glycerol adjusted water activities in the range of 0.6 to 1.0. Orthophosphate was observed to increase kobs; in contrast, polymeric phosphates (sodium pyrophosphate, sodium tripolyphosphate, and sodium hexametaphosphate) were observed to significantly decrease kobs. Sodium nitrite decreased kobs at 80 degree C. OTC degradation was found to occur at a slower rate in porcine tissue [pork] than in aqueous media. Addition of orthophosphate (0.5% as anhydrous dibasic sodium phosphate) to tissue resulted in no observable change in kobs; addition of polyphosphates (equivalent to 0.5% anhydrous dibasic sodium phosphate) increased kobs. Sodium nitrite (200 p.p.m) in tissue increased kobs at 60 degree C but decreased it at 80 degree C.

Inclusion of calcium chloride significantly decreased kobs in both aqueous and tissue matrices. Thermal treatments-food additive combinations were found to have significant effects upon the rate of OTC degradation.
DE: ANTIBIOTICS-; FOOD-SAFETY-ANIMAL-FOODS; PORK-; PROCESSING-; OXYTETRACYCLINE-
UD: 199801

Record 33 of 121 - FSTA Current 1990-2001/03

AN: 1997-11-R0078
TI: Natural minced fish products quality as influenced by polyphosphates involvement.
AU: Gat'ko-NN
AD: Kirgizskii Tekh. Univ., Kirzigia
PY: 1996
SO: Izvestiya-Vysshikh-Uchebnykh-Zavedenii,-Pishchevaya-Tekhnologiya; No. 5/6, 30-31, 3 ref.
DT: Journal-Article
LA: Ru (Russian); Non-English
SC: R Fish-and-marine-products
AB: Studies showed that 1.0% hexametaphosphate could be added to fish mass in order to improve quality and increase nutritional value of fish mince products. Good results were also achieved using 1.0% disodium phosphate.
DE: FISH-PRODUCTS; PHOSPHATES-; SALTS-; POLYPHOSPHATES-
UD: 199711

Record 34 of 121 - FSTA Current 1990-2001/03

AN: 1997-10-T0002
TI: Method for the analysis of phloxine B, uranine, and related xanthene dyes in soil using supercritical fluid extraction and high-performance liquid chromatography.
AU: Alcantara-Licudine-JP; Kawate-MK; Qing-XLi
AD: Correspondence (Reprint) address, Qing X. Li, Dep. of Environmental Biochem., Univ. of Hawaii, Honolulu, HI 96822, USA. Tel. (808) 956-2011. Fax (808) 956-5037. E-mail qingl@hawaii.edu
PY: 1997
SO: Journal-of-Agricultural-and-Food-Chemistry; 45 (3) 766-773, 40 ref.
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: The use of supercritical fluid (SF) carbon dioxide (CO2) modified by organic solvents and inorganic salts or chelating reagents was investigated for the extraction of the xanthene dyes phloxine B and uranine from soil. Methanol (MeOH), n-butylamine (n-BA), and a chelating agent, ethylenediaminetetraacetic acid tetrasodium salt (Na4EDTA), were the most effective modifiers of SF CO2 for quantitative recoveries of phyloxine B and uranine in soils with 10-20% moisture at 60 degree C/476 atm and 60 degree C/272 atm, respectively. At these supercritical fluid extraction (SFE) conditions, recoveries of related xanthene dyes (i.e., 2'7'-dichlorofluorescein, 4,5,6,7-tetrachlorofluorescein, eosin Y lactone, erythrosin B, and rose bengal) fortified at 25 mug/g in Hawaiian soils ranged from 65 to 93%. Good separation of a mixture of these dyes was achieved by HPLC. A mixture of MeOH, n-BA, and sodium hexametaphosphate [NaPO3)6) was effective for conventional solvent extraction of phloxine B and uranine from fortified soils. However, SFE was more selective and gave cleaner extracts. Recoveries were comparable to those by solvent extraction.

DE: ADDITIVES-; CARBON-DIOXIDE; COLORANTS-; EXTRACTION-; MINERALS-; B-; PHLOXINE-; SUPERCRITICAL-CO2-EXTRACTION
UD: 199710

Record 35 of 121 - FSTA Current 1990-2001/03

AN: 1997-10-J0168
TI: Role of calcium and magnesium ions in the hardening of pressure-treated root vegetables.
AU: Kasai-M; Okamoto-N; Hatae-K; Shimada-A
AD: Sch. of Human Life & Environmental Sci., Ochanomizu Univ., 2-1-1 Otsuka, Bunkyo-ku, Tokyo 112, Japan. Fax +81 3 5978 5760. E-mail kasai@kei.fd.ocha.ac.jp
PY: 1997
SO: Journal-of-Agricultural-and-Food-Chemistry; 45 (3) 599-603, 17 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: We investigated the effect of calcium and magnesiom ions on the hardening of Japanese radish by pressure treatment at 400 MPa. Pectins were separated into three components. Water-soluble pectin (WP) and hydrochloric acid-soluble pectin (HP) were decreased by pressure treatment, whereas hexametaphosphate-soluble pectin (PP), which is a metal binding type pectin, was increased. The degree of esterification of WP was decreased by pressurization. Variations with time after pressure release of all pectin fractions and the concentrations of calcium and magnesium ions contained in pectin fractions were small. We studied the hardness of the pressure treated samples by soaking them with or without EGTA and EDTA and the effect of the order reversal of the soaking and the standing. It was found that the magnesium ions had a great influence on the hardness of both non-treated and pressure-treated uncooked samples and that calcium ions affected the hardness of pressure-treated cooked samples. The suppressing effect of the calcium ions on the softening during cooking suggested that the interactions between such components as proteins and hemicellulose were promoted by the calcium ions. The mass transfer processes followed by the collapse of the cell membranes by the pressure treatment are considered to strengthen these interactions.
DE: CARBOHYDRATES-; IONS-; MECHANICAL-PROPERTIES; MINERALS-; PECTIC-SUBSTANCES; PHYSICAL-PROPERTIES; PRESSURE-; RADISHES-; SALTS-; VEGETABLES-SPECIFIC; HARDNESS-; PECTINS-
UD: 199710

Record 36 of 121 - FSTA Current 1990-2001/03

AN: 1997-10-J0076
TI: The mechanism of the increases in firmness in strawberry fruit treated with 100% CO2.
AU: Goto-T; Goto-M; Chachin-K; Iwata-T
AD: Toyo Inst. of Food Tech., 4-23-2, Minamihanayashiki, Kawanishi-shi, Hyogo 666, Japan
PY: 1996
SO: Journal-of-Japanese-Society-of-Food-Science-and-Technology-(Nippon-Shokuhin-Kagaku-Kogaku-Kaishi); 43 (10) 1158-1162, 14 ref.
DT: Journal-Article
LA: En (English)
LS: ja (Japanese)
SC: J Fruits-vegetables-and-nuts
AB: The mechanism responsible for increases in the firmness of strawberry fruit treated with 100% CO2 was studied. Internal concn. of

CO2 in the fruit were monitored during and after treatment with CO2. Ratios of water soluble pectin content and hexametaphosphate soluble pectin content to total pectin content in fruit increased during and after treatment. The ratio of hydrochloric acid soluble pectin to total pectin was unaffected by the treatment. The ratio of Ca in the NaCl-soluble fraction to total Ca content was higher in treated fruit compared to untreated. Pectin methyl esterase activity was higher in treated fruit than in untreated. Results suggest that increases in fruit firmness following 100% CO2 treatment may be due to the formation of intramolecular bridges in pectin, mediated by Ca-2-+. [From En summ.]
DE: CARBOHYDRATES-; CARBON-DIOXIDE; FIRMNESS-; FRUITS-SPECIFIC; GASES-; PECTIC-SUBSTANCES; SENSORY-PROPERTIES; STRAWBERRIES-; CO2-; PECTINS-
UD: 199710

Record 37 of 121 - FSTA Current 1990-2001/03

AN: 1997-09-J0137
TI: Formulation and processing of a heat stable calcium-fortified soy milk.
AU: Yazici-F; Alvarez-VB; Mangino-ME; Hansen-PMT
AD: Correspondence (Reprint) address, V. B. Alvarez, Dep. of Food Sci. & Nutr., Ohio State Univ., Columbus, OH 43210, USA
PY: 1997
SO: Journal-of-Food-Science; 62 (3) 535-538, 15 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: Calcium-fortified soymilk (200 mg/100 g) was formulated by adding to water (85-90 degree C) full-fat soy flour (10%), sucrose (2.75%) and soy protein isolate (2.25%). Following homogenization, the blend was twice clarified and pasteurized at 65 degree C/30 min before refrigeration. Samples of the soymilk (45 degree C) were adjusted to pH 8 before adding calcium lactogluconate (1.55%) and varying amounts of sodium hexametaphosphate or potassium citrate. Samples with 1.25% potassium citrate had the best heat stability. For successful calcium fortification, it is recommended to maintain a calcium-to-protein ratio less than 38 mg/g and to use an appropriate sequestering agent at a molar ratio of 0.8/mole calcium.
DE: CALCIUM-; FOOD-ENRICHMENT; MINERALS-; SOY-PRODUCTS; VEGETABLE-PRODUCTS; CA-; SOYMILK-
UD: 199709

Record 38 of 121 - FSTA Current 1990-2001/03

AN: 1997-08-R0014
TI: Water uptake, protein solubility, and protein changes of cod mince stored on ice as affected by polyphosphates.
AU: Chang-CC; Regenstein-JM
AD: Dep. of Food Sci., 112 Rice Hall, Cornell Univ., Ithaca, NY 14853-5601, USA
PY: 1997
SO: Journal-of-Food-Science; 62 (2) 305-309, 20 ref.
DT: Journal-Article
LA: En (English)
SC: R Fish-and-marine-products
AB: Water uptake ability (WUA) and protein solubility of cod mince were higher with sodium hexametaphosphate (SHMP) than with sodium tripolyphosphate (STP) or untreated controls during ice storage. WUA increased significantly with SHMP concn. up to 0.7% SHMP but above that WUA decreased, although protein solubility continued to increase. The

SDS-PAGE results showed that extraction of a specific amount of water-soluble protein, perhaps including some myosin heavy chain (MHC, 200 kd), correlated with high WUA. However, excess extraction of MHC may cause destruction of the structural matrix of the insoluble protein network, preventing it from holding water. [See also preceding abstr.]
DE: COD-; EXTRACTION-; FISH-; FUNCTIONAL-PROPERTIES; PHOSPHATES-; PHYSICAL-PROPERTIES; PROCESSING-; PROTEINS-; PROTEINS-ANIMAL; SALTS-; SEA-FOODS; FISHES-; POLYPHOSPHATES-; WATER-HOLDING-CAPACITY
UD: 199708

Record 39 of 121 - FSTA Current 1990-2001/03

AN: 1997-08-R0013
TI: Textural changes and functional properties of cod mince proteins as affected by kidney tissue and cryoprotectants.
AU: Chang-CC; Regenstein-JM
AD: Dep. of Food Sci., 112 Rice Hall, Cornell Univ., Ithaca, NY 14853-5601, USA
PY: 1997
SO: Journal-of-Food-Science; 62 (2) 299-304, 32 ref.
DT: Journal-Article
LA: En (English)
SC: R Fish-and-marine-products
AB: Effect of addition of cryoprotectants, e.g. a mixture of sucrose and sorbitol or polydextrose (PDT) with sodium hexametaphosphate (SHMP), to improve the texture and water retention properties of cod mince with kidney tissue (modified mince) was studied at -14 degree C. Kidney tissue provided trimethylamine oxide (TMAO) demethylase to accelerate dimethylamine (DMA) and formaldehyde formation. Expressible moisture (EM), water uptake ability (WUA), protein solubility, cook loss, DMA production, and textural profile analysis were determined to detect changes in modified mince during frozen storage. Modified mince with SHMP and sucrose/sorbitol or PDT at -14 degree C had improved EM, WUA and cook loss and was more tender. [See also following abstr.]
DE: ADDITIVES-; COD-; FISH-; FROZEN-FOODS; KIDNEYS-; OFFAL-; PROCESSED-FOODS; SEA-FOODS; CRYOPROTECTANTS-; FISHES-
UD: 199708

Record 40 of 121 - FSTA Current 1990-2001/03

AN: 1997-07-P0114
TI: Polysaccharide ingredients in dairy product applications: increase in cheese yields.
AU: Kailasapathy-K
AD: Sch. of Food Sci., Univ. of Western Sydney, Hawkesbury, Richmond, NSW 2753, Australia
PY: 1996
SO: Food-Australia; 48 (10) 458-461, 10 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Cottage cheese variants were prepared with 0-2000 p.p.m. carrageenan and 0-300 p.p.m. sodium hexametaphosphate, and wt. of cheese and whey was determined, together with composition of whey and moisture content of cheese. Creamed cheese samples were evaluated for sensory properties using semi-trained panellists. Cheddar cheese variants were also prepared with carrageenan and gellan (at 250 and 500 p.p.m.). Whey protein precipitation was examined by SDS-PAGE, and rheological and sensory properties of cheese were evaluated. In Cheddar cheese, addition of polysaccharides to cheese milk improved retention of whey proteins normally lost in cheesemaking, and improved cheese yields by 4-17%.

kappa- and iota-carrageenans (1000 p.p.m.) achieved 10-20% increases in fresh wt. yields of Cottage cheese. Cheddar cheese texture was little affected by addition of polysaccharides, although the higher concn. of carrageenan caused a gumminess and hardness, and reduced sensory scores for texture and flavour. Gellan treated Cheddar was superior to control and carrageenan treated cheeses in flavour and appearance scores. For Cottage cheeses, polysaccharide addition had little effect on sensory properties, although appearance was slightly inferior due to mild shattering of curd. Overall, carrageenan treated cheeses were less preferred than control and commercial samples. kappa-Carrageenan produced a less acid, firmer curd than iota-carrageenan.
DE: ADDITIVES-; CHEESE-; DAIRY-PRODUCTS
UD: 199707

Record 41 of 121 - FSTA Current 1990-2001/03

AN: 1997-07-J0119
TI: Extraction and purification of pectic polysaccharides from soybean okara and enzymatic analysis of their structures.
AU: Yamaguchi-F; Ota-Y; Hatanaka-C
AD: Food R & D Cent., Japan Tobacco Inc., 6-2, Umegaoka, Aoba-ku, Yokohama, Kanagawa 227, Japan
PY: 1996
SO: Carbohydrate-Polymers; 30 (4) 265-273, 38 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: Extraction and purification of pectic substances from soybean okara (soybean curd waste) were examined, and the amount and distribution of galacturonan regions and side chains were estimated by enzymic-HPLC. Pectic polysaccharides were extracted from okara with sodium hexametaphosphate solution. DEAE-cellulose chromatography was used to separate the extract into rich and poor galacturonate fractions. The fractionated polysaccharides were degraded by 3 pectinases and 2 hemicelluases. The values of degradation limit revealed that okara pectic substances are composed of galacturonan and rhamnogalacturonan, and the galacturonan regions were distributed at the reducing and nonreducing ends of the molecules. The side chains branching from rhamnogalacturonan were mainly composed of homogeneous arabinan and galactan.
DE: CARBOHYDRATES-; PECTIC-SUBSTANCES; SOY-PRODUCTS; VEGETABLE-PRODUCTS; OKARA-
UD: 199707

Record 42 of 121 - FSTA Current 1990-2001/03

AN: 1997-06-R0047
TI: The textural changes and protein functional properties of minced cod (Gadus morhua) with or without kidney tissue during frozen storage.
AU: Chang-C
AD: Cornell Univ., Ithaca, NY 14853, USA
PY: 1996
SO: Dissertation-Abstracts-International,-B; 56 (11) 5859 Order No. DA9608249, 277pp.
DT: Thesis
LA: En (English)
SC: R Fish-and-marine-products
AB: Effects of frozen storage (-14 and -40 degree C) and addition of cryoprotectants (sucrose + sorbitol, sodium tripolyphosphate, sodium hexametaphosphate and polydextrose) on texture and water holding capacity of minced cod (Gadus morhua) with or without kidney tissue

present were studied. Measures of expressible moisture, water uptake ability, protein solubility, cook loss and dimethylamine production, and texture profile analysis and SDS-PAGE were used to detect changes in the fish mince during frozen storage. [From En summ.]
DE: COD-; FISH-; FROZEN-FOODS; FUNCTIONAL-PROPERTIES; PHYSICAL-PROPERTIES; PROCESSED-FOODS; SEA-FOODS; SENSORY-PROPERTIES; STORAGE-; TEXTURE-; FISHES-; WATER-HOLDING-CAPACITY
UD: 199706

Record 43 of 121 - FSTA Current 1990-2001/03

AN: 1997-05-J0127
TI: Effects of hexametaphosphate on soybean pectic polysaccharide extraction.
AU: Yamaguchi-F; Kojima-H; Muramoto-M; Ota-Y; Hatanaka-C
AD: Food R&D Cent., Japan Tobacco Inc., 6-2 Umegaoka, Aoba-ku, Yokohama, Kanagawa 227, Japan
PY: 1996
SO: Bioscience,-Biotechnology,-and-Biochemistry; 60 (12) 2028-2031, 20 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: Effects of sodium hexametaphosphate concn. [0.5, 1.0 and 2.0% (w/v)], incubation temp. [50-120 degree C] and pH [1-6.3] on extraction of polysaccharides from soybean okara (soybean curd waste) were examined. Results suggest that soybean polysaccharides were almost completely extracted with 50x their vol. of a 2% hexametaphosphate solution at 100 degree C for 2 h, avoiding protein contamination. Viscosity, mol. wt. and sugar composition of the polysaccharides were compared with those of the equivalent commercially available samples. No differences were observed in the mol. wt. or neutral sugar composition. However, it was found that the galacturonate distribution in the molecules of 2 polysaccharides was different. Viscosity of polysaccharide solutions was altered by addition of small amounts of salt.
DE: CARBOHYDRATES-; EXTRACTION-; POLYSACCHARIDES-; PROCESSING-; SOY-PRODUCTS; VEGETABLE-PRODUCTS; OKARA-
UD: 199705

