

Now

allowed

# NOSB NATIONAL LIST FILE CHECKLIST

## PROCESSING

**MATERIAL NAME:** Calcium chloride

**CATEGORY:** Non-agricultural

Complete?: 3/16

✓

**NOSB Database Form**

✓

**References**

✓

**MSDS (or equivalent)**

✓

**FASP (FDA)**

✓

**Date file mailed out:** 2/14/95

✓

**TAP Reviews from:** Richard Theuer

Steven Harper

Steve Taylor

✓

**Supplemental Information:**

Excerpt from Dictionary of additives

**MISSING INFORMATION:** \_\_\_\_\_

# NOSB/NATIONAL LIST COMMENT FORM/BALLOT

Use this page to write down comments and questions regarding the data presented in the file of this National List material. Also record your planned opinion/vote to save time at the meeting on the National List.

Name of Material Calcium Chloride

Type of Use:  Crops;  Livestock;  Processing

TAP Review by:

1. Rich Theuer
2. Steven Harper
3. Steve Taylor

Comments/Questions:

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My Opinion/Vote is:

Signature \_\_\_\_\_ Date \_\_\_\_\_

# USDA/TAP REVIEWER COMMENT FORM

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Attach additional sheets if you wish.

This file is due back to us within 30 days of: 14 Feb

Name of Material: Calcium chloride

Reviewer Name: STEVE TAYLOR

Is this substance Natural or Synthetic? Explain (if appropriate)

Natural - from brines  
Synthetic - from Solvay process

Please comment on the accuracy of the information in the file:

This material should be added to the National List as:

Synthetic Allowed       Prohibited Natural

or,  This material does not belong on the National List because:

Are there any restrictions or limitations that should be placed on this material by use or application on the National List?

*Restrict to CaCl<sub>2</sub> made from natural brines*

Any additional comments or references?

Signature Steve Taylor

Date 3-5-95

# USDA/TAP REVIEWER COMMENT FORM

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Attach additional sheets if you wish.

This file is due back to us within 30 days of: 14 Feb

Name of Material: Calcium chloride

Reviewer Name: Steven Harper

**Is this substance Natural or Synthetic? Explain (if appropriate)**

Natural substance found in brine which is sometimes produced synthetically.

**Please comment on the accuracy of the information in the file:**

Good

**This material should be added to the National List as:**

Synthetic Allowed       Prohibited Natural

or,  This material does not belong on the National List because: Calcium chloride is primarily a natural substance. However, it is also produced synthetically and is therefore difficult to accurately classify.

**Are there any restrictions or limitations that should be placed on this material by use or application on the National List?**

Attempts should be made by users to apply naturally derived CaCl. This may be very difficult to regulate.

**Any additional comments or references?**

Calcium chloride is a very difficult substance to classify because it is produced both naturally and synthetically.

Signature Steven Harper

Date 3/10/95

USDA/TAP REVIEWER  
COMMENT FORM

Original mailing date:

Name of Material: Calcium Chloride  
Reviewer Name: Richard C. Theuer

**NATURAL** Calcium chloride occurs naturally in brines. In fact, brines are the sole commercial source of calcium chloride in the United States. The brine is concentrated through solar evaporation and subsequently purified by normal means. NOTE: The Solvay process for manufacture of soda ash creates synthetic calcium chloride as a by-product. However, the Solvay process is no longer used in the U.S. because soda ash (sodium carbonate) is now produced by the more economical and more environmentally friendly trona ore methods.

**COMMENTS RE SECTION 2119(m) CRITERIA:**

1. Calcium chloride is popularly used by homeowners as a sidewalk de-icer in Winter. It is superior to rock salt (sodium chloride) because it is more environmentally friendly; it adds calcium to the soil rather than sodium.
2. Calcium chloride is used to help canned fruits and vegetables maintain their firmness. Calcium chloride is slightly bitter so there is a disincentive to use more than the minimum amount required for this effect.
3. Both calcium and chloride are nutritionally essential mineral elements. Calcium must be declared for each food according to the latest Federal food labeling regulations.
4. Calcium chloride is the primary food firming agent because it provides calcium ion, which reacts with pectin and other food polysaccharides, in a soluble form. Other calcium salts - carbonates, sulfates, etc. - are extremely insoluble. Therefore there are no alternatives.
5. Calcium chloride is a natural material isolated from brine so it is compatible with a long-term sustainable system.

The following natural substance should be allowed as an ingredient in organic foods. It should not be added to the National List of natural substances prohibited for use as ingredients or processing aids in Organic Food:

calcium chloride.