Record 44 of 121 - FSTA Current 1990-2001/03

AN: 1997-03-J0100
TI: Hydrolysis kinetics of okara and characterization of its water-soluble polysaccharides.
AU: Yoshii-H; Furuta-T; Maeda-H; Mori-H
AD: Dep. of Biochem. Eng., Toyama Nat. Coll. of Tech., Toyama 939, Japan
PY: 1996
SO: Bioscience,-Biotechnology,-and-Biochemistry; 60 (9) 1406-1409, 19 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: Okara is a by-product of tofu and soy protein manufacture. Water soluble polysaccharides (WSP) from this waste product have potential as emulsifiers for the food industry and may be extracted from okara by hydrolysis. The kinetic mechanism of okara hydrolysis and the properties of the extracted WSP were investigated. Okara was hydrolysed in an autoclave at pH 4.5 in 2 vol. of water with or without a chelator (hexametaphosphate or EDTA). Results showed that okara consisted of

cross-linked galacturonate polymer with Ca-2-+ between carboxylic groups ('egg-box' regions) and non-egg-box regions with bound proteins. Okara hydrolysis proceeded by a surface degradation mechanism in the absence of a chelator. Characterization of WSP suggested that the egg-box regions in okara were susceptible to degradation in the presence of a chelator, since removal of Ca-2-+ by the chelator loosened the structure of okara. The non-egg-box regions contained WSP linked with hydrophobic proteins. WSP with a molecular wt. of _10-5 was produced by okara hydrolysis and emulsification properties of WSP were governed by the amount of protein bound to the polysaccharides. [From En summ.]
DE: CARBOHYDRATES-; EXTRACTION-; FUNCTIONAL-PROPERTIES; PHYSICAL-PROPERTIES; POLYSACCHARIDES-; PROCESSING-; SOY-PRODUCTS; VEGETABLE-PRODUCTS; EMULSIFICATION-PROPERTIES; OKARA-
UD: 199703

Record 45 of 121 - FSTA Current 1990-2001/03

AN: 1997-02-T0034
TI: Large-scale production of salt fortified with iodine and iron.
AU: Ranganathan-S; Vinodini-Reddy; Ramamoorthy-P
AD: Nat. Inst. of Nutr., Indian Council of Med. Res., Jamai Osmania, Hyderabad, India
PY: 1996
SO: Food-and-Nutrition-Bulletin; 17 (1) 73-78, 12 ref.
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: A new dry-mixing process for producing I- and Fe-fortified salt on a large scale (20-30 t per shift), developed in salt factories at Valinokkam and Hyderabad, India, is described. Common salt is mixed with 1% sodium hexametaphosphate, 0.5% ferrous sulphate heptahydrate, and 0.0055% potassium iodide or 0.007% potassium iodate in a ribbon blender. Dry mixing is superior to spray mixing and is associated with no operational problems. The fortified salt produced by this method retained the original colour of the unfortified salt, and the distribution of iodine and iron was uniform. Acceptability of the fortified salt was satisfactory, as various food preparations using the product were indistinguishable in colour, taste and flavour from those containing unfortified salt.
DE: FLAVOURINGS-; FOOD-ENRICHMENT; IODINE-; IRON-; MINERALS-; SALT-; FE-; FORTIFICATION-; I-
UD: 199702

Record 46 of 121 - FSTA Current 1990-2001/03

AN: 1997-02-J0002
TI: Softening of several fruits and vegetables at low humidity with respect to their endogenous ethylene concentrations.
AU: Yanbin-Xue; Ishikawa-K; Kubo-Y; Inaba-A; Nakamura-R
AD: Fac. of Agric., Okayama Univ., Tsushima, Okayama 700, Japan
PY: 1996
SO: Journal-of-the-Japanese-Society-for-Horticultural-Science; 65 (1) 169-176, 23 ref.
DT: Journal-Article
LA: Ja (Japanese); Non-English
LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: Induction of softening in banana, cucumber, carrot and Japanese radish at low RH (55%) was investigated with respect to their endogenous ethylene production. In banana, exogenous ethylene pretreatment rapidly hastened yellowing of the peel and softening of the flesh at both high

and low RH. Pretreatment with diazocyclopentadiene (DACP), an inhibitor of ethylene action, inhibited yellowing but did not prevent softening at high and low RH. In cucumber, carrot and Japanese radish, softening of the tissue progressed at low RH, even though endogenous ethylene activity was inhibited by DACP pretreatment. In cucumber, the flesh softened rapidly at low RH, which was positively correlated to increases in water soluble pectin and a decrease in sodium hexametaphosphate soluble pectin. Results suggest that induction of softening in several fruits and vegetables proceeds independently of endogenous ethylene concn., and that the degradation of cell wall polysaccharides is induced directly by water deficit stress.
DE: BANANAS-; ETHYLENE-; FIRMNESS-; FRUITS-SPECIFIC; HUMIDITY-; PLANT-GROWTH-REGULATORS; SENSORY-PROPERTIES; VEGETABLES-; RH-; SOFTENING-
UD: 199702

Record 47 of 121 - FSTA Current 1990-2001/03

AN: 1997-01-R0010
TI: The impact of polyphosphates on the water retention of fresh fillets and frozen cod minces.
AU: Xiaowen-Lu
AD: Cornell Univ., Ithaca, NY 14853, USA
PY: 1996
SO: Dissertation-Abstracts-International,-B; 56 (8) 4078-4079 Order no. DA9542502, 294pp.
DT: Thesis
LA: En (English)
SC: R Fish-and-marine-products
AB: Effects of treatment of cod, ocean perch, flounder, dogfish and rainbow trout with sodium monophosphate, sodium tripolyphosphate, potassium tripolyphosphate, sodium hexametaphosphates and FishPlusRegistered on water retention properties were examined. Possible mechanisms of action were also studied. Increasing the dipping time and concn. resulted in higher P content, lower expressible moisture and higher water uptake ability (WUA). Long-chain polyphosphates increased WUA while short-chain polyphosphates reduced expressible moisture. Protein solubility increased as water retention increased. Polyphosphates increased fish muscle protein interaction with water. From pH 5 to 8, there was a linear relationship between pH and WUA and expressible moisture. Chelation did not affect water retention. Ca level and aw decreased the effect or polyphosphate on water retention. For minced, frozen stored cod, most of the polyphosphates did not affect dimethylamine formation, texture profile analysis parameters or water retention properties; however, sodium hexametaphosphate significantly increased WUA throughout frozen storage. Addition of kidney tissue, a source of trimethylamine oxide demethylase, caused rapid formation of dimethylamine and toughening of fish texture. [From En summ.]
DE: FISH-; PHOSPHATES-; SALTS-; SEA-FOODS; WATER-; POLYPHOSPHATES-
UD: 199701

Record 48 of 121 - FSTA Current 1990-2001/03

AN: 1997-01-J0151
TI: The correlation between texture changes and chemical components of radish during cooking processes.
AU: Wei-Hsien-Chang; Lee-Lee-Chen
AD: Graduate Inst. of Agric. Chem., Nat. Taiwan Univ., Taipei, Taiwan
PY: 1996
SO: Journal-of-the-Chinese-Agricultural-Chemical-Society; 34 (4) 497-507, 17 ref.
DT: Journal-Article

LA: Ch (Chinese); Non-English
LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: In radish cubes cooked for 30 min at between 40 and 100 degree C, firmness increased as the cooking temp. increased from 40 to 60 degree C, but when cooking temp. was greater than 70 degree C, radish tissue gradually softened. For radish cubes precooked at 60 degree C for 30 min prior to further cooking in boiling water, firmness was higher than in those cooked in boiling water without precooking. Metallic salts added to the precooking solution increased or maintained firmness of radish tissue with effectiveness in the order CaCl2 greater than MgCl2 greater than distilled water greater than NaCl greater than KCl. Results show that, by selecting appropriate temp. and times for precooking and addition of an appropriate salt, radish tissue may be made more resistant to the softening effects of high temp. cooking. Results of studying pH and temp. optimum of pectinesterase (PE), polygalacturonase and cellulase of radish suggested that activation and action of PE was responsible for the firming effect of precooking. Effects of Ca, Mg, Na and K ions on the firmness of radish tissue are attributed to ion exchange forming or destroying the cross-links between free carboxyl groups on pectin molecules. During cooking, contents of cold hexametaphosphate-soluble pectin and total pectin in the alcohol-insoluble solids of radish were positively correlated with tissue firmness, while contents of cold water-soluble pectin were negatively correlated with firmness. [From En summ.]
DE: COOKING-; FIRMNESS-; PROCESSING-THERMAL; RADISHES-; SENSORY-PROPERTIES; VEGETABLES-SPECIFIC
UD: 199701

Record 49 of 121 - FSTA Current 1990-2001/03

AN: 1996-11-J0150
TI: Kinetic study of extraction of water-soluble polysaccharides from okara.
AU: Yoshii-H; Furuta-T
AD: Dep. of Biochem. Eng., Toyama Nat. Coll. of Tech., Toyama 939, Japan
PY: 1995
SO: Report-of-the-Soy-Protein-Research-Committee; 16, 41-45, 7 ref.
DT: Journal-Article
LA: Ja (Japanese); Non-English
LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: The kinetics of okara hydrolysis were investigated using an autoclave at pH 4.5 and a mixture of okara and water with or without addition of 0.5-2% sodium hexametaphosphate (a chelating agent). The okara hydrolysis reaction proceeded by the surface degradation mechanism without addition of chelator. Characterization of extracted water-soluble polysaccharides (WSP), suggested that the egg-box regions in okara were degradation labile in the presence of the chelator and that the non-egg-box regions had a higher content of WSP bound to hydrophobic proteins. Mol. wt. of WSP (greater than 10-5) and content of WSP bound to protein was important for emulsifying characteristics of WSP. Hydrolysis of okara, without addition of the chelator, was an effective method for producing WSP suitable for use as an emulsifier. [From En summ.]
DE: ADDITIVES-; CARBOHYDRATES-; EXTRACTION-; POLYSACCHARIDES-; PROCESSING-; SOY-PRODUCTS; VEGETABLE-PRODUCTS; CHELATING-AGENTS; OKARA-
UD: 199611

Record 50 of 121 - FSTA Current 1990-2001/03

AN: 1996-10-S0110
TI: Effects of phosphate type and addition level on binding ability, microstructure and storage characteristics of restructured pork jerky.
AU: Choi-YI; An-KY
AD: Dep. of Animal Sci., Coll. of Agric., Chungbuk Nat. Univ., Cheongju, Korea
PY: 1996
SO: Korean-Journal-of-Animal-Science; 38 (2) 159-170, 28 ref.
DT: Journal-Article
LA: Ko (Korean); Non-English
LS: en (English)
SC: S Meat-poultry-and-game
AB: Effects of phosphate type and addition level on protein extractability, protein binding ability and storage properties of low salt, restructured pork jerky were studied. Phosphate types used were sodium acid pyrophosphate (SAPP), sodium hexametaphosphate (SHMP) and sodium tripolyphosphate (STPP); addition levels were either 0, 0.1, 0.3 or 0.5%. Products were stored for up to 4 wk at 20 degree C. Compared to SAPP, addition of both SHMP and STPP increased pH and salt soluble protein extractability and improved the processing yield and binding ability of the pork jerky. After 4 wk of storage at 20 degree C, addition of all the phosphate types decreased TBA values of the jerky. Effectiveness of the phosphate types as antioxidants was in the order SAPP greater than STPP greater than SHMP. Microbial counts of the products were not affected by addition of any of the phosphates. As level of addition of STPP increased from 0.1 to 0.3%, pH of the jerky, salt soluble protein extractability, protein binding ability and processing yield of the jerky increased; however, there was no difference in the composition of the product, except for the level of ash present. Electrophoresis results showed that concn. of myosin heavy chains and actin recovered were increased with addition of STPP. In the pork jerky containing 0 or 0.1% STPP, the presence of large spaces was observed using SEM, where the protein matrix was not fully formed and was not very dense. In products containing 0.3 or 0.5% STPP, the protein matrix was dense. After storage for 21 days at 20 degree C, products containing 0.3 or 0.5% STPP had decreased TBA values, but microbial counts were not affected. [From En summ.]
DE: MEAT-PRODUCTS; MEAT-SPECIFIC; PHOSPHATES-; PORK-; SALTS-; JERKY-
UD: 199610

Record 51 of 121 - FSTA Current 1990-2001/03

AN: 1996-10-S0102
TI: Influence of phosphates and their blends in the sensory attributes and yield of 'cook-in'.
AU: Udaeta-JEM; Terra-NN
AD: Correspondence (Reprint) address, N. N. Terra, Dep. de Tec. e Ciencia dos Alimentos, Cent. de Ciencias Rurais, Univ. Fed. de Santa Maria, CEP 97119-900 Santa Maria, RS, Brazil
PY: 1995
SO: Ciencia-e-Tecnologia-de-Alimentos; 15 (3) 279-283, 17 ref.
DT: Journal-Article
LA: Pt (Portuguese); Non-English
LS: en (English)
SC: S Meat-poultry-and-game
AB: Effects of different phosphates used for brining on the sensory properties of 'cook-in' hams were investigated. Washed hams were injected with brine and cured before being packaged and cooked. Brines were composed of 0.5% phosphate, 2.0% salt, 0.4% curing salts, 0.66% ham condiment and 0.25% ascorbate, and adjusted to pH 9.0. Phosphates used

were either a commercial blend (3 types), 100% sodium polyphosphate (STP-100) or 95% sodium polyphosphate plus 5% sodium hexametaphosphate (SHMP-5). Losses occurring during tumbling and cooking and sensory properties were determined. Optimum sensory properties and cooking losses were achieved using one of the commercial phosphate blends. Acceptability of ham cured with STP-100 was also high. Lowest acceptability was observed using SHMP-5. [From En summ.]
DE: BRINING-; HAM-; MEAT-PRODUCTS; PHOSPHATES-; PROCESSING-; SALTS-; SENSORY-PROPERTIES
UD: 199610

Record 52 of 121 - FSTA Current 1990-2001/03

AN: 1996-10-G0049
TI: Optimization of hexametaphosphate-assisted extraction of flaxseed proteins using response surface methodology.
AU: Wanasundara-PKJPD; Shahidi-F
AD: Dep. of Biochem., Memorial Univ. of Newfoundland, St. John's, Nfld., A1B 3X9, Canada
PY: 1996
SO: Journal-of-Food-Science; 61 (3) 604-607, 24 ref.
DT: Journal-Article
LA: En (English)
SC: G Catering-speciality-and-multi-component-foods
AB: Use of sodium hexametaphosphate for extraction of proteins from mucilage reduced flax seed meal (Linum usitatissimum L., cv. Somme) was studied. A composite central rotatable design was used to study effects of pH (X1), meal-to-solvent ratio (X2) and concn. of SHMP (X3) on nitrogen extractability (Y1) and protein recovery (Y2). Using response surface methodology, quadratic polynomial equations were obtained for Y1 and Y2 by multiple regression analysis. All 3 variables significantly affected nitrogen solubility and protein extractability: pH was the most effective factor and meal-to-solvent ratio the least. Verification experiments confirmed validity of predicted models. Stationary points for response surfaces were characterized as maxima and they were Y1 = 77.6% at X1 = 8.90, X2 = 1:33.6 and X3 = 2.75% and Y2 = 57.5% at X1 = 9.00, X2 = 1:33.3 and X3 = 2.85%, for nitrogen extractability and protein recovery, respectively. [From En summ.]
DE: EXTRACTION-; OILSEEDS-; PHOSPHATES-; PROCESSING-; PROTEINS-; PROTEINS-VEGETABLE; SALTS-; SEEDS-; SODIUM-; VEGETABLE-PRODUCTS; FLAX-SEEDS; SODIUM-HEXAMETAPHOSPHATE
UD: 199610

Record 53 of 121 - FSTA Current 1990-2001/03

AN: 1996-05-J0046
TI: The relationship between textural changes and chemical changes in pectins of plums during salting processes.
AU: Chi-Yue-Chang; Hsiu-Jiuan-Liao
AD: Dep. of Food Eng., Da-Yeh Inst. of Tech., Chang-Hwa, Taiwan
PY: 1995
SO: Food-Science,-Taiwan; 22 (3) 292-300, 22 ref.
DT: Journal-Article
LA: Ch (Chinese); Non-English
LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: Minerals and pectin fractions in the alcohol insoluble solids (AIS) of plums after various salting treatments (20% NaCl alone or combined with 0.4% acetic acid, 3% CaCl2, 0.4% citric acid or 3% KCl) were determined to investigate the relationships between textural changes and chemical changes in pectins of plums during salting. Ca ion

contents of AIS after salting were correlated positively (P less than 0.01) with firmness of the salted plums; contents of cold water soluble pectins (CWP) and cold hexametaphosphate soluble pectins (CHP) were correlated negatively (P less than 0.001) and positively (P less than 0.01), respectively, with firmness. It is concluded that the increase in firmness of plums salted with NaCl + CaCl2 resulted from formation of cross links between Ca ions and free carboxyl groups of pectin molecules, and the subsequent conversion of CWP to CHP. [From En summ. & tables.]
DE: BRINING-; FIRMNESS-; FRUITS-SPECIFIC; PLUMS-; PROCESSING-; SENSORY-PROPERTIES
UD: 199605

Record 54 of 121 - FSTA Current 1990-2001/03

AN: 1996-03-C0106
TI: Inhibitory effect of hexametaphosphate on the growth of Staphylococcus aureus.
AU: Matsuoka-A; Tsutsumi-M; Watanabe-T
AD: Food Sci. & Human Nutr., Kwassui Women's Junior Coll., 1-50, Higashiyamate-machi, Nagasaki 850, Japan
PY: 1995
SO: Journal-of-the-Food-Hygienic-Society-of-Japan-[Shokuhin-Eiseigaku-Zasshi]; 36 (5) 588-594, 34 ref.
DT: Journal-Article
LA: En (English)
SC: C Hygiene-and-toxicology
AB: Inhibition of Staphylococcus aureus IFO 3060 by sodium polyphosphates (pyrophosphate, tripolyphosphate, tetrapolyphosphate, hexametaphosphate (HP) and ultrapolyphosphate) was investigated. HP had the strongest antibacterial activity against S. aureus among the polyphosphates studied; HP had a min. inhibitory concn. of 0.05%. The effect of heating on chelation and inhibitory activity of HP was also studied. The chelation value and growth inhibitory effect of HP decreased as the polyphosphate was heated and hydrolysed into low mol. wt. substances. These results suggest that the antibacterial effect of HP depends on both its chelating ability and polymeric nature. Effect of HP on S. aureus cell survival, salt tolerance of HP-treated cells and leakage of cell constituents during incubation with HP were also investigated. HP at concn. of 0.05-1.0% was bacteriostatic to S. aureus even after approx. 8 h incubation. Viability of HP-treated bacterium decreased gradually on media containing 7.5% NaCl, but not on normal agar plates, suggesting that HP acts on the S. aureus cell membrane and decreases salt tolerance of the bacterium. HP induced leakage of Mg from the cells into the medium, and increased leakage of amino acids and small nucleic acid-related substances from cells into deionized water. During HP treatment for 6 h, the cells slowly leaked large amounts of Mg and small molecular substances, a small amount of proteins and no nucleic acids. Results suggest a weak action of HP on the cell membrane and some HP-induced damage. It is concluded that the antibacterial action of HP on S. aureus is caused by the loss of osmoregulation and selective permeability due to damage to the cell membrane, and by a lowering of metabolic function caused by substrate leakage. [From En summ.]
DE: BACTERIA-; FOOD-SAFETY; INHIBITION-; PHOSPHATES-; SALTS-; STAPHYLOCOCCUS-; POLYPHOSPHATES-
UD: 199603

Record 55 of 121 - FSTA Current 1990-2001/03

AN: 1996-02-S0057

TI: Treatments with nisin and chelators to reduce Salmonella and Escherichia coli on beef.
AU: Cutter-CN; Siragusa-GR
AD: Roman L. Hruska US Meat Animal Res. Cent., ARS, USDA, Clay Center, NE 68933, USA
PY: 1995
SO: Journal-of-Food-Protection; 58 (9) 1028-1030, 11 ref.
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: Salmonella typhimurium ATCC 14028 or Escherichia coli O157:H7 attached to lean beef tissue were treated with [the chelating agents] citrate, lactate, sodium hexametaphosphate or EDTA, alone or in combination with nisin in simple buffers, and incubated at 4 degree C for up to 3 days. Lactate with nisin reduced S. typhimurium attached to beef by 0.40 log10 cfu/cm-2, while EDTA and nisin reduced E. coli O157:H7 by 0.42 log10 cfu/cm-2. Earlier in vitro studies with nisin and chelating agents resulted in reductions of greater than 4 log10 cfu/cm-2; such reductions were not observed in situ.
DE: ADDITIVES-; ANTIBIOTICS-; BACTERIA-; BACTERIOCINS-; BEEF-; DRUGS-; ESCHERICHIA-; FOOD-SAFETY; FOOD-SAFETY-ANIMAL-FOODS; INHIBITION-; MEAT-SPECIFIC; PRESERVATIVES-; SALMONELLA-; CHELATING-AGENTS; NISIN-
UD: 199602

Record 56 of 121 - FSTA Current 1990-2001/03

AN: 1996-02-C0030
TI: Population reductions of Gram-negative pathogens following treatments with nisin and chelators under various conditions.
AU: Cutter-CN; Siragusa-GR
AD: Roman L. Hruska US Meat Animal Res. Cent., ARS, USDA, Box 166, Clay Center, NE 68933, USA
PY: 1995
SO: Journal-of-Food-Protection; 58 (9) 977-983, 16 ref.
DT: Journal-Article
LA: En (English)
SC: C Hygiene-and-toxicology
AB: When used in combination with chelating agents (EDTA, EGTA, citrate, phosphate), the bacteriocin nisin is effective for reducing populations of Gram-negative bacteria in vitro. Parameters (buffers, temp., presence of divalent cations) affecting nisin inhibition of Escherichia coli O157:H7 and Salmonella typhimurium (ATCC 14028) were examined. Approx. 7 log10 cfu/ml of E. coli and S. typhimurium were treated in PBS or MOPS buffers containing 50 mug/ml of purified nisin, alone or in combination with 500mM lactate, 100mM citrate, 50mM EDTA and 1% (w/v) sodium hexametaphosphate (pH 7.0), at 37 degree C for 60 min or 5 degree C for 30 min. Surviving bacterial populations were compared to untreated controls (buffers without nisin). Data indicated that treatments with nisin in buffers resulted in reductions of 4.30 and 2.30 log10 cfu/ml of E. coli and S. typhimurium, respectively, as compared to untreated controls. Population reductions ranging from 2.29 to 5.49 log10 cfu/ml were observed when cells were treated with nisin and chelator combinations at either 37 degree C for 60 min or 5 degree C for 30 min. Addition of Mg and Ca to buffers with nisin decreased inhibition. Data obtained from spectrophotometric experiments indicated that treatments were causing the release of cellular constituents. However, TEM analyses were inconclusive, since cellular membranes did not appear to be disrupted.
DE: ADDITIVES-; ANTIBIOTICS-; BACTERIA-; BACTERIOCINS-; DRUGS-; ESCHERICHIA-; FOOD-SAFETY; INHIBITION-; PRESERVATIVES-; SALMONELLA-; CHELATING-AGENTS; NISIN-

UD: 199602

Record 57 of 121 - FSTA Current 1990-2001/03

AN: 1996-01-T0009
TI: [Interaction of agar with electrolytes and food gums.]
AU: Zhao-MM; Wang-MC; Chen-ZF; Wang-RF
AD: Dep. of Food Eng., South China Univ. of Sci. & Eng., Guangzhou, Guangdong 510641, China
PY: 1995
SO: Food-&-Fermentation-Industries; No. 1, 1-7, 12 ref.
DT: Journal-Article
LA: Ch (Chinese); Non-English
LS: en (English)
SC: T Food-additives-spices-and-condiments
AB: Effects of electrolytes and non-electrolytes at various concn. on gelation properties of 1.55 agar solution (gel strength, transparency, elasticity, water holding ability) were studied. Sodium hexametaphosphate at 0.25%, potassium chloride at 0.2% and potassium dihydrogen phosphate at 0.02% increased gel strength by 22.5, 14.7 and 10.4%, respectively. Food gums also showed synergistic activities. Locust bean gum, 0.5% carrageenan gel, 0.55 tragon gum and 11.6% dextrin increased gel strength by 16, 13.6, 11.6 and 12.8%, respectively. Pectin, sodium carboxymethylcellulose, guar gum, beta-cyclodextrin, starch and hydroxypropylated starch at 5% decreased gel strength by 37-10.4%.
DE: AGAR-; GUMS-; SALTS-; STABILIZERS-; THICKENERS-
UD: 199601

Record 58 of 121 - FSTA Current 1990-2001/03

AN: 1996-01-P0052
TI: Effect of whey protein incorporation into Cheddar cheese using ultrafiltration techniques on product yield, body, and texture. (Volumes I and II).
AU: Dybing-ST
AD: Univ. of Minnesota, St. Paul, MN 55108, USA
PY: 1995
SO: Dissertation-Abstracts-International,-B; 55 (10) 4189 Order no. DA9505397, 349pp.
DT: Thesis
LA: En (English)
SC: P Milk-and-dairy-products
AB: Stirred curd Cheddar cheese was made from milk, 1.5x ultrafiltration (UF) retentate, and 4.8x UF retentate using either calf rennet or a mixture of 50% rennet and 50% porcine pepsin. Concentrating the milk by UF did not significantly increase cheese yields. Type or amount of coagulant did not create significant differences in cheese yield. Cheese became bitter within 2-4 wk, possibly due to retention of excessive amounts of rennet in the curd. Cheese produced from the 4.8x UF retentate was rubbery, unable to fracture, and possessed significant differences in the springiness, cohesiveness, gumminess and chewiness. The differences were due to the high cheese pH (5.34), and were avoided by adding salt when pH of the curd was between 5.10 and 5.20. Differences in the percentage of alpha-casein, beta-casein, p-kappa-casein and beta-lactoglobulin in the cheese were not significant. Proteolysis of alpha-casein and beta-casein occurred throughout ripening, while both p-kappa-casein and beta-lactoglobulin resisted proteolysis. Ability of 0.05, 0.10, 0.15 and 0.20% solutions of monosodium phosphate, tetrasodium phosphate, sodium hexametaphosphate, calcium phosphate and kappa-carrageenan to coagulate whey proteins was

evaluated at pH 2.5, 4.6, 6.75 and 12.0. Treated whey protein solutions were supplemented with 0, 0.05, 0.10, 0.15 or 0.20% of either calcium acetate or calcium chloride and exposed to 22-24, 65 or 85 degree C for 30 min. The most acceptable whey protein coagulums were created by mixing a whey protein solution at pH 6.4 with 0.20% tetrasodium pyrophosphate for 5 min and then adding 0.15% calcium chloride, mixing a whey protein solution at pH 2.5 with 0.05% sodium hexametaphosphate, and mixing a whey protein solution at pH 4.6 with 0.05% kappa-carrageenan. Each of the treated whey protein mixtures significantly interfered with casein coagulation, and failed to enhance recovery of whey proteins in the casein coagulums. [From En summ.]
DE: CHEESE-VARIETIES; DAIRY-PRODUCTS; PROTEINS-; PROTEINS-MILK; WHEY-; CHEDDAR-CHEESE; WHEY-PROTEINS
UD: 199601

Record 59 of 121 - FSTA Current 1990-2001/03

AN: 1996-01-J0083
TI: Effects of high carbon dioxide with short term treatment on quality of strawberry fruits.
AU: Goto-T; Goto-M; Chachin-K; Iwata-T
AD: Toyo Inst. of Food Tech., 4-23-2, Minamihanayashiki, Kawanishi-shi, Hyogo 666, Japan
PY: 1995
SO: Journal-of-Japanese-Society-of-Food-Science-and-Technology-[Nippon-Shokuhin-Kogyo-Gakkaishi]; 42 (3) 176-182, 13 ref.
DT: Journal-Article
LA: Ja (Japanese); Non-English
LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: Influence of treatment temp., cv. and harvest maturity on maintaining firmness of strawberries by short term high CO2 treatment was determined. Hokowase fruits obtained from a wholesale market or harvested at 3 stages (30, 70 and 100% coloured) were treated with high CO2 mixed gas (CO2:O2:N2 = 20:10:70) for 24 h at 1 or 20 degree C and then stored at 1 or 20 degree C. Firmness of treated fruits at every stage was harder than that of untreated fruits stored at both temp. CO2 treatment was most effective in 30% coloured fruits. In treated Hokowase fruits, colour development was delayed, showing a lower content of anthocyanin, especially at the 30% coloured stage. No difference was observed in contents of total sugar and ascorbic acid between treated and untreated fruits at all harvest stages. In treated fruits, content of water soluble pectin (WSP) decreased and content of hexametaphosphate soluble pectin (HMP) increased after CO2 treatment. Fungal growth on strawberry fruits was delayed by CO2 treatment. Tioga fruits harvested at mature (100% coloured) stage were treated with high CO2 mixed gas for 24 h at 20 degree C, and stored at the same temp. Firmness of treated Tioga fruits was not as great as that of Hokowase fruits. [From En summ.]
DE: CARBON-DIOXIDE; FRUITS-SPECIFIC; GASES-; STRAWBERRIES-; CO2-
UD: 199601

Record 60 of 121 - FSTA Current 1990-2001/03

AN: 1996-01-J0035
TI: Effect of ashed egg shell and various hardeners on hardness and tissue structure of brined ume fruit.
AU: Kaneko-K; Otoguro-C; Odake-S; Tsuji-K; Maeda-Y
AD: Lab. of Food Sci., Koriyama Women's Junior Coll., 3-25-2, Kaisei, Koriyama, Fukushima, 963, Japan
PY: 1995

SO: Journal-of-Japanese-Society-of-Food-Science-and-Technology-[Nippon-Shokuhin-Kogyo-Gakkaishi]; 42 (6) 456-461, 11 ref.
DT: Journal-Article
LA: En (English)
LS: ja (Japanese)
SC: J Fruits-vegetables-and-nuts
AB: Egg shell ashed (AES) at 800 degree C was compared with calcium carbonate, calcium hydroxide, calcium oxide and calcium lactate with respect to maintaining firmness of brined ume fruit (Japanese apricot, Prunus mume). Fruit with added hardeners remained firm, whereas control fruit without any additives became soft. Yield (wt. ratio of brined fruit to fresh fruit) of fruit brined with calcium carbonate was 91%, and alcohol insoluble substances (AIS), NaCl content and total acid were 4.2, 17.1 and 3.23%, respectively. Ca content of treated fruits was considerably higher than that of fresh and untreated brined fruit. Ca content of treated fruits was similar, except for fruit treated with calcium carbonate which was approx. 1000 g/100 g less. Brining reduced the ratio of 0.05N HCl soluble pectin (HSP) to total pectin, and increased the ratios of water soluble pectin (WSP) and 0.4% hexametaphosphate soluble pectin (HXSP) to total pectin. Conversion of HSP to WSP was slighty supressed by calcium carbonate, and blocked by calcium lactate, calcium hydroxide, calcium oxide and AES. Fruit brined with calcium hydroxide, calcium oxide or AES had a higher ratio of 0.05N NaOH soluble pectin (SSP) to total pectin than the other treated fruits. DSC analysis of the sarcocarp of fresh fruit cells revealed firm rectangular cells, and unclear flat shaped cells for brined fruit without added hardeners. Cells of fruit with added calcium carbonate were observed as crushed flat shapes, whereas cells from fruits brined with calcium lactate, calcium hydroxide, calcium oxide and AES were similar in shape to those of fresh fruit. [From En summ.]
DE: BRINING-; CALCIUM-; EGG-SHELLS; FIRMNESS-; FRUITS-SPECIFIC; MINERALS-; PROCESSING-; SENSORY-PROPERTIES; BRINES-; CA-; JAPANESE-APRICOTS
UD: 199601

Record 61 of 121 - FSTA Current 1990-2001/03

AN: 1996-01-J0034
TI: Effect of ashed egg shell on hardness of brined ume fruit.
AU: Otoguro-C; Odake-S; Tsuji-K; Kaneko-K
AD: Yamanashi Ind. Tech. Cent., 2094, Otsu-cho, Kofu-shi, Yamanashi 400, Japan
PY: 1995
SO: Journal-of-Japanese-Society-of-Food-Science-and-Technology-[Nippon-Shokuhin-Kogyo-Gakkaishi]; 42 (5) 353-361, 13 ref.
DT: Journal-Article
LA: En (English)
LS: ja (Japanese)
SC: J Fruits-vegetables-and-nuts
AB: Ca content, hardness and pectin composition of brined ume (Japanese apricot, Prunus mume) fruit, containing egg shell ashed at 500-900 degree C were measured to determine the effect of egg shell on hardness of fruit. Tissue structure of fruit was analysed using SEM. Ashed egg shell (AES) was analysed for Ca content and composition. Ca content of egg shell ashed at temp. between 700 and 800 degree C increased. X-ray diffraction showed that Ca in dried egg shell (DES) ashed at 500 (AES-500) and 600 degree C (AES-600) exists as $CaCO_3$; AES-700 and -750 samples may contain Ca as both $CaCO_3$ and CaO, and Ca in AES-800 and -900 samples may be almost entirely CaO. Hardness of brined fruit was maintained by addition of DES or AES. Fruit with DES, AES-500 or -600 decreased in yield, as expressed by the ratio of brined fruit to

fresh fruit. Fruit with added DES was similar to control fruit with respect to ratio of 0.05N HCl soluble pectin (HSP) to total pectin; however, water soluble pectin (WSP) ratio was lower, and 0.4% hexametaphosphate soluble pectin (HXSP) and 0.05N NaOH soluble pectin (SSP) ratios were higher. Fruit with added AES-500 or -600 was similar to fruit with added DES in terms of HSP, HXSP and SSP, and similar to fresh fruit in terms of WSP. WSP and HSP gradually decreased, whilst HXSP and SSP increased with ashing temp. of DES between 700 and 800 degree C. SEM identified firm rectangular cells in the sarcocarp of fresh fruit and flat shaped cells in brined fruit. Cells of fruit with added DES, AES-500 or -600 were crushed flat, but cells of fruit with added AES-750 or 800 were a similar shape to fresh fruit cells. [From En summ.]
DE: CARBOHYDRATES-; EGG-SHELLS; FRUITS-SPECIFIC; MECHANICAL-PROPERTIES; PECTIC-SUBSTANCES; PHYSICAL-PROPERTIES; SALTS-; HARDNESS-; JAPANESE-APRICOTS; PECTINS-
UD: 199601

Record 62 of 121 - FSTA Current 1990-2001/03

AN: 1995-12-T0029
TI: Effect of pH, buffer solution, buffer concentration, pectin concentration and heating on viscosity of sunflower pectin.
AU: Li-GJ; Chang-KC
CA: IFT Annual Meeting 1995
AD: Dep. of Food & Nutr., N. Dakota State Univ., Fargo, ND 58105, USA
PY: 1995
SO: p. 288
DT: Conference-Proceedings
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: Sunflower low-methoxy pectin samples (0.33, 0.67 or 1%) were prepared in 0.01, 0.05, 0.1 and 0.2M buffers (sodium citrate, hexametaphosphate or tripolyphosphate) at pH 2-6, and viscosity was measured at 25 degree C, before and after heating at 100 degree C for 5 min and cooling to 25 degree C. To examine effects of shearing and reheating, cooled samples were vortexed, reheated to 100 degree C for 2 min, cooled to room temp. and re-evaluated. A commercial citrus pectin product was used as a reference compound. Results indicated that sunflower pectin had high potential for use in increasing viscosity of liquid foods and beverages under several processing conditions. [Further abstracts from this Meeting can be traced via the FSTA author index, under IFT Annual Meeting 1995. See FSTA (1995) 27 10A6. From En summ.]
DE: CARBOHYDRATES-; PECTIC-SUBSTANCES; PHYSICAL-PROPERTIES; PROCESSING-; SUNFLOWER-SEEDS; VISCOSITY-; PECTINS-; SUNFLOWERS-
UD: 199512