18 Feb 1995



## Identification

<b>Common Name</b>	<b>Calcium chloride</b>	<b>Chemical Name</b>	
<b>Other Names</b>	Calcium dichloride, Calcosan, Superflake anhydrous		
<b>Code #: CAS</b>	10043-52-4; 10035-04-8	<b>Code #: Other</b>	
<b>N. L. Category</b>	Non-agricultural	<b>MSDS</b>	<input checked="" type="radio"/> yes <input type="radio"/> no

## Chemistry

### Family

**Composition** CaCl<sub>2</sub>·2H<sub>2</sub>O. Possible impurities include lime, and chlorides of sodium, potassium and magnesium.

**Properties** White, hard, odorless fragments or granules. Deliquescent (absorbs water from the air). Dissolves in water and alcohol.

**How Made** Majority is made by concentration and purification of natural brines. Lime is added to precipitate magnesium chloride. Can also be produced as a by-product of the ammonia-soda process (the Solvay process) used to make soda ash (sodium carbonate). Sodium chloride and calcium carbonate are reacted with ammonia, producing sodium carbonate and calcium chloride. The Solvay process is no longer used in the USA.

## Use/Action

**Type of Use** Processing

**Specific Use(s)** Miscellaneous and general purpose. Calcium supplement in evaporated milk. Brine bath to increase firmness of fruits and vegetables.

**Action** sequestrant, firming agent, pH control agent. Calcium reacts with pectins and other food polysaccharides to form calcium pectate which helps keep canned foods firm.

**Combinations**

## Status

**OFPA**

**N. L. Restriction**

**EPA, FDA, etc** FDA §133, §145.145, §184.1193 etc. GRAS

**Directions**

**Safety Guidelines** Can irritate or burn eyes. Inhalation of dust may irritate nose, throat or lungs.

**State Differences**

**Historical status**

**International status** Allowed by IFOAM, EU, and Codex.

## OFPA Criteria

**2119(m)1: chemical interactions**      **Not Applicable**

**2119(m)2: toxicity & persistence**      **Not Applicable**

**2119(m)3: manufacture & disposal consequences**

In high concentrations can retard plant growth. Similar to environmental impact of salt except it adds calcium to the environment instead of sodium. Brine process: all environmental impacts of brine recovery and refining. As with all mine operations, processors must effectively mitigate locally variable environmental impacts including runoff, erosion, and dust.

Synthetic process: all issues of chemical plants must be addressed, including: emissions, solvent containment, wastewater treatment, and instrument monitoring. Local factors play a big role in environmental impact.

**2119(m)4: effect on human health**

Very low in acute oral toxicity, similar to common table salt. Valuable nutrient source of calcium.

**2119(m)5: agroecosystem biology**      **Not Applicable**

**2119(m)6: alternatives to substance**

Other calcium containing materials can be used as mineral supplement. Sodium chloride could substitute in brines. No good alternatives as firming agent because it is the only soluble calcium source.

**2119(m)7: Is it compatible?**

## References

The Merck Index. 9th ed. Rahway, New Jersey: Merck & Co., Inc., 1976. p. 210

Kemp, Robert and Suzanne E. Keegan, "Calcium Chloride", *in*: Ullmann's Encyclopedia of Industrial Chemistry, 5th Edition, Elvers, et al. (eds.) VCH Verlagsgesellschaft mbH, Weinheim, Germany. 1992. Vol. A4. p. 547-553.

Kirk-Othmer Encyclopedia of Chemical Technology, 3rd. Ed., Volume 4, pp 432-436.

Food Chemicals Codex, 3rd Ed., National Academy Press, Washington D.C. 1981.

AU: Conway,-W.S.; Sams,-C.E.; Abbott,-J.A.; Bruton,-B.D.

TI: Postharvest calcium treatment of apple fruit to provide broad-spectrum protection against postharvest pathogens.

SO: Plant-Dis. St. Paul, Minn. : American Phytopathological Society. June 1991. v. 75 (6) p. 620-622.

**CN: DNAL 1.9-P69P**

Paul Schmidt, Tetra Chemical 12/22/94. (written communication)



## MSDS for CALCIUM CHLORIDE, ANHYDROUS

Page 1

## 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: CALCIUM CHLORIDE, ANHYDROUS

FORMULA: CaCl2

FORMULA WT: 110.99

CAS NO.: 10043-52-4

NIOSH/RTECS NO.: EV9800000

PRODUCT CODES: 1311

EFFECTIVE: 09/26/85

REVISION #01

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 1 SLIGHT

FLAMMABILITY - 0 NONE

REACTIVITY - 0 NONE

CONTACT - 2 MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

STORAGE: KEEP IN TIGHTLY CLOSED CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

## 2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
CALCIUM CHLORIDE		90-100 10043-52-4

## 3 - PHYSICAL DATA

BOILING POINT: N/A

VAPOR PRESSURE(MM HG): N/A

MELTING POINT: 772 C ( 1422 F)

VAPOR DENSITY(AIR=1): N/A

SPECIFIC GRAVITY: 2.15  
(H<sub>2</sub>O=1)EVAPORATION RATE: N/A  
(BUTYL ACETATE=1)SOLUBILITY(H<sub>2</sub>O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: 0  
APPEARANCE & ODOR: WHITE GRANULES.