Record 63 of 121 - FSTA Current 1990-2001/03

AN: 1995-12-S0145
TI: Absorption properties of phosphate marinades in tumbled chicken filets.
AU: Xiong-YL; Kupski-DR; Gnanasekharan-K
CA: IFT Annual Meeting 1995
AD: Food Sci. Sect., Dep. of Animal Sci., Univ. of Kentucky, Lexington, KY 40546, USA
PY: 1995
SO: p. 227
DT: Conference-Proceedings
LA: En (English)
SC: S Meat-poultry-and-game

AB: Effects of various types of phosphates (1.6% sodium pyro- [SPP], tripoly- [STP], or hexametaphosphate [HMP]), with or without 8% salt, in marinades used for tumbling chicken filets for 0, 5, 15 or 30 min, were examined, in terms of marinade penetration (traced using FD&C Blue No. 1), absorption and retention (wt. of filets measured immediately after tumbling and after 24 h draining). Marinade absorption was not necessarily related to penetration rate, and ability of phosphates to immobilize moisture followed the order: SPP greater than STP greater than HMP, apparently related to their molecular structure. [Further abstracts from this Meeting can be traced via the FSTA author index, under IFT Annual Meeting 1995. See FSTA (1995) 27 10A6. From En summ.]
DE: CHICKEN-MEAT; CHICKENS-; MEAT-SPECIFIC; PHOSPHATES-; POULTRY-; POULTRY-MEAT; PROCESSING-; SALTS-; SOAKING-; SORPTION-; ABSORPTION-; MARINADES-
UD: 199512

Record 64 of 121 - FSTA Current 1990-2001/03

AN: 1995-11-R0061
TI: Influence of cryoprotectants on protein functional properties and textural changes of frozen minced cod with or without kidney tissue.
AU: Chang-CC; Regenstein-JM
CA: IFT Annual Meeting 1995
AD: Dep. of Food Sci., Cornell Univ., Ithaca, NY 14853, USA
PY: 1995
SO: p. 98
DT: Conference-Proceedings
LA: En (English)
SC: R Fish-and-marine-products
AB: Cod minces with 0.8% (mince wt.) of kidney tissue were treated with various cryoprotectant mixtures and frozen-stored at -14 or -40 degree C. Expressible moisture, water uptake, cook loss, toughness, dimethylamine levels, etc., were determined in treated and untreated fish minces. A combination of sucrose/sorbitol (4%/4% mince wt.) and sodium hexametaphosphate (0.5% mince wt.) improved protein functional and textural properties of the mince during frozen storage. [Further abstracts from this Meeting can be traced via the FSTA author index, under IFT Annual Meeting 1995. See FSTA (1995) 27 10A6. From En summ.]
DE: ADDITIVES-; COD-; FISH-; FROZEN-FOODS; PROCESSED-FOODS; SEA-FOODS; CRYOPROTECTANTS-; FISHES-
UD: 199511

Record 65 of 121 - FSTA Current 1990-2001/03

AN: 1995-10-P0033
TI: Effects of soluble calcium-to-protein ratio on age gelation of ultrafiltration or reverse osmosis concentrated, ultra-high temperature-treated milk.
AU: Je-Hong-Ryue
AD: Utah State Univ., Logan, UT 84322, USA
PY: 1995
SO: Dissertation-Abstracts-International,-B; 55 (7) 2461 Order no. DA9433766, 108pp.
DT: Thesis
LA: En (English)
SC: P Milk-and-dairy-products
AB: Reverse osmosis (RO) and ultrafiltration (UF) milk retentates were (UHT) processed and compared with respect to shelf life at room temp. Viscosity studies indicated that UHT-treated, RO retentate had more delayed age gelation than UF retentate at the same TS level (26%). When compared at a 6.4% protein level (2x RO vs. 2.7x where x = ratio of the

feed vol. to concentrate vol.), the shelf life for both RO and UF retentates was approx. 6-8 months. Sodium hexametaphosphate (SHMP) and disodium phosphate (DSP) were incorporated at concn. of 1, 3, 5, 10 and 20mM prior to UHT processing of each sample to investigate effects on shelf life. SHMP at 1 and 3mM was effective in delaying age gelation, whereas all levels of DSP accelerated gelation. SHMP accelerated age gelation when added at concn. of 10 and 20mM. Use of SHMP at 1mM in RO retentates was more effective in delaying age gelation than the same SHMP level in 2 UF samples (22 and 26% TS). Analysis showed that RO/UHT treated samples had higher soluble Ca and ionic Ca levels than UF/UHT treated samples. A coeff. of determination of R-2 = 0.80 was observed between soluble Ca-to-protein ratio and shelf life. [From En summ.]
DE: DAIRY-PRODUCTS; GELATION-; MILK-; PHOSPHATES-; PROCESSING-; REVERSE-OSMOSIS; SALTS-; SHELF-LIFE; ULTRAFILTRATION-; UHT-MILK
UD: 199510

Record 66 of 121 - FSTA Current 1990-2001/03

AN: 1995-09-T0009
TI: Enzymic pectin extraction from protopectins using microbial protopectinases.
AU: Sakamoto-T; Hours-RA; Sakai-T
AD: Dep. of Applied Biol. Chem., Coll. of Agric., Univ. of Osaka Prefecture, 1-1 Gakuen-cho, Sakai City, Osaka 593, Japan
PY: 1995
SO: Process-Biochemistry; 30 (5) 403-409, 25 ref.
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: Protopectinases are a heterogeneous group of enzymes able to solubilize pectin from the insoluble plant protopectin by restricted depolymerization. Enzymic and acid solubilization of pectin from protopectins obtained from different plant materials were compared. Protopectins were prepared from orange, grapefuit, lemon, apple, pear, peach, red and white grapes, carrot, potato and sugar beet by sequential washing with water and sodium hexametaphosphate. [Protopectins were then treated with HCl or various microbial protopectinases to release pectins.] Substantial differences in the amounts of pectin released by the same enzyme from different protopectins (substrate specificity) and by different enzymes from the same protopectin (enzyme specificity) were evident. [Differences were also observed in the amounts of pectin released by acid and enzymic extraction; amounts of pectin produced by enzymic extraction were dependent on the source of the protopectin and the enzyme.]
DE: CARBOHYDRATES-; EXTRACTION-; FRUITS-; PECTIC-SUBSTANCES; PROCESSING-; VEGETABLES-; PECTINS-
UD: 199509

Record 67 of 121 - FSTA Current 1990-2001/03

AN: 1995-08-J0117
TI: Changes in pectic substances of Korean pickled cucumbers with different preparation methods.
AU: Mee-Weon-Park; Yong-Kon-Park; Myung-Sook-Jang
AD: Correspondence (Reprint) address, Myung-Sook Jang, Dep. of Food Sci. & Nutr., Dankook Univ., Seoul 140-714, Korea
PY: 1995
SO: Journal-of-the-Korean-Society-of-Food-and-Nutrition; 24 (1) 133-140, 18 ref.
DT: Journal-Article
LA: Ko (Korean); Non-English

LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: Effects of processing method on levels of pectic substances in the alcohol insoluble solids (AIS) fraction extracted from salt-pickled cucumbers were studied. Salt-pickled cucumbers were prepared by 3 brining methods: 10% NaCl solution (boiled); 20% NaCl solution (cooled to 25 degree C after boiling); and 20% NaCl solution (boiled). The level of hot water soluble pectin (HWSP) in AIS decreased during brining, while that of 0.4% sodium hexametaphosphate soluble pectin (NaSP) increased. Ca and Mg levels in AIS increased with all 3 preparation methods used. NaSP and HWSP fractions from fresh and brined cucumbers were separated by DEAE cellulose chromatography into 6 and 5 fractions, respectively. The main fractions of HWSP were found at peaks of 0.2M for fresh cucumber and 0.05M and 0.2M for pickled cucumber. NaSP fractions from fresh and brined cucumbers separated into 5 fractions; the 0.4M peak represented the main fraction. The galacturonic acid and neutral sugar ratio in the 0.4M peak fraction of brined cucumber was higher than that of fresh cucumber. [From En summ.]
DE: CARBOHYDRATES-; CUCUMBERS-; PECTIC-SUBSTANCES; PICKLING-; PROCESSING-; VEGETABLES-SPECIFIC
UD: 199508

Record 68 of 121 - FSTA Current 1990-2001/03

AN: 1995-07-S0094
TI: Efficacy of selected chemicals for killing pathogenic and spoilage microorganisms on chicken skin.
AU: Cheng-An-Hwang; Beuchat-LR
AD: Correspondence (Reprint) address, L. R. Beuchat, Cent. for Food Safety & Quality Enhancement, Dep. of Food Sci. & Tech., Univ. of Georgia, Griffin, GA 30223-1797, USA
PY: 1995
SO: Journal-of-Food-Protection; 58 (1) 19-23, 35 ref.
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: [Chemical wash solutions were evaluated for their effectiveness in decontaminating chicken carcasses. As microbial contamination is primarily on the carcass surface, effect of the treatment on the chicken skin was determined.] Chicken skin inoculated with 5 strain mixtures of Salmonella spp. or Listeria monocytogenes was washed for 30 min with sterile water (control), 10% solutions of sodium tripolyphosphate (STPP), monosodium phosphate (MSP), sodium acid pyrophosphate (SAPP), or sodium hexametaphosphate (SHMP), 1% trisodium phosphate (TSP), 1% lactic acid, or 0.05% NaOH, with or without addition of 1 or 5% Tween 80. Viable populations of Salmonella spp., L. monocytogenes, and psychrotrophs were significantly (P less than 0.05) lower on skin washed with 1% TSP or 1% lactic acid compared to skin washed with water or 10% MSP, STPP, SAPP, or SHMP. Washing skin with 0.05% NaOH significantly reduced the Salmonella population but had no effect on L. monocytogenes. Addition of 5% Tween 80 to TSP solutions enhanced removal of psychrotrophs and Salmonella but had little effect on L. monocytogenes. Skin inoculated with Salmonella spp., L. monocytogenes, Campylobacter jejuni or Staphylococcus aureus was washed in sterile water, 0.3% lactic acid/0.05% sodium benzoate (LB35), or 0.5% lactic acid/0.05% sodium benzoate (LB55) and then stored at 4 degree C for up to 16 days. Washing skin with solutions of LB35 or LB55 resulted in greater reductions in Salmonella spp., L. monocytogenes, and C. jejuni compared to washing with water. No viable Salmonella were detected on skin washed with LB35 or LB55 and stored for 2 and 8 days at 4 degree C, respectively. Populations of L. monocytogenes on control skin samples increased

slightly after 8 days storage, but the pathogen was not detected in LB35- and LB55-washed skins after 6 days. C. jejuni was not detected on LB35- and LB55-washed skins after 2 days storage at 4 degree C, whereas S. aureus steadily decreased to a non-detectable level after 8 days.
DE: BACTERIA-; CHICKENS-; CLEANING-; FOOD-SAFETY; MICROORGANISMS-; POULTRY-; SKIN-; CHICKEN-SKIN; WASHING-
UD: 199507

Record 69 of 121 - FSTA Current 1990-2001/03

AN: 1995-06-T0011
TI: [Interactions among agar, electrolytes and gums in foods.]
AU: Wang-RF; Zhao-MM; Wang-MC; Chen-ZF
AD: Food Eng. Dep., South China Univ. of Sci. & Tech., Guangzhou, Guangdong 510641, China
PY: 1994
SO: Food-Science,-China; No. 8, 7-11, 3 ref.
DT: Journal-Article
LA: Ch (Chinese); Non-English
SC: T Food-additives-spices-and-condiments
AB: Gelatinization strength, transparency, viscosity and water holding capacity were tested for combinations of agar with electrolytes (potassium chloride, sodium hexametaphosphate, potassium dihydrogenphosphate) and gums (gum tragon gelatin, kataya gum, dextrin, carrageenan xanthan gum, hydroxypropyl starch). Each electrolyte showed different effects on the properties of the mixtures; electrolytes improved gelatinization strength and transparency of the mixtures. At a total gum concn. of 1.5%, gelatinization strength compared with that of mixtures containing agar but no electrolytes, increased by 30.8% in the mixture 0.1% sodium hexametaphosphate + 0.8% gum tragon + 99.2% agar, 30% in 0.1% sodium hexametaphosphate + 5% xanthan gum + 95% agar, 35.8% in 0.025% potassium dihydrogenphosphate + 1.5% gum tragon + 98.5% agar, and 16.9% in 0.125% sodium hexametaphosphate + 1.5% gum tragon + 98.5% agar.
DE: AGAR-; FUNCTIONAL-PROPERTIES; GUMS-; PHYSICAL-PROPERTIES; SALTS-; STABILIZERS-; THICKENERS-; ELECTROLYTES-
UD: 199506

Record 70 of 121 - FSTA Current 1990-2001/03

AN: 1995-05-R0072
TI: Seafood analogs from caseinate and process of making same.
AU: Konstance-RP
CA: United States of America, Secretary of Agriculture
PY: 1994
SO: United-States-Patent; US 5 368 871, US 2342 (19930106) [Secretary of Agriculture, Washington, DC, USA]
DT: Patent
LA: En (English)
SC: R Fish-and-marine-products
AB: Irreversible, protein-containing gels, of firm but elastic texture, are produced by homogeneously blending a mixture of calcium caseinate, sodium hexametaphosphate and either a carrageenan or a combination of lactalbumin and egg albumin, in an aqueous solution. This blend is heated to form a uniform viscous solution which, on cooling, forms an edible gel suitable for use in sea food analogues, including kamaboko. [From En summ.]
DE: PATENTS-; PROCESSED-FOODS; SEA-FOODS; SIMULATED-FOODS
UD: 199505

Record 71 of 121 - FSTA Current 1990-2001/03

AN: 1995-04-J0221
TI: Sunflower head residue pectin extraction as affected by physical conditions.
AU: Chang-KC; Dhurandhar-N; You-X; Miyamoto-A
AD: Dep. of Food & Nutr., North Dakota State Univ., Fargo, ND 58105, USA
PY: 1994
SO: Journal-of-Food-Science; 59 (6) 1207-1210, 21 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: [Sunflower head residues, left after seeds have been harvested, are a known source of raw materials for preparation of commercial pectins.] Effects of extraction pH, temp., and time on yield and quality of pectin from sunflower heads (Interstate cv.) were investigated. Low-methoxyl pectin was extracted, using 0.75% sodium hexametaphosphate at pH 3, 4, and 5 and at 75, 85, and 95 degree C for 20, 40, and 60 min, respectively. Yield, mol. wt., and firmness of pectin gels were determined. 3-way statistical analysis on yield, mol. wt., and gel firmness showed strong interactions among pH, temp., and time. Highest yields were obtained at pH 5, 95 degree C for 20 min, and pH 4, 85 degree C for 40 min. Pectin extracted for 40 min at pH 3 and 4 and at 85 and 75 degree C, respectively, had the highest mol. wt. Gel firmness of sunflower pectin prepared at pH 5.4 was higher than that of a commercial citrus pectin.
DE: CARBOHYDRATES-; EXTRACTION-; PECTIC-SUBSTANCES; PROCESSING-; SEEDS-; SUNFLOWER-SEEDS; PECTINS-; SUNFLOWERS-
UD: 199504

Record 72 of 121 - FSTA Current 1990-2001/03

AN: 1995-04-J0135
TI: Characterization of pectic substances from two potato cultivars with different sensitivities to prewarming.
AU: Quinn-JS; Schafer-HW
AD: Kraft General Foods Inc., Glenview, IL 60025, USA
PY: 1994
SO: Potato-Research; 37 (1) 87-97, 21 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: Potato cv. Chieftain and Kennebec were prewarmed at 70 degree C for 15 min prior to heating at 100 degree C for 18 min in a water bath. Chieftain exhibited a large increase in fracturability upon treatment while Kennebec showed a smaller increase. Pectic substances of the 2 cv. were sequentially extracted in water, sodium hexametaphosphate (0.5%), hydrochloric acid (0.05M, 50 degree C), and sodium hydroxide (0.05M, 5 degree C). The largest fraction isolated from both cv. consisted of hydroxide-soluble pectic substances, and was followed by the acid-soluble fraction. Chieftain contained significantly greater amounts of the hydroxide-soluble fraction than Kennebec. Ion exchange chromatography revealed that the extracted pectic substances from the 2 major fractions consisted of a charged pectin chain with attached neutral sugars. Gel filtration chromatography revealed wide molecular size distributions for the isolated pectic substances. Pectic neutral sugar content for the hydroxide-soluble fraction (50% of total pectic substances) was greater for Chieftain than for Kennebec.
DE: CARBOHYDRATES-; PECTIC-SUBSTANCES; POTATOES-; VEGETABLES-SPECIFIC
UD: 199504

Record 73 of 121 - FSTA Current 1990-2001/03

AN: 1995-04-J0020
TI: Studies of the utilization of citrus waste for pectin extraction.
AU: Poonia-S; Yamdagini-R; Dhawan-SS
AD: Dep. of Hort., CCS Haryana Agric. Univ., Hisar, India
PY: 1994
SO: Haryana-Journal-of-Horticultural-Science; 23 (1) 28-32, 8 ref.
DT: Journal-Article
LA: En (English)
LS: hi (Hindi)
SC: J Fruits-vegetables-and-nuts
AB: Four citrus species (sweet orange (Citrus sinensis), grapefruit (Citrus paradisi), Kinnow mandarin, and Bhadri lemon (Citrus limon)) were evaluated for their pectin content using various extractants (sodium hexametaphosphate, ammonium oxalate, EDTA, and water). Crude pectin and jelly units were significantly higher when ammonium oxalate was used as an extractant. Pectin quality in terms of methoxyl content, anhydrouronic acid, and degree of esterification was better when sodium hexametaphosphate was used. The rag portion of the fruit gave higher crude pectin and jelly units than the peel. Bhadri lemon yielded a higher crude pectin with higher number of jelly units than the other citrus species. Kinnow mandarin yielded the lowest grade pectin. Grapefruit yielded pectin with higher jelly grade but due to lower yield the jelly units were lower than Bhadri lemon. [From En summ.]
DE: CARBOHYDRATES-; CITRUS-FRUITS; EXTRACTION-; FRUITS-SPECIFIC; PECTIC-SUBSTANCES; PROCESSING-; WASTES-; PECTINS-
UD: 199504

Record 74 of 121 - FSTA Current 1990-2001/03

AN: 1995-03-R0052
TI: Crystalline precipitates in bay scallops (Argopecten irradians) imported from China.
AU: Fisher-RA
AD: Virginia Sea Grant Coll. Program, Marine Advisory Services, Virginia Inst. of Marine Sci., College of William & Mary, Gloucester Point, VA 23062, USA
PY: 1994
SO: Journal-of-Aquatic-Food-Product-Technology; 3 (2) 57-70, 8 ref.
DT: Journal-Article
LA: En (English)
SC: R Fish-and-marine-products
AB: Macroscopic evaluations documented uncharacterized white spots in bay scallops (Argopecten irradians) to be a surface phenomenon, occupying scallop tissue only to a depth demarcated by translucent tissue, which is associated with salt solution penetration. Light microscopy characterized the white material to be crystalline in nature. SEM and energy dispersive X-ray spectroscopy identified 2 types of crystals, the crystal present in scallops as imported from China, and a second precipitate resulting from reprocessing scallops with sodium tripolyphosphate (STP). The crystals present in imported scallops were largely water insoluble, did not dissociate upon heating, and contained phosphorous and magnesium as major elements with sodium present only in trace amounts. Crystals resulting from STP reprocessing contained P, Mg, and Na. This slight compositional alteration affected crystal stability, producing a more water soluble crystal which dissociated upon heating. Both crystals share similar attributes with struvite crystals (magnesium ammonium phosphate) but are considered to be different precipitates. Dissociation of crystalline precipitates in imported bay scallops was demonstrated during phosphate processing using alternatives to the

alkaline STP. Sodium hexametaphosphate (SHMP, pH 7.0) provided total dissociation of scallop precipitates during processing, while a phosphate blend (pH 7.2) containing STP, SHMP, and acid pyrophosphate provided partial precipitate dissociation. STP solutions with pH adjusted to 5.0, 6.3, and 7.0, had no effect on precipitate dissociation.
DE: CRYSTALS-; MOLLUSCS-; SHELLFISH-; SPICES-; BAY-; SCALLOPS-
UD: 199503

Record 75 of 121 - FSTA Current 1990-2001/03

AN: 1994-11-T0008
TI: Phosphates in seafood processing.
AU: Sherief-PM; Krishnakumar-S
AD: Coll. of Fisheries, Cochin, India
PY: 1994
SO: Seafood-Export-Journal; 25 (13) 19, 21, 23, 25, 28
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: Phosphates, e.g. sodium acid pyrophosphate, tetrasodium pyrophosphate, sodium tripolyphosphate and sodium hexametaphosphate, used in foods and their application in sea foods are discussed. Aspects covered include: chemical characteristics; toxic limits; acceptable daily intake; application in sea food products; merits of using phosphates as food additives in preserving colour and improving tenderness, binding, moisture retention and flavour; and demerits such as upgrading of lower grade food products and increase of water content of food products.
DE: PHOSPHATES-; SALTS-; SEA-FOODS
UD: 199411

Record 76 of 121 - FSTA Current 1990-2001/03

AN: 1994-10-T0024
TI: Fortification of salt with iron and iodine to control anaemia and goitre: development of a new formula with good stability and bioavailability of iron and iodine.
AU: Narasinga-Rao-BS
PY: 1993
SO: Food-and-Nutrition-Bulletin; 15 (1) 32-39, 24 ref.
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: Studies were undertaken to develop an appropriate formula for addition of iodine to iron-fortified salt. Previous studies had indicated that iron-fortified salt was highly unstable. Addition of 1% sodium hexametaphosphate was found to stabilize both iron (1 mg/g) and iodine (40 mg/g). Bioavailability of both iron and iodine from the fortified salt was satisfactory. [From En summ.]
DE: FLAVOURINGS-; FOOD-ENRICHMENT; IODINE-; IRON-; MINERALS-; SALT-; FE-; FORTIFICATION-; I-
UD: 199410

Record 77 of 121 - FSTA Current 1990-2001/03

AN: 1994-09-P0003
TI: Modification and pilot production of induced complex formation between xanthan gum and whey proteins at reduced pH value.
AU: Milani-FX
AD: Univ. of Wisconsin-Madison, Madison, WI 53706, USA

PY: 1994
SO: Dissertation-Abstracts-International,-B; 54 (7) 3414: Order no. DA9320916, 173pp.
DT: Thesis
LA: En (English)
SC: P Milk-and-dairy-products
AB: Stabilizers are used in frozen dairy desserts to protect against heat shock and control development of coarse, icy textures. Use of xanthan gum has been limited in low pH frozen dairy products such as frozen yoghurt because long, narrow fibres appear as a result of a complexation between xanthan gum and whey proteins. In a model system for fibre formation, physical parameters such as viscosity, pH, rate of pH adjustment, heat treatments, concn., homogenization, and ionic strength were varied to study their effect upon the gum and protein complex. Solids, total nitrogen, protein profiles obtained from SDS-PAGE, complex sizing from microphotography, and turbidity were determined on fibres and associated supernatant fluid. Factors that significantly decreased the amount of precipitate formed between xanthan gum and whey proteins were homogenization of xanthan gum before acidification, time of lowering pH, and concn. of xanthan gum. Fibres were either prevented or attenuated with homogenization of an aqueous solution of xanthan gum at neutral pH, or dilution to contain 0.2% sodium hexametaphosphate, or _0.5% sodium chloride. Pilot production of a complexed xanthan gum and fresh whey protein was prepared to ascertain if manufacture of a soft-serve, low-fat frozen dairy dessert with good texture and acceptable flavour was feasible. Long, fibrous complexes were avoided by addition of 0.2% sodium hexametaphosphate before altering pH to 4.00 with citric acid. Concentration of the complex to an average of 11.3% solids was achieved using a desludging centrifuge. A description of the frozen dairy dessert is given; an acceptable product with smooth texture and slight astringency was feasible. [From En summ.]
DE: ADDITIVES-; DAIRY-PRODUCTS; DESSERTS-; FROZEN-FOODS; GUMS-; PROCESSED-FOODS; PROTEINS-; PROTEINS-MILK; STABILIZERS-; WHEY-; XANTHAN-; DAIRY-DESSERTS; MODELLING-; WHEY-PROTEINS; XANTHANS-
UD: 199409

Record 78 of 121 - FSTA Current 1990-2001/03

AN: 1994-08-T0025
TI: Judicious use of sequestrants to optimize KELCOGEL gellan gum performance in sugar gels.
AU: Bell-VL; Sanderson-GR; Valli-RC
AD: Kelco Div. of Merck & Co. Inc., PO Box 23576, San Diego, CA 92123, USA
PY: 1994
SO: Research-Disclosure; No. 361, 237
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: The relationship between Ca and Na ions and performance of Kelcogel gellan gum is discussed with reference to effect of sugar concn., acidity and use of sequestrants. In non-acidic products, containing more than around 35% sugar, manipulation of the sequestrant to attain the balance of Ca and Na ions that gives acceptable gel strength and melting and setting temp. is relatively straightforward. However, most sequestrants bind Ca less efficiently at acid pH. This means that Ca ions, effectively bound at neutral pH, can be converted, upon acidification, to free Ca in excess of the amount needed for optimal gel characteristics. Sodium hexametaphosphate, in contrast to most other sequestrants, binds Ca ions strongly at both neutral and acid pH. It is therefore possible, in products such as high sugar gels where

even low levels of free Ca can impair gel strength and melting/setting characteristics, to use a sequestrant of this type to remove interfering Ca ions at acid pH and, at the same time, use another sequestrant to provide both the desired buffering capacity, and additional sodium ions to obtain the best balance between gel strength and melting and setting properties. Application of these principles is demonstrated in a glaze formulation using a combination of sodium hexametaphosphate and sodium citrate as sequestrants. The formulation made in this manner melted more rapidly and had a higher gel strength than a control formulation made with sodium citrate as the sole sequestrant. Use of such sequestrant combinations is applicable to all products with a high sugar content, such as confectionery, icings, toppings, frostings and fruit preparations. [From En summ.]
DE: ADDITIVES-; GUMS-; STABILIZERS-; GELLAN-GUMS; SEQUESTRANTS-
UD: 199408

Record 79 of 121 - FSTA Current 1990-2001/03

AN: 1994-05-M0047
TI: Effect of stabilization of rice bran on the extractability and recovery of proteins.
AU: Prakash-J; Ramanatham-G
AD: Dep. of Protein Tech., Cent. Food Tech. Res. Inst., Mysore, India
PY: 1994
SO: Nahrung-; 38 (1) 87-95, 27 ref.
DT: Journal-Article
LA: En (English)
LS: de (German)
SC: M Cereals-and-bakery-products
AB: Untreated, stabilized (acid- or heat-stabilized to inactivate lipase) and parboiled rice bran samples were defatted and milled into 3 fractions of varying particle size. Proteins were extracted from the milled bran by extraction into water adjusted to pH 11.0 using 1N NaOH for 30 min. Protein content increased during milling as particle size decreased. Max. extraction of protein from defatted rice bran at pH 11.0 was 72%, of which 70% could be subsequently precipitated at isoelectric pH 4.0. Increasing extraction time or addition of NaCl, SDS, or sodium hexametaphosphate did not result in increased protein extraction. Extraction and precipitation profiles were similar for acid-stabilized and untreated rice bran and were superior to those of heat-stabilized and parboiled bran. Denaturation of protein by heat affected extractability. Protein content of concentrates obtained from unstabilized and acid-stabilized rice bran was 71-73%, compared with 39.5 and 54.5% for heat-stabilized and parboiled rice bran, respectively.
DE: BRAN-; CEREAL-PRODUCTS; CEREALS-; EXTRACTION-; PROCESSING-; PROTEINS-; PROTEINS-CEREAL; RICE-; RICE-BRAN
UD: 199405

Record 80 of 121 - FSTA Current 1990-2001/03

AN: 1994-05-G0026
TI: [Effect of sodium hexametaphosphate on the extractability of sesame meal protein and amino acid composition and colour of its protein concentrate.]
AU: Jeong-Soo-Rhee; Jyung-Rewng-Park
AD: Dep. of Food & Nutr., Yeungnam Univ., Kyongsan 712-749, Korea
PY: 1993
SO: Journal-of-the-Korean-Society-of-Food-and-Nutrition; 22 (6) 758-762, 19 ref.
DT: Journal-Article

LA: Ko (Korean); Non-English
LS: en (English)
SC: G Catering-speciality-and-multi-component-foods
AB: Effects of sodium hexametaphosphate (SHMP, 0-2.5%) on the extraction of defatted sesame meal protein and on the colour and amino acid composition of the protein concentrate were studied. Highest extractability of sesame seed protein was observed with 1.5% SHMP at pH 12. An increase in the extraction rate was observed with increasing sesame flour:solvent ratio, approx. 60% protein was obtained at a ratio of 1:40. Colour of sesame seed protein concentrate was improved with SHMP treatment. Lysine and methionine contents were decreased and valine and leucine contents were increased in the SHMP-treated protein concentrate. [From En summ.]
DE: EXTRACTION-; PHOSPHATES-; PROCESSED-FOODS; PROCESSING-; PROTEIN-CONCENTRATES; SALTS-; SEEDS-; SESAME-SEEDS; SODIUM-
UD: 199405

Record 81 of 121 - FSTA Current 1990-2001/03

AN: 1994-03-J0190
TI: Effect of proteases on groundnut proteins (Arachis hypogaea L.).
AU: Bhagya-S; Srinivasan-KS; Prakash-V
AD: Dep. of Protein Tech., Cent. Food Tech. Res. Inst., Mysore 570 013, India
PY: 1993
SO: Nahrung-; 37 (6) 528-537, 26 ref.
DT: Journal-Article
LA: En (English)
LS: de (German)
SC: J Fruits-vegetables-and-nuts
AB: Total proteins of 3 groundnut var. (Spanish Improved, TMV-2 and DH-3-30) were extracted and hydrolysed with 2 group-specific enzymes, alpha-chymotrypsin and trypsin, and a less specific enzyme, pepsin. Compared to casein, the proteins were highly resistant to hydrolysis by the group-specific enzymes. However, TMV-2 was more susceptible to proteolysis than the other 2 var. While the rate and extent of hydrolysis for pepsin were similar in all var., marked differences were noted for alpha-chymotrypsin. N solubility profiles of protein meals in water, 1M NaCl and 2% sodium hexametaphosphate solutions did not show any marked difference between var. Gel filtration, DEAE-cellulose chromatography, analytical ultracentrifugation and PAGE patterns of the proteins did not indicate any major differences. However, the relative proportions of different fractions differed among var. Gel filtration indicated that the Spanish Improved var. contains higher amounts of conarachins (15%). Such quantitative differences in the various fractions may be responsible for the observed difference in resistance to hydrolysis by the proteolytic enzymes.
DE: ENZYMES-; FRUITS-; PEANUTS-; PROTEINASES-; PROTEINS-; PROTEINS-VEGETABLE; PROTEOLYSIS-; SEEDS-; VAR-
UD: 199403

Record 82 of 121 - FSTA Current 1990-2001/03

AN: 1994-02-P0015
TI: Axial compression properties of calcium caseinate gels.
AU: Konstance-RP
AD: USDA, ARS, E. Reg. Res. Cent., Philadelphia, PA 19118, USA
PY: 1993
SO: Journal-of-Dairy-Science; 76 (11) 3317-3326, 25 ref.
DT: Journal-Article
LA: En (English)

SC: P Milk-and-dairy-products
AB: The wide range of physicochemical and functional properties of caseins and caseinates, as well as their bland flavour make them an excellent protein source for the creation of formulated foods, either as novel or imitation products. The gelation properties of these highly nutritive proteins were investigated to determine their potential for the creation or imitation of high value products such as kamaboko, a surimi product. Instrumental texture profile analyses and stress-strain relationships were evaluated to determine the textural responses of caseinate gels with various additives. The addition of sodium hexametaphosphate (0.5%, w/w) was effective in creating firm, elastic gels that more closely resembled many of the textural properties of kamaboko. Addition of kappa-carrageenan with the phosphate markedly improved gel cohesiveness, springiness, water holding [capacity] and foldability. Elasticity and recoverable energy of the gels were also improved, but the gels were not as elastic as kamaboko.
DE: ADDITIVES-; CASEINATES-; FISH-PRODUCTS; GELS-; SENSORY-PROPERTIES; SIMULATED-FOODS; TEXTURE-; KAMABOKO-
UD: 199402

Record 83 of 121 - FSTA Current 1990-2001/03

AN: 1993-11-G0021
TI: Preparation and functional properties of rapeseed protein products.
AU: Mansour-EH; Peredi-J; Dworschak-E
AD: Nat. Inst. of Food Hygiene & Nutr., Gyali ut 3/a, H-1097 Budapest, Hungary
PY: 1992
SO: Acta-Alimentaria; 21 (3/4) 293-305, 29 ref.
DT: Journal-Article
LA: En (English)
SC: G Catering-speciality-and-multi-component-foods
AB: A mixture of 3 double zero rapeseed cv., Lindore, Santana and Tandem, grown in Hungary were examined. The proteins of raw rapeseed meal showed 2 isoelectric points, the 1st at pH 3.2 and the 2nd at pH 7.2. Yield of protein isolate was 39.3% using 2-step precipitation; yield reached 68.3% when sodium hexametaphosphate was used as precipitation aid with single-step precipitation at pH 3.2. Heat treatment reduced glucosinolates and phytic acid contents by approx. 47-93% and 9-42%, respectively. Protein isolation reduced glucosinolates content by approx. 72-94% and phytic acid content by 73-91% in concentrate and isolate, respectively. Both protein isolate and concentrate had very good functional properties (nitrogen solubility index, water absorption, fat absorption and emulsifying capacity), excluding emulsifying activity and emulsion stability. [From En summ.]
DE: PROTEINS-; PROTEINS-VEGETABLE; RAPESEEDS-; SEEDS-; VEGETABLE-PRODUCTS; PROTEIN-ISOLATES
UD: 199311

Record 84 of 121 - FSTA Current 1990-2001/03

AN: 1993-09-T0056
TI: Large scale production of iron fortified salt.
AU: Ranganathan-S; Dillikumar-PK; Ramamoorthy-P; Vinodini-Reddy
AD: Nat. Inst. of Nutr., Hyderabad 500 007, India
PY: 1993
SO: Journal-of-Food-Science-and-Technology,-India; 30 (3) 166-168, 12 ref.
DT: Journal-Article
LA: En (English)

SC: T Food-additives-spices-and-condiments
AB: A large-scale process for the production of iron-fortified salt is described, which was developed in a salt factory at Ramanathapuram, Tamil Nadu State, India. In the process, common salt is mixed with 0.5% each of ferrous sulphate and sodium hexametaphosphate in a ribbon blender. This dry mixing process is superior to the traditional method which is based on spraying a solution of ferrous sulphate, monosodium orthophosphate and sodium acid sulphate over common salt. The spray-mixing method encountered operational problems due to stickiness of the components; this method also required additional equipment (a drier). Iron-fortified salt obtained by the dry-mixing process remains colourless during prolonged storage at ambient temp., whereas the spray-mixing method produced salt which develops a yellow colour. Iron distribution within the fortified salt was found to be uniform. Food items prepared using the new iron-fortified salt were indistinguishable from those containing unfortified salt in terms of colour, taste, flavour and texture. [From En summ.]
DE: FLAVOURINGS-; FOOD-ENRICHMENT; IRON-; MINERALS-; SALT-; FE-
UD: 199309