## 4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A

FLAMMABLE LIMITS: UPPER - N/A %    LOWER - N/A %

**FIRE EXTINGUISHING MEDIA**

USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

**SPECIAL FIRE-FIGHTING PROCEDURES**

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.

TOXIC GASES PRODUCED: HYDROGEN CHLORIDE

**5 - HEALTH HAZARD DATA**

TOXICITY: LD50 (ORAL-RAT)(MG/KG)    - 1000  
LD50 (IPR-MOUSE)(MG/KG)        - 280

CARCINOGENICITY: NTP: NO    IARC: NO    Z LIST: NO    OSHA REG: NO

**EFFECTS OF OVEREXPOSURE**

CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR BURNS.  
INGESTION MAY CAUSE NAUSEA AND VOMITING.  
DUST MAY IRRITATE NOSE AND THROAT.

TARGET ORGANS: NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: NONE IDENTIFIED

ROUTES OF ENTRY: NONE INDICATED

**6 - REACTIVITY DATA**

STABILITY: STABLE                      HAZARDOUS POLYMERIZATION: WILL NOT OCCUR  
CONDITIONS TO AVOID: MOISTURE  
INCOMPATIBLES: MOST COMMON METALS, WATER  
DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE

**7 - SPILL AND DISPOSAL PROCEDURES****STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE**

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

**DISPOSAL PROCEDURE**

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

**8 - PROTECTIVE EQUIPMENT**

VENTILATION:                      USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION

-----  
TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.

EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, UNIFORM, RUBBER GLOVES ARE RECOMMENDED.

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**9 - STORAGE AND HANDLING PRECAUTIONS**  
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SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

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**10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION**  
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DOMESTIC (D.O.T.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: CALCIUM CHLORIDE, DIHYDRATE
FORMULA: CaCl2 2H2O FORMULA WT: 147.02
CAS NO.: 10035-04-8 NIOSH/RTECS NO.: EV0177000
PRODUCT CODES: 1332,1336,1337
EFFECTIVE: 10/22/86 REVISION #02

PRECAUTIONARY LABELLING
HEALTH - 1 SLIGHT
FLAMMABILITY - 0 NONE
REACTIVITY - 0 NONE
CONTACT - 2 MODERATE

BAKER SAF-T-DATA(TM) SYSTEM

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT
SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

WARNING HARMFUL IF INHALED
CAUSES EYE IRRITATION
DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

2 - HAZARDOUS COMPONENTS

Table with 3 columns: COMPONENT, %, CAS NO.
Row 1: CALCIUM CHLORIDE, DIHYDRATE, 90-100, 10035-04-8

3 - PHYSICAL DATA

BOILING POINT: N/A VAPOR PRESSURE(MM HG): N/A
MELTING POINT: 176 C ( 349 F) VAPOR DENSITY(AIR=1): N/A
SPECIFIC GRAVITY: 0.84 (H2O=1) EVAPORATION RATE: N/A (BUTYL ACETATE=1)
SOLUBILITY(H2O): APPRECIABLE (MORE THAN 10 %) % VOLATILES BY VOLUME: 0
APPEARANCE & ODOR: ODORLESSS, SMALL, WHITE FLAKES.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A
FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

**FIRE EXTINGUISHING MEDIA**

USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

**SPECIAL FIRE-FIGHTING PROCEDURES**

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.

TOXIC GASES PRODUCED: HYDROGEN CHLORIDE

**5 - HEALTH HAZARD DATA**

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

**EFFECTS OF OVEREXPOSURE**

CONTACT WITH SKIN OR EYES MAY CAUSE SEVERE IRRITATION OR BURNS.  
DUST MAY BE IRRITATING TO EYES, NOSE, THROAT, OR LUNGS.  
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.

TARGET ORGANS: EYES, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: NONE IDENTIFIED

ROUTES OF ENTRY: INGESTION, INHALATION, EYE CONTACT, SKIN CONTACT

**EMERGENCY AND FIRST AID PROCEDURES**

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

**6 - REACTIVITY DATA**

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE

INCOMPATIBLES: MOST COMMON METALS, WATER

DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE

**7 - SPILL AND DISPOSAL PROCEDURES****STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE**

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.  
WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

**8 - PROTECTIVE EQUIPMENT**

VENTILATION: USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.

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EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, UNIFORM, RUBBER GLOVES ARE RECOMMENDED.

**9 - STORAGE AND HANDLING PRECAUTIONS**

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS  
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

**10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION**

DOMESTIC (D.O.T.)  
PROPER SHIPPING NAME    CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)  
PROPER SHIPPING NAME    CHEMICALS, N.O.S. (NON-REGULATED)

# **OxyChem.**

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## **Noted restrictions:**