Record 85 of 121 - FSTA Current 1990-2001/03

AN: 1993-09-G0008
TI: Stabilizer/emulsifier blends for high whey protein-containing frozen desserts.
AU: Anon
AD: Kelco Div., Merck & Co. Inc., PO Box 23576, San Diego, CA 92123, USA
PY: 1993
SO: Research-Disclosure; No. 350, 382
DT: Journal-Article
LA: En (English)
SC: G Catering-speciality-and-multi-component-foods
AB: Addition of sodium hexametaphosphate, mono- and diglycerides or hydrolysed milk protein to a frozen dessert mix including a xanthan gum-containing hydrocolloid and/or emulsifier blend and a relatively high level (i.e. less than 15% replacement of standard SNF) of whey protein products (i.e. whey protein concentrate, sweet whey, liquid concn. whey) can result in a lower mix viscosity than that obtained without the above-mentioned additives to the hydrocolloids and/or emulsifier blend. The intent is to manufacture frozen dessert mixes that have high whey protein levels that can be easily processed in continuous pasteurization and homogenization systems (HTST and UHT). The final product would contain 0.0-0.5% of the chosen viscosity reducing additive. The mixes will be subjected to air incorporation and freezing in the same equipment with the processes preferably occurring simultaneously (i.e. continuous freezer) or sequentially (i.e. batch freezer).
DE: ADDITIVES-; DAIRY-PRODUCTS; DESSERTS-; EMULSIFIERS-; FROZEN-FOODS; PROCESSED-FOODS; PROTEINS-; PROTEINS-MILK; STABILIZERS-; WHEY-; WHEY-PROTEINS
UD: 199309

Record 86 of 121 - FSTA Current 1990-2001/03

AN: 1993-06-J0157
TI: [Non-volatile organic acids, mineral, fatty acids and fiber composition of Dolsan mustard leaves (Brassica juncea).]
AU: Seok-Kyu-Park; Young-Sook-Cho; Jeong-Ro-Park; Soon-Sil-Chun; Ju-Seok-Moon
AD: Dep. of Food & Nutr., Sunchon Nat. Univ., Sunchon 540-742, Korea Republic

PY: 1993
SO: Journal-of-the-Korean-Society-of-Food-and-Nutrition; 22 (1) 53-57, 28 ref.
DT: Journal-Article
LA: Ko (Korean); Non-English
LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: Chemical composition (non-volatile organic acids, minerals, fibre and fatty acids) of Dolsan mustard greens (Brassica juncea) was determined. Non-volatile organic acids composition of Dolsan mustard greens (DMG) was determined as (mg%): malic (49.1); oxalic (23.8); L-ascorbic (19.3); citric (12.4) and succinic (10.5). Non-volatile organic acids were more abundant in plant leaves than in plant stalks. Mineral composition of DMG was as follows (mg%): Ca, 137.6; Mg, 17.2; Na, 14.4; Fe, 7.0; and Zn, 1.8. Mineral content of leaves was also higher than that of stalks. alpha-Linolenic acid comprised 63.2% of total fatty acids content of leaves and 55.3% of total fatty acids in leaf stalks. The polyunsaturated:saturated fatty acid ratio was 4.1 and 2.9 in leaves and leaf stalks, respectively. Values for the alcohol insoluble solids, hot water soluble solids, sodium hexametaphosphate soluble pectin and HCl soluble pectin contents of DMG are presented. Data for the dietary fibre content of DMG (neutral detergent fibre, acid detergent fibre, lignin, hemicellulose and cellulose) are given. [From En summ.]
DE: NUTRIENTS-; VEGETABLES-SPECIFIC; MUSTARD-GREENS
UD: 199306

Record 87 of 121 - FSTA Current 1990-2001/03

AN: 1993-06-J0021
TI: The comparative evaluation of pectin from citrus fruit rinds.
AU: Khan-FZ; Asif-Saeed-M; Hamaad-Ahmad; Ahmad-M
AD: Fac. of Pharmacy, Univ. of Punjab, Lahore, Pakistan
PY: 1991
SO: Pakistan-Journal-of-Scientific-Research; 43/44, 77-84, 15 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: Factors affecting production of pectin from citrus fruit were investigated. Pectin was obtained from the peel of oranges (Red Malta), mandarins (Kinnow and Feutrell's Early) or grapefruit by heating with sodium hexametaphosphate for 30, 45 or 60 min and ethanol extraction at pH 2.0. 3.0 or 3.5. Effects of fruit type, heating temp. and extraction pH were highly significant (P less than 0.01); interactions between these 3 parameters were not significant as revealed by ANOVA factorial experimental design. Least squares difference analysis indicated significant production of pectin at 60 min heating and pH 2.0 extraction with max. and min. recoveries from Kinnow mandarin and grapefruit, respectively. Quadratic regression was considered best for analysis of the processing time parameter, while linear regression was best for analysis of pH.
DE: CITRUS-FRUITS; EXTRACTION-; FRUITS-; PECTIC-SUBSTANCES; PEEL-; POLYSACCHARIDES-; PROCESSING-; CITRUS-PEEL; PECTINS-
UD: 199306

Record 88 of 121 - FSTA Current 1990-2001/03

AN: 1993-05-S0063
TI: Phosphates and muscle fiber type influence thermal transitions in porcine salt-soluble protein aggregation.
AU: Robe-GH; Xiong-YL
AD: Food Sci. Sect., Dep. of Animal Sci., Univ. of Kentucky,

Lexington, KY 40546, USA
PY: 1992
SO: Journal-of-Food-Science; 57 (6) 1304-1307, 1310, 26 ref.
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: Salt-soluble proteins (SSP) were extracted from porcine serratus ventralis (red), vastus intermedius (red) and longissimus dorsi (white) muscles and heated to examine dynamic changes and transitions in protein aggregation. At pH 6.0, red muscle SSP typically showed 1 or 2 transitions and white muscle SSP exhibited 3 transitions. Addition of ortho-, pyro-, tripoly- and hexametaphosphate up to 1% increased SSP transition temp. and altered transition patterns; NaCl at comparable ionic strengths did not show this effect. SSP transitions were most affected by 0.15-0.25% tripolyphosphate and low pH (less than 6.0). Red and white SSP exhibited different thermal properties and responses to phosphate treatments. These findings indicate red and white muscle types should undergo different processing treatments for optimum quality meat products.
DE: MEAT-; PHOSPHATES-; PHYSICAL-PROPERTIES; PORK-; PROTEINS-; PROTEINS-ANIMAL; SALTS-; THERMOPHYSICAL-PROPERTIES
UD: 199305

Record 89 of 121 - FSTA Current 1990-2001/03

AN: 1993-05-P0158
TI: Process for preparing culture concentrates for direct vat set dairy products production.
AU: Mathison-SM
CA: Sanofi Bio Ingredients Inc.
PY: 1992
SO: United-States-Patent; US 5 128 260, US 295997 (19890112) [Sanofi Bio Ingredients, Waukesha, WI, USA]
DT: Patent
LA: En (English)
SC: P Milk-and-dairy-products
AB: A procedure for preparation of bacterial culture concentrates for direct vat inoculation of milk is described. Lactic acid bacteria are cultured in an aqueous medium, recovered and concentrated by centrifugation. Before or after fermentation, 0.05-0.2% (based on culture wt.) of a soluble food-grade polyphosphate (tripolyphosphate or hexametaphosphate with 4-22 phosphate groups/molecule) and 0.25-0.5% of a soluble food-grade citrate are added to the medium. [From En summ.]
DE: BACTERIA-; CONCENTRATES-; DAIRY-PRODUCTS; MICROORGANISMS-; PATENTS-; STARTERS-; LACTIC-ACID-BACTERIA
UD: 199305

Record 90 of 121 - FSTA Current 1990-2001/03

AN: 1993-05-P0075
TI: Heat stability of buffalo milk as affected by phosphate salts addition.
AU: Khan-S; Ghatak-PK; Bandyopadhyay-AK
AD: Dep. of Dairy Chem., F/O. Vet. & Animal Sci., Bidhan Chandra Krishi Viswavidyalaya, PO Mohanpur 741 252, Dist, Nadia, India
PY: 1992
SO: Indian-Journal-of-Dairy-Science; 45 (9) 461-464, 13 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Effect of the addition of phosphates on the heat stability of

buffaloes' milk was examined. 4 phosphates were used, sodium dihydrogen phosphate, sodium pyrophosphate, disodium hydrogen phosphate and sodium hexametaphosphate, at concn. of 25, 50, 75 and 100 mg/ml. Where the phosphates altered the pH of the milk, effect of pH alone was also considered. Max. heat stability of milk occurred at pH 6.6 and 6.5 when treated with HCl/NaOH or phosphates, respectively. Treatment of diluted milk with phosphates increased its heat stability at pH 6.9 and above. It is concluded that sodium dihydrogen phosphate improved the heat stability of raw, conc., reconstituted and conc. sterilized buffaloes' milk.
DE: BUFFALOES-; DAIRY-PRODUCTS; MILK-; PHOSPHATES-; PHYSICAL-PROPERTIES; SALTS-; THERMOPHYSICAL-PROPERTIES; BUFFALO-MILK; HEAT-STABILITY
UD: 199305

Record 91 of 121 - FSTA Current 1990-2001/03

AN: 1993-05-J0166
TI: Extraction and physicochemical characterization of pectin from sunflower head residues.
AU: Miyamoto-A; Chang-KC
AD: Dep. of Cereal Sci. & Food Tech., N. Dakota State Univ., Fargo, ND 58105, USA
PY: 1992
SO: Journal-of-Food-Science; 57 (6) 1439-1443, 36 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: [Extraction and characterization of pectin from sunflowers were studied.] Pectin was isolated from sunflower head residues, using 0.75% sodium hexametaphosphate extraction followed by acid precipitation. Yield of pectin was 7.3% of the head residues. Isolated pectin contained 89.2% anhydrogalacturonic acid, 2% acetyl ester, and 4.2% neutral sugars, which were mainly rhamnose and glucose. Degree of methylation was 38.5%. The pectin had a high viscosity (527 cP (centipoise) at 1% level) at pH 3 and a high water-holding capacity (57 g water/g organic matter). The peak molecular mass of the sunflower pectin was greater than 523 000 Da.
DE: OILSEEDS-; PECTIC-SUBSTANCES; POLYSACCHARIDES-; SUNFLOWER-SEEDS; PECTINS-; SUNFLOWERS-
UD: 199305

Record 92 of 121 - FSTA Current 1990-2001/03

AN: 1993-02-T0027
TI: Fortification of common salt with iron: use of polyphosphate stabilisers.
AU: Ranganathan-S
AD: Nat. Inst. of Nutr., Indian Council of Med Res., Jamai Osmania PO, Hyderabad 500 007, India
PY: 1992
SO: Food-Chemistry; 45 (4) 263-267, 30 ref.
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: Fortification of common salt with ferrous sulphate and sodium hexametaphosphate was found to be a satisfactory method for production of iron-fortified salt. There was no discoloration of the fortified salt. Iron stability was satisfactory and distribution was uniform (1000 plus/minus 50 p.p.m.). Iron absorption was better than with the old formulae of iron-fortified salt. It was readily acceptable in place of

common salt. Large scale production in factories was smooth and economical. These observations indicate that production of iron-fortified salt by 'dry mixing' is suitable for a tropical country like India.
DE: CONDIMENTS-; FOOD-ENRICHMENT; IRON-; MINERALS-; PHOSPHATES-; SALT-; SALTS-; FE-; FORTIFICATION-; POLYPHOSPHATES-
UD: 199302

Record 93 of 121 - FSTA Current 1990-2001/03

AN: 1993-01-J0091
TI: [Effects of high pressure processing and standing after treatment on hardness of Japanese radishes and the mechanism for the effects.]
AU: Yamamoto-A; Kasai-M; Hatae-K; Simada-A
AD: Ochanomizu Univ., 2-1-1, Otsuka, Bunkyo-ku, Tokyo 112, Japan
PY: 1992
SO: Journal-of-Japanese-Society-of-Food-Science-and-Technology-[Nippon-Shokuhin-Kogyo-Gakkaishi]; 39 (7) 571-577, 12 ref.
DT: Journal-Article
LA: Ja (Japanese); Non-English
LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: Textural changes in Japanese radishes subjected to hydrostatic pressure treatment (2-6 x 10-3 kg/cm-2) were examined. Fracture load and strain of radish samples, as measured by Rheoner, increased with increasing pressure up to 4 x 10-3 kg/cm-3; at higher pressures no further increase in fracture load or strain was observed. When soaked in 0.5% NaCl, pressurized samples absorbed more salt than controls. Pressure treatment decreased sample impedance at low frequencies. The quantity of calcium bound to pectin increased with increased duration of pressure treatment. The degree of esterification of pectin decreased as a result of pressure treatment, although pectin esterase remained active. Water soluble pectin decreased and hexametaphosphate soluble pectin increased in test radish samples. These changes increased with increased standing time after pressure treatment. It is proposed that loss of cell membrane function during pressure treatment and subsequent reaction between cellular components are responible for the observed changes in radish texture. [From En summ.]
DE: PRESSURE-; RADISHES-; VEGETABLES-SPECIFIC; JAPAN-
UD: 199301

Record 94 of 121 - FSTA Current 1990-2001/03

AN: 1992-11-P0009
TI: Effects of some calcium-chelating agents on the physical properties of acid-set milk gels.
AU: Johnston-DE; Murphy-RJ
AD: Dep. of Food & Agric. Chem., Queen's Univ. of Belfast, Belfast BT9 5PX, UK
PY: 1992
SO: Journal-of-Dairy-Research; 59 (2) 197-208, 26 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Acid-set milk gels containing up to 30mM added hexametaphosphate, oxalate, citrate, EDTA or orthophosphate were prepared using gluconic acid-delta-lactone and their properties investigated. Increases in the apparent shear modulus were observed in the gels containing hexametaphosphate, oxalate, citrate and EDTA. The effect was max. for hexametaphosphate-containing gels at approx. 8mM. Increases were also observed in the force required to break the gels, and for added

hexametaphosphate the effect peaked at approx. 5mM. The ability of the gels to resist syneresis was investigated by a cut, tip and drain type test and by a centrifugation method. In both tests, resistance to syneresis was increased by added hexametaphosphate, oxalate, citrate and EDTA. The additions of anions were shown to cause disintegration of the micelles and release caseins to the serum. It is suggested that the improved homogeneity of casein distribution that results allows greater opportunity for protein-protein interaction during gel formation and leads to improved properties. Controlled micelle disintegration would therefore appear to offer promise for the development of improved or novel products.
DE: ADDITIVES-; DAIRY-PRODUCTS; GELS-; MILK-; PHYSICAL-PROPERTIES; CHELATING-AGENTS
UD: 199211

Record 95 of 121 - FSTA Current 1990-2001/03

AN: 1992-10-T0024
TI: Characterization of pectin from mango fruit waste.
AU: Tandon-DK; Kalra-SK; Singh-BP; Neelima-Garg
AD: Cent. Inst. of Hort., N. Plains, Lucknow, India
PY: 1991
SO: Indian-Food-Packer; 45 (4) 9-12, 16 ref.
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: Pectin was extracted from dry peel and kernel of immature and ripe Dashehari mango using 0.05N HCl, 0.05N NaOH, or 0.3% sodium hexametaphosphate (SHMP). Pectin yield (12.79%) was max. from ripe mango peel using SHMP extraction. Kernels of immature fruit contained higher pectin levels than kernels of ripe fruit; the opposite trend was observed in peels of immature and ripe fruits. Quality of SHMP extracted pectin from ripe mango peel was better than that from immature fruit. Alcohol insoluble solids were higher in kernel from ripe fruit; water soluble pectin was higher in ripe fruit peel (12.8%) while the alkali soluble fraction was higher in immature fruit peel (10.4).
DE: EXTRACTION-; FRUITS-; MANGOES-; PECTIC-SUBSTANCES; POLYSACCHARIDES-; WASTES-; PECTINS-
UD: 199210

Record 96 of 121 - FSTA Current 1990-2001/03

AN: 1992-10-N0001
TI: Recovery of canola meal proteins by precipitation.
AU: Chen-M; Rohani-S
AD: Correspondence (Reprint) address, S. Rohani, Dep. of Chem. Eng., Univ. of Saskatchewan, Saskatoon, Sask. S7N 0W0, Canada
PY: 1992
SO: Biotechnology-and-Bioengineering; 40 (1) 63-68, 15 ref.
DT: Journal-Article
LA: En (English)
SC: N Fats-oils-and-margarine
AB: Recovery of rapeseed proteins from defatted canola meal by precipitation was investigated. The ability of different precipitating agents, such as sodium hexametaphosphate (HMP), CMC, ammonium sulphate, and isoelectric precipitation using HCl, were evaluated based on the yield and mean size of protein agggregates. Almost 94% of dissolved protein was precipitated in the presence of 2.7M ammonium sulphate, while the largest mean protein particle size (32 mum) was obtained in the presence of HMP at pH 3.3.
DE: OILSEEDS-; PROTEINS-; PROTEINS-VEGETABLE; PURIFICATION-;

RAPESEEDS-
UD: 199210

Record 97 of 121 - FSTA Current 1990-2001/03

AN: 1992-08-J0106
TI: Stabilization of soy milk fortified with calcium gluconate.
AU: Rasyid-F; Hansen-PMT
AD: Dep. of Food Sci. & Tech., Ohio State Univ., Columbus, OH 43210, USA
PY: 1991
SO: Food-Hydrocolloids; 4 (5) 415-422, 15 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: High-calcium soy milk was prepared by adding calcium gluconate as a calcium source, sodium hexametaphosphate (SHMP) as a sequestering agent, and calcium-D-saccharic acid as a stabilizing agent, so that the calcium content of soy milk was increased to the same or higher levels than that of bovine milk. The addition of these substances resulted in a soy milk with a high content of calcium and satisfactory heat stability of the final beverage. SHMP and calcium-D-saccharic acid were effective in reducing the calcium ion activity of soy milk. The findings suggest that there was a synergistic effect between the sequestering agent and the stabilizing agent.
DE: CALCIUM-; MINERALS-; SOY-PRODUCTS; STABILITY-; STABILIZERS-; VEGETABLE-PRODUCTS; CA-; FOODS-ENRICHMENT; SOYMILK-; STABILIZATION-
UD: 199208

Record 98 of 121 - FSTA Current 1990-2001/03

AN: 1992-07-J0160
TI: Process for preserving lemon juice utilizing a non-sulfite preservative.
AU: McKenna-RJ; Keller-DJ; Bibeau-LS
CA: Borden Inc.
PY: 1991
SO: United-States-Patent; US 5 021 251, US 556758 (19900723) [Borden, Columbus, OH, USA]
DT: Patent
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: A process for production of a shelf stable lemon juice without use of sulphite preservatives is described. Lemon concentrate and/or lemon oil, sodium benzoate and water are mixed; ascorbic acid, sodium acid pyrophosphate, glucose oxidase or sodium hexametaphosphate is added with stirring; and an inert gas, e.g. CO2, He or N2, is bubbled through the mixture, to produce a juice with a shelf life of greater than 9 (preferably greater than 12) months.
DE: CITRUS-FRUITS; CITRUS-JUICES; FRUIT-JUICES; LEMONS-; PATENTS-; PRESERVATION-; LEMON-JUICES; UNITED-STATES-OF-AMERICA
UD: 199207

Record 99 of 121 - FSTA Current 1990-2001/03

AN: 1992-06-P0055
TI: Age gelation in UHT-processed reconstituted concentrated skim milk.
AU: McKenna-AB; Singh-H
AD: Campden Food & Drink Res. Ass., Chipping Campden, Gloucester GL55 6LD, UK

PY: 1991
SO: International-Journal-of-Food-Science-&-Technology; 26 (1) 27-38, 26 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: UHT reconstituted conc. skim milks made from high-heat powder had considerably longer gelation times than those made from medium- or low-heat powders. Addition of hexametaphosphate to the conc. milk before UHT processing markedly delayed onset of gelation during storage. Sediment formation was greatest in UHT conc. skim milk made using high-heat powder followed by samples made using medium- and low-heat powders, resp. Extent of proteolysis, as measured by 12% TCA-soluble amino groups, increased at a faster rate in UHT milks stored at 40 degree C than in those stored at 22 degree C but decreased with increasing heat treatment of milk prior to powder manufacture. Electrophoretic patterns of samples stored at 22 degree C clearly showed the breakdown of beta-casein with a corresponding increase in slower moving bands, presumably gamma-casein and proteose-peptone components. Storage of samples at 40 degree C resulted in diffused 'blurred' protein patterns with some protein material not entering the resolving gel. At 22 degree C there was some evidence of proteolysis but no evidence of high mol. wt. polymer formation, while at 40 degree C both proteolysis and high mol. wt. polymer formation increased with storage time. It appeared that both physico-chemical and proteolytic processes play some part in the mechanism of gelation in UHT reconstituted conc. skim milk.
DE: GELATION-; MILK-; RECONSTITUTED-FOODS; STORAGE-; PREPARED-FOODS; SKIM-MILK; STERILIZED-MILKS
UD: 199206

Record 100 of 121 - FSTA Current 1990-2001/03

AN: 1992-06-H0168
TI: Sulfated polysaccharides inhibit browning of apple juice and diced apples.
AU: Tong-CBS; Hicks-KB
AD: Correspondence (Reprint) address, K. B. Hicks, E. Reg. Res. Cent., ARS, USDA, 600 E. Mermaid Lane, Philadelphia, PA 19118, USA
PY: 1991
SO: Journal-of-Agricultural-and-Food-Chemistry; 39 (10) 1719-1722, 18 ref.
DT: Journal-Article
LA: En (English)
SC: H Alcoholic-and-non-alcoholic-beverages
AB: Browning of fresh Granny Smith apple juice was inhibited almost 100% for 24 h at room temp. by the addition of iota-, kappa-, or lambda-carrageenan, alone (0.25%) or in combination (0.05%) with 0.5% citric acid. The combination of 0.1% of any of the carrageenans and 0.5% sodium hexametaphosphate was slightly less effective. Browning was also inhibited by amylose sulphate (0.025%) or xylan sulphate (0.025%) combined with 0.5% citric acid. Under the assay conditions, citric acid alone inhibited browning approx. 34%, but sodium hexametaphosphate alone did not inhibit browning. The inhibition of browning by these compounds in combination with the carbohydrate polymers was synergistic. The combination of 0.1% of any of the carrageenans and 0.5% citric acid was able to inhibit browning of unpasteurized apple juice containing 0.1% sodium benzoate for up to 3 months at 3 degree C. The combination of 0.5% carrageenan and 0.5% citric acid also inhibited browning in Granny Smith and Red Delicious diced apple fruit. These combinations may have practical application in the prevention of enzymic browning in fresh, raw apple juice or diced apples.

DE: APPLE-JUICES; APPLES-; BROWNING-; FRUITS-; INHIBITION-; POLYSACCHARIDES-
UD: 199206

Record 101 of 121 - FSTA Current 1990-2001/03

AN: 1992-04-P0081
TI: Effect of casein-carrageenan interactions on yield and sensory qualities of Cottage cheese.
AU: Kailasapathy-K; Hourigan-JA; Nguyen-MH
AD: Dep. of Food Sci. & Tech., Univ. of Western Sydney, Hawkesbury, Richmond, NSW 2753, Australia
PY: 1992
SO: Food-Australia; 44 (1) 30-31, 33-34, 21 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Effect of casein-carrageenan-whey protein interactions in a modified process of making Cottage cheese using direct set frozen starter cultures was investigated, with particular reference to yield increases. At 1000 p.p.m. concn., kappa- and iota-carrageenan (widely used as thickening agents and stabilizers in the food industry) gave 10-20% increase in fresh wt. yield of Cottage cheese base. Sensory trials showed that it was unnecessary to upgrade the quality of the cheese to be comparable with a commercial Cottage cheese. Sodium hexametaphosphate (150 p.p.m.) retarded the reaction of soluble Ca in the milk with carrageenan and prevented the formation of a water gel. [From En summ.]
DE: CARRAGEENANS-; CHEESE-VARIETIES; DAIRY-PRODUCTS; GUMS-; SEAWEEDS-; STABILIZERS-; THICKENERS-; CHEESES-SPECIFIC; COTTAGE-CHEESE
UD: 199204

Record 102 of 121 - FSTA Current 1990-2001/03

AN: 1992-04-G0026
TI: [Physicochemical and functional properties of rapeseed protein upon purification conditions.]
AU: Lee-JS; Kim-HS; Kim-CH; Jung-YH; Kang-YJ
AD: Correspondence (Reprint) address, Y. J. Kang, Dep. of Food Sci. & Tech., Cheju Nat. Univ., Cheju 690-756, Korea Republic
PY: 1991
SO: Journal-of-the-Korean-Society-of-Food-and-Nutrition; 20 (6) 551-558, 24 ref.
DT: Journal-Article
LA: Ko (Korean); Non-English
LS: en (English)
SC: G Catering-speciality-and-multi-component-foods
AB: Physicochemical and functional properties of rapeseed (Brassica napus var. Youngsan) protein, prepared by combining various solvent and purification procedures, such as ultrafiltration (UF) concentration and acid-washing were investigated. Lightness value of each protein was gradually improved and its hydrophobicity increased by degree of purification. Analysis of each protein by SDS-PAGE revealed 9 bands, most of which had a mol. wt. of 1.96-1.59 x 10-4 Da. The content of amino acids increased more in the processed proteins than in the control, and decreased considerably in the proteins extracted by mixed solvent (1% sodium hexametaphosphate (SHMP) and 0.25M EDTA). The better the proteins were purified, the lower the kinematic viscosities were in value. Water absorption and foaming properties were scarcely different with each process. Oil absorption and emulsion activity index increased with degree of purification. Heat coagulation revealed high values in the proteins processed by EDTA, but showed considerably lower values

with other proteins.
DE: OILSEEDS-; PROTEINS-; PROTEINS-VEGETABLE; PURIFICATION-; RAPESEEDS-
UD: 199204

Record 103 of 121 - FSTA Current 1990-2001/03

AN: 1991-11-S0044
TI: Growth and aminopeptidase activity of Pseudomonas fragi in presence of phosphates.
AU: Harmayani-E; Sofos-JN; Schmidt-GR
AD: Dep. of Anim. Sci., Colorado State Univ., Fort Collins, CO 80523, USA
PY: 1991
SO: Lebensmittel-Wissenschaft-und-Technologie; 24 (4) 350-354, 23 ref.
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: Effect of several types of phosphates including sodium acid pyrophosphate (SAPP), sodium hexametaphosphate (SHMP), sodium tripolyphosphate (STPP) and tetrasodium pyrophosphate (TSPP) at 0.3 and 0.5% on growth and aminopeptidase activity of Pseudomonas fragi ATCC 4973 in a culture medium of tripticase soy broth incubated at 5 degree C for 5 days was investigated. Inhibition of the secretion or activity of proteolytic enzymes by spoilage bacteria would help in extending the shelf-life of protein foods such as meat products. SHMP at the levels of 0.3 and 0.5% virtually eliminated the growth of Pseudomonas fragi during 5 days at 5 degree C. Addition of SAPP at 0.5% inhibited growth but to a lesser degree than SHMP. STPP and TSPP had minor inhibitory effects only at 0.5%. Effect of SHMP at both levels significantly (P less than 0.5) inhibited aminopeptidase activity compared to the control and other phosphates tested. Samples with SAPP, STPP and TSPP had reduced (P less than 0.05) aminopeptidase activity but to a lesser degree than SHMP. The inhibitory effect of phosphates decreased as follows: SHMP greater than SAPP greater than STPP greater than TSPP. After 5 days, all phosphate treated samples had significantly lower aminopeptidase activity than the control. It is concluded that SHMP and SAPP are potential antibacterial agents and may be useful in delaying meat spoilage by inhibiting growth as well as proteolytic enzyme activity.
DE: BACTERIA-; ENZYMES-; PHOSPHATES-; PROTEINASES-; PSEUDOMONAS-; SALTS-; AMINOPEPTIDASES-; PSEUDOMONADACEAE-
UD: 199111

Record 104 of 121 - FSTA Current 1990-2001/03

AN: 1991-11-P0122
TI: Effect of additives on the quality of yoghurt.
AU: Shukla-FC; Jain-SC
AD: Dep. of Food Sci. & Tech., Punjab Agric. Univ., Ludhiana 141 004, India
PY: 1991
SO: Indian-Journal-of-Dairy-Science; 44 (1) 130-133, 3 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: The effect of various additives, including gelatin, sodium hexametaphosphate, CMC, pectin, gum acacia and sodium alginate, on the problem of 'whey-off' in yoghurt was studied. Additives were studied at 4 levels: 0.1, 0.2, 0.3 and 0.4%. Gelatin was most effective at improving yoghurt quality when added at 0.2-0.3%. Sodium hexametaphosphate, gum acacia, pectin and sodium alginate improved

yoghurt when at levels of 0.2-0.3, 0.2, 0.2 and 0.2%, resp. Gum acacia was not a suitable additive since it imparted a flavour to the yoghurt. CMC had a negative effect on the quality of the yoghurt.
DE: ADDITIVES-; DAIRY-PRODUCTS; YOGHURT-; CULTURED-MILKS
UD: 199111

Record 105 of 121 - FSTA Current 1990-2001/03

AN: 1991-11-P0106
TI: Methods for increasing calcium in Cottage cheese.
AU: Martin-JH; Zullo-PA
AD: Food Sci. & Tech. Dep., The Ohio State Univ., Columbus, OH 43210, USA
PY: 1991
SO: Cultured-Dairy-Products-Journal; 26 (3) 11-14, 16, 18, 11 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Ca fortification of small-curd Cottage cheese was investigated by 2 methods: fortification of pasteurized skim milk used for Cottage cheese manufacture by adding sterile supersaturated calcium gluconate/saccharate solution; and incorporating various levels of sodium hexametaphosphate (SHMP) into the pasteurized skim milk. Ca retention in the resulting Cottage cheese curd was determined. Control cheese contained 40 mg Ca/100 g curd. Addition of 5mM SHMP increased Ca to 204.7 mg/100 g and addition of 7% calcium gluconate/saccharate increased Ca to 97.6 mg/100 g. However, the quality of the experimental cheese was inferior. Work is continuing to improve the quality of the cheese while maintaining the increased levels of Ca.
DE: CALCIUM-; CHEESE-VARIETIES; DAIRY-PRODUCTS; FOOD-ENRICHMENT; MINERALS-; CA-; CHEESES-SPECIFIC; COTTAGE-CHEESE; FOODS-ENRICHMENT; FORTIFICATION-
UD: 199111

Record 106 of 121 - FSTA Current 1990-2001/03

AN: 1991-10-T0006
TI: Inhibition of Aspergillus flavus and selected Gram-positive bacteria by chelation of essential metal cations by polyphosphates.
AU: Knabel-SJ; Walker-HW; Hartman-PA
AD: Dep. of Food Sci., Pennsylvania State Univ., University Park, PA 16802, USA
PY: 1991
SO: Journal-of-Food-Protection; 54 (5) 360-365, 37 ref.
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: A simple well-plate technique was used to determine the effect of various metals on the growth of microorganisms in media containing different polyphosphates. Aspergillus flavus and 4 Gram-positive bacteria were completely inhibited by media containing 1% of various alkaline polyphosphates. 4 Gram-negative bacteria were not. Significant differences were observed between the type of polyphosphate added, the type of metal added, and the spp. of Gram-positive bacterium inhibited. Addition of Mg-2-+ stimulated growth of A. flavus and Bacillus cereus in the presence of tetrasodium pyrophosphate, whereas Mn-2-+ permitted growth of A. flavus and Staphylococcus aureus in the presence of sodium hexametaphosphate. Iron supplementation allowed the growth of S. aureus and Listeria monocytogenes on media containing 1% tetrasodium pyrophosphate. A method for determining the amount of calcium and magnesium in water was modified to detect free Mg-2-+ by replacing EDTA

with phosphate. Addition of free Mg-2-+, but not Mg-2-+ chelated by tetrasodium pyrophosphate, permitted the growth of B. cereus on a medium containing tetrasodium pyrophosphate. It is speculated that polyphosphates specifically inhibited A. flavus and Gram-positive bacteria by removing essential metals from cation-binding sites located within their cell walls.
DE: FOOD-SAFETY; INHIBITION-; IONS-; MICROORGANISMS-; PHOSPHATES-; SALTS-; CATIONS-; METALS-; POLYPHOSPHATES-
UD: 199110

Record 107 of 121 - FSTA Current 1990-2001/03

AN: 1991-07-C0036
TI: A fluorogenic assay for the rapid detection of some Vibrio species including Vibrio parahaemolyticus in foods.
AU: Miyamoto-T; Sheu-YI; Miwa-H; Hatano-S
AD: Dep. of Food Sci. & Tech., Fac. of Agric., Kyushu Univ., 6-10-1, Hakozaki, Higashi-ku, Fukuoka, Japan
PY: 1989
SO: Journal-of-the-Food-Hygienic-Society-of-Japan-[Shokuhin-Eiseigaku-Zasshi]; 30 (6) 534-541, 10 ref.
DT: Journal-Article
LA: En (English)
SC: C Hygiene-and-toxicology
AB: A rapid assay for some Vibrio spp., including V. parahaemolyticus, was developed. The assay involved enrichment culture of Vibrio spp. in BSP-HP medium (0.2% bacto-tryptone, 2% NaCl, 250 units polymyxin B sulphate/ml, 0.025% sodium hexametaphosphate, pH 8.5) and specific measurement of intracellular trypsin-like activity, using the fluorogenic substrate benzoyl-L-arginine-7-aminomethylcoumarin. In BSP-HP medium, growth and trypsin-like activity of bacteria other than V. parahaemolyticus, V. alginolyticus and V. harveyi were suppressed. Although trypsin-like enzyme activity in food samples interfered with the fluorogenic assay, the interference could be overcome by addition of 1mM EDTA. Using this fluorogenic assay with commercial seafoods, V. parahaemolyticus was detected at 400 cfu/g within 8 h. Trypsin-like activity was proportional to the V. parahaemolyticus count determined by the conventional BTB teepol agar plating method (r = 0.97). In the medium, V. alginolyticus and V. harveyi also showed vigorous growth and high trypsin-like activity. More specific culture conditions for V. parahaemolyticus are required, and further investigation is in progress.
DE: ANALYTICAL-TECHNIQUES; BACTERIA-; FLUOROMETRY-; FOOD-SAFETY; VIBRIO-; FOODS-
UD: 199107

Record 108 of 121 - FSTA Current 1990-2001/03

AN: 1991-06-S0059
TI: Research in improving the WHC (water holding capacity) of meat in sausage products. In 'Proceedings. 35th International Congress of Meat Science and Technology. Aug. 20-25 1989. Copenhagen, Denmark'. Roskilde, Denmark; Danish Meat Research Institute [see FSTA (1991) 23 6S1].
AU: Min-L; Ni-Chen
AIA: International-Congress-of-Meat-Science-&-Technology-[35th-Symposium]
AD: Dep. of Food Eng., Heilongjiang Commercial Coll., 50 Tongda St., Daoli District, Harbin, Heilongjiang Province, China
PY: 1989
SO: Proceedings,-International-Congress-of-Meat-Science-and-Technology; No. 35, Vol. III, 781-786, 11 ref.
DT: Conference-Proceedings

LA: En (English)
SC: S Meat-poultry-and-game
AB: Lean meat was ground and mixed with citric acid or sodium carbonate (pH tests) or solutions of various additives (sodium pyrophosphate, sodium tripolyphosphate, sodium hexametaphosphate, NaCl, isolated soy protein). After stabilizing at 0-4 degree C for 30 min, water holding capacity (WHC) was determined by 3 methods, i.e. pressing, cook-centrifuge technique and microwave heating procedure. Results are given in graphs and tables and fully discussed. WHC could be improved by altering meat pH away from the isoelectric point and by using the various additives tested, increasing meat product output by 15-20% and enhancing product quality.
DE: ADDITIVES-; FUNCTIONAL-PROPERTIES; MEAT-PRODUCTS; MOISTURE-CONTENT; PH-; WATER-HOLDING-CAPACITY
UD: 199106

Record 109 of 121 - FSTA Current 1990-2001/03

AN: 1991-04-V0006
TI: [Process for recovery of microbial protein.] Verfahren zur Gewinnung von mikrobiellen Proteinen.
AU: Lippert-E; Krausse-T; Kretzschmar-U
CA: German Democratic Republic, Humboldt-Universitaet
PY: 1990
SO: German-Democratic-Republic-Patent; DD 281 906
DT: Patent
LA: De (German); Non-English
SC: V Patent-literature
AB: A process for recovery of protein from microbial cells (especially brewers', bakers' or feed yeasts) is based on: a rapid high temp./pressure treatment under acid conditions (resulting in extraction of acid-soluble protein); elimination of nucleic acid and nucleotides by precipitation of this protein by addition of condensed polyphosphates (preferably sodium hexametaphosphate); and washing the protein precipitate to eliminate residues of polyphosphates. Approx. 80% of the total protein is extracted into the acidic medium; approx. 80% of this acid-soluble protein is precipitated by polyphosphate.
DE: CELLS-; MICROORGANISMS-; PATENTS-; PROTEIN-PRODUCTS; PROTEINS-
UD: 199104

Record 110 of 121 - FSTA Current 1990-2001/03

AN: 1991-03-U0082
TI: [Food additives. Sodium hexametaphosphate.]
CA: China, China Association for Standardization
AD: Available from BSI, Milton Keynes MK14 6LE, UK
PY: 1989
SO: China-National-Standard; GB 1890
DT: Standard
LA: Ch (Chinese); Non-English
SC: U Standards-laws-and-regulations
DE: ADDITIVES-; PHOSPHATES-; SALTS-; SODIUM-; STANDARDS-; ASIA-; CHINA-; TITLE-
UD: 199103

Record 111 of 121 - FSTA Current 1990-2001/03

AN: 1991-03-S0094
TI: Effects of salt and fat reduction on the rheological and gelation properties of turkey meat batters.
AU: Barbut-S; Mittal-GS

AD: Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ont. N1G 2W1, Canada
PY: 1989
SO: Canadian-Agricultural-Engineering; 31 (2) 271-277, 24 ref.
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: The gelation and rheological properties of turkey meat batters prepared with 2 fat levels (16 and 23%) and 3 salt levels (2.5% NaCl, 1.75% NaCl, 1.75% NaCl + 0.4% hexametaphosphate (HMP)) were studied. The relationship between shear rate and shear stress for the different raw meat batters was found to be nonlinear and followed the Bingham pseudoplastic behaviour. The yield stress for the high-fat batter containing 2.5% NaCl was significantly lower than all the other treatments. The highest rigidity modulus (G) values obtained during cooking were observed in the low-fat batter with 1.75% NaCl followed by the 2.5% NaCl batters with high- and low-fat content and the high-fat batter with 1.75% NaCl. The batters containing HMP showed the lowest G values, regardless of fat content, exhibiting the strong effect of HMP on rigidity development.
DE: BAKERY-PRODUCTS; COATINGS-; FATS-ANIMAL; GELATION-; MEAT-SPECIFIC; PHYSICAL-PROPERTIES; POULTRY-; RHEOLOGICAL-PROPERTIES; SALT-; TURKEY-MEAT; TURKEYS-; BATTERS-
UD: 199103

Record 112 of 121 - FSTA Current 1990-2001/03

AN: 1991-01-S0045
TI: Prevention of warmed-over flavor in cooked beef: effect of phosphate type, phosphate concentration, a lemon juice/phosphate blend, and beef extract.
AU: Trout-GR; Dale-S
AD: CSIRO Meat Res. Lab., PO Box 12 Cannon Hill, 4170, Australia
PY: 1990
SO: Journal-of-Agricultural-and-Food-Chemistry; 38 (3) 665-669, 23 ref.
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: This study examined the effect of: 0.5% Lemophos (a commercial blend of lemon juice and sodium tripolyphosphate); 3.0% commercial beef extract; 5 different phosphates (0.5%) [disodium phosphate (Pi), tetrasodium pyrophosphate (PP), sodium tripolyphosphate (TPP), sodium tetrapolyphosphate (TTPP) and sodium hexametaphosphate (HMP)]; and 4 TPP concn. on the TBA reactive substances (TBARS) values and warmed-over flavour (WOF) of cooked ground beef during 6 days of refrigerated storage. [At 0.5% concn.] PP, TPP, TTPP and Lemophos completely inhibited WOF as determined by both TBARS values and sensory evaluation. With HMP, TBARS values increased slightly with increasing storage time; however, the WOF scores did not show a corresponding increase. Pi and beef extract slightly reduced TBARS values and WOF scores; the beef extract also partly masked the WOF. The min. TPP concn. required to inhibit WOF completely was 0.5%; 0.375% TPP prevented the increase in WOF scores but not the increase in TBARS values.
DE: BEEF-; CITRUS-JUICES; COOKING-; EXTRACTS-; FLAVOUR-; JUICES-; LEMONS-; MEAT-; PHOSPHATES-; PROCESSING-THERMAL; SENSORY-PROPERTIES; THERMAL-PROCESSES
UD: 199101

Record 113 of 121 - FSTA Current 1990-2001/03

AN: 1990-12-T0019
TI: Semi-micro method for the quantitative determination of gellan gum in food products.
AU: Graham-HD
AD: Dep. of Chem., Univ. of Puerto Rico, Mayagueez 00709, Puerto Rico
PY: 1990
SO: Food-Hydrocolloids; 3 (6) 435-445, 9 ref.
DT: Journal-Article
LA: En (English)
SC: T Food-additives-spices-and-condiments
AB: A reagent consisting of 0.1% thiourea in conc. H_2SO_4 and cysteine hydrochloride at a final concn. of 600 mug/ml was used to determine gellan gum in pudding mix, salad dressings, dog food, orange drink mix, milk, milk products and pineapple pie fillings in the presence of other food hydrocolloids. Proteins and starch were removed by digestion with papain and amyloglucosidase, resp. Gellan gum and other hydrocolloids in the clarified digest were precipitated with cetylpyridinium chloride (CPC) and the mixed CP-hydrocolloid complex trapped on a Celite column, washed to remove soluble sugars and the gellan gum eluted with boiling 2% sodium hexametaphosphate. The colour developed by reacting an aliquot of the eluate with the reagent was measured at 455 nm and the amount present determined from a standard curve. The rhamnose moiety of the gum gives the specific colour response. Max. colour development occurred after 4 h at 26 plus/minus 2 degree C and remained relatively constant for 24 h. Using 'product' blanks, average recovery from milk was 90% with a reproducibility of 2.6% for high-clarity gellan gum. With low-clarity gellan gum, average recovery was 86.4% with a reproducibility of 3%. Pudding, pie fillings (high starch) and salad dressings (high oil content) gave lower recoveries.
DE: ADDITIVES-; ANALYTICAL-TECHNIQUES; GUMS-; STABILIZERS-; THICKENERS-; FOODS-; GELLAN-GUMS
UD: 199012

Record 114 of 121 - FSTA Current 1990-2001/03

AN: 1990-10-J0089
TI: The effects of acidification and sugar addition on quality attributes of canned tomatoes.
AU: Wahem-IA
AD: Dep. of Hort., Ohio State Univ., Columbus, OH 43210, USA
PY: 1990
SO: Journal-of-Food-Processing-and-Preservation; 14 (1) 1-15, 36 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: Reducing the pH of 2 tomato cv. [Ohio 7663 and Ohio 7814] to 4.0 and 3.5 with citric and formic acids, reducing the processing time in a boiling water bath to 20 and 15 min, resp., and compensating for tartness of added acids with sucrose and fructose, significantly increased drained wt., total acidity, soluble solids, NaOH-soluble pectin and sodium hexametaphosphate-soluble pectin levels and palatability. Increases in these attributes were greater at pH 3.5. Less formic acid and fructose were required to reduce pH and balance tartness. When fructose was added instead of sucrose, drained wt. improved.
DE: ACIDS-; CANNED-FOODS; CITRIC-ACID; FRUITS-; ORGANIC-ACIDS; PRESERVATIVES-; SUGARS-; TOMATOES-; FORMIC-ACID
UD: 199010

Record 115 of 121 - FSTA Current 1990-2001/03

AN: 1990-08-J0036
TI: [Relationships between various parameters, especially organic acid content and picking time, on the processing of plums into Ume-Zuke.]
AU: Kaneko-K; Ota-K; Kawano-K; Maeda-Y
AD: Lab. of Food Sci., Koriyama Women's Junior Coll., Koriyama 963, Japan
PY: 1989
SO: Journal-of-Japanese-Society-of-Nutrition-and-Food-Science-[Nihon-Eiyo-Shokuryo-Gakkai-shi]; 42 (2) 179-184, 10 ref.
DT: Journal-Article
LA: Ja (Japanese); Non-English
LS: en (English)
SC: J Fruits-vegetables-and-nuts
AB: The pectic substances, metal elements and organic acid content and the hardness of Takada bungo plums (Prunus mume Sieb. et Zucc.) were analysed for about 1 month from the end of May 1987, and the results were investigated in relation to harvest time for the processing of the fruit into Ume-Zuke (pickled plum). Results obtained were as follows: Ca content of ethanol-insoluble substances from the plums changed little until the middle of June, but decreased gradually with fruit growth; the ratio of HSP (hexametaphosphate-soluble pectin) to TP (total pectin) showed little change with fruit growth, but decreased after the middle of June, whereas the ratio of HWSP (hot water-soluble pectin) to TP changed little with fruit growth, but increased after the middle of June; malic acid content of plums reached a max. in the middle of June and decreased markedly with fruit growth, whereas the citric acid content of the plums increased gradually with fruit growth, followed by an appreciable increase after the middle of June; Ume-Zuke manufactured from plums harvested after the last 10 days of June had a softer texture. From these results, it was concluded that the increase in citric acid occurring during fruit growth gives rise to chelate binding of divalent cations combined with pectic substances, and that the release of these divalent cations, changing HSP to HWSP to some degree, consequently causes a decrease in the hardness of texture of Ume-Zuke.
DE: ACIDS-; FIRMNESS-; FRUITS-; MINERALS-; ORGANIC-ACIDS; PECTIC-SUBSTANCES; PLUMS-; POLYSACCHARIDES-; PROCESSING-; METALS-
UD: 199008

Record 116 of 121 - FSTA Current 1990-2001/03

AN: 1990-08-J0007
TI: Differences between bamboo shoots and vegetables in thermal disintegration of tissues and polysaccharides fractionated by successive extraction.
AU: Fuchigami-M
AD: Dep. of Food. Sci., Okayama Prefectural Junior Coll., 3-1-1, Ishima-cho, Okayama-shi 700, Japan
PY: 1990
SO: Journal-of-Food-Science; 55 (3) 739-745, 21 ref.
DT: Journal-Article
LA: En (English)
SC: J Fruits-vegetables-and-nuts
AB: Bamboo shoots were more difficult to disintegrate during cooking than other vegetables (potato, Japanese radish, carrot, burdock, and East Indian lotus). The pectic substances of bamboo shoots were fractionated with 3 reagents. The uronic acid composition of HCl-soluble pectin (PA), acetate buffer-soluble pectin (PB) and sodium hexametaphosphate-soluble pectin (PC) were about 8-10, 2-4, and 88%, resp. Conversely, the other vegetables contained only a small amount of PC and completely disintegrated after extraction of PA and PB; bamboo shoots retained considerable firmness under the same conditions. Acidic

polysaccharides in bamboo shoots separated by DEAE-cellulose column chromatography contained large amounts of neutral sugars. This suggested that the glucose and xylose rich PC (low methoxyl pectin) affected solubilization of pectic polysaccharides and thermal disintegration of bamboo shoots.
DE: COOKING-; HEATING-; PECTIC-SUBSTANCES; VEGETABLES-; VEGETABLES-SPECIFIC; BAMBOO-SHOOTS
UD: 199008

Record 117 of 121 - FSTA Current 1990-2001/03

AN: 1990-06-V0035
TI: Novel process for lowering the concentration of beta-lactoglobulin in cheese whey.
AU: Al-Mashiki-SA; Nakai-S
CA: Canada, University of British Columbia
PY: 1989
SO: United-States-Patent; US 4 849 241, CA 528135 (19870126) [University of British Columbia, Vancouver, Canada]
DT: Patent
LA: En (English)
SC: V Patent-literature
AB: Concn. of beta-lactoglobulin in whey is reduced, while the immunoglobulins are retained, by treating the whey with a polyphosphate, such as sodium hexametaphosphate, within a pH range of approx. 3.8-4.7.
DE: DAIRY-PRODUCTS; LACTOGLOBULINS-; PATENTS-; PHOSPHATES-; PROTEINS-; REDUCTION-; WHEY-; BETA-LACTOGLOBULIN
UD: 199006

Record 118 of 121 - FSTA Current 1990-2001/03

AN: 1990-04-S0139
TI: Effects of salt reduction on the rheological and gelation properties of white and dark poultry meat batters.
AU: Mittal-GS; Barbut-S
AD: Eng. School, Univ. of Guelph, Guelph, Ont. N1G 2W1, Canada
PY: 1989
SO: Journal-of-Texture-Studies; 20 (2) 209-222, 30 ref.
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: Rheological and gelation properties of poultry dark and white meat batters, prepared with average and reduced NaCl levels (2, 1 and 0%) and with 0.5% hexametaphosphate (HMP) added to the 1% salt batters, were studied. Lowering salt content decreased the shear stress in both the white and dark meat at the same shear rates. HMP addition to 1% NaCl treatments increased shear stress in the dark meat but not in the white meat at the same shear rates using a concentric cylinder viscometer. The relationship between rotor angular velocity and shear stress of the raw batters was nonlinear and resembled a pseudoplastic behaviour with yield stress in all cases. Plots of the modulus of rigidity (G) vs. cooking temp. indicated that white meat always exhibited higher G than that of dark meat. Highest G was observed in white meat with 2.0% NaCl and lowest in dark meat with no salt. Batters with no salt also exhibited gel formation, however with lower G values.
DE: BAKERY-PRODUCTS; COATINGS-; GELATION-; MEAT-SPECIFIC; POULTRY-; POULTRY-MEAT; RHEOLOGICAL-PROPERTIES; SALT-; BATTERS-
UD: 199004

Record 119 of 121 - FSTA Current 1990-2001/03

AN: 1990-03-P0118
TI: Effect of additives on the quality of yoghurt.
AU: Shukla-FC; Jain-SC; Sekhon-KS
AD: Dep. of Food Sci. & Tech., Punjab Agric Univ., Ludhiana 141 004, India
PY: 1988
SO: Indian-Journal-of-Dairy-Science; 41 (4) 467-468, 3 ref.
DT: Journal-Article
LA: En (English)
SC: P Milk-and-dairy-products
AB: Various additives were tested, at levels of 0.1, 0.2, 0.3 and 0.4%, for their ability to prevent wheying-off in yoghurt prepared from standardized, toned and double-toned buffaloes' milk. Appearance, body/texture and flavour were significantly improved by addition of 0.1-0.3% gelatin to the milk. Quality of yoghurt was also improved by addition of 0.2% sodium hexametaphosphate (0.3% required with double-toned milk), 0.2-0.3% gum acacia, 0.3% pectin (0.2% with standardized milk), or 0.2% sodium alginate, but gum acacia imparted its unpleasant flavour to the product. Addition of greater than 0.1% CMC adversely affected yoghurt quality.
DE: ADDITIVES-; DAIRY-PRODUCTS; YOGHURT-; CULTURED-MILKS
UD: 199003

Record 120 of 121 - FSTA Current 1990-2001/03

AN: 1990-03-C0056
TI: Effects of polyphosphates on cell numbers, enterotoxin A, and extracellular protein in Staphylococcus aureus 196E.
AU: Shelef-LA; Wang-ZL
AD: Dep. of Nutr. & Food Sci., Wayne State Univ., Detroit, MI 48202, USA
PY: 1989
SO: Journal-of-Food-Science; 54 (6) 1550-1552, 19 ref.
DT: Journal-Article
LA: En (English)
SC: C Hygiene-and-toxicology
AB: Effects of sodium salts of pyro- (SAPP), tripoly (STPP), and hexametaphosphate (SHMP) on cell numbers, enterotoxin A (SEA) and extracellular protein production (ECP) of Staphylococcus aureus strain 196A were studied in 4% N-Z amine broth plus 1% yeast extract after 24 h at 30 degree C. At pH 7.0, concn. lower than 56mM (1.2%) SAPP, 27mM (1%) STPP or 3mM (0.4%) SHMP had no antibacterial effects, and a bacteriostatic effect showed at slightly higher concn. SAPP was the least effective inhibitor at neutral pH, but displayed enhanced inhibitory effects at pH 5.5. Reduction in SEA and ECP paralleled cell growth suppression; their concn. were 1400 ng/ml and 1.5 mg/ml, resp., in phosphate free broth (9 x 10-9 cfu/ml), and nondetectable when cell numbers were _10-6 per ml.
DE: ADDITIVES-; BACTERIA-; ENTEROTOXINS-; FOOD-SAFETY; INHIBITION-; PHOSPHATES-; STAPHYLOCOCCUS-; TOXINS-; POLYPHOSPHATES-
UD: 199003

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AN: 1990-02-S0053
TI: Evaluation of salt, polyphosphates and their blends at different levels on physicochemical properties of buffalo meat and patties.
AU: Anjaneyulu-ASR; Sharma-N; Kondaiah-N
AD: Div. of Livestock Products Tech., Indian Vet. Res. Inst., Izatnagar 243 122 Uttah Pradesh, India
PY: 1989

SO: Meat-Science; 25 (4) 293-306, 30 ref.
DT: Journal-Article
LA: En (English)
SC: S Meat-poultry-and-game
AB: Trials were conducted to evaluate effects of 2% NaCl and/or 0.3, 0.5 or 0.7% polyphosphates (sodium pyrophosphate, SPP; sodium tripolyphosphate, STPP; sodium acid pyrophosphate, SAPP; sodium hexametaphosphate, SHMP; or blends of these compounds) on characteristics of buffalo meat. The additives were blended with finely ground lean buffalo meat; patties and meat emulsions (with soybean oil) were prepared. Data are given for pH, water holding capacity, emulsifying capacity, salt-soluble protein, cooking loss, emulsion stability, patty yield, shear force, moisture content and visual and instrumental colour characteristics. Quality characteristics were generally significantly improved by SPP, STPP and some phosphate blends; SAPP and SHMP had much smaller effects. The most effective phosphate blends were 90% SPP 10% SHMP, 75% SPP/25% STPP, and 65% SPP/17.5% STPP/17.5% SAPP; this last 3-phosphate blend was as effective as SPP, and contained 3% less Na. Functional properties of hot boned meat with added phosphate + NaCl were better than those of chilled meat with added phosphate + NaCl.
DE: BUFFALOES-; EMULSIONS-; MEAT-PRODUCTS; MEAT-SPECIFIC; PHOSPHATES-; BUFFALO-MEAT; PATTIES-; POLYPHOSPHATES-
UD: 199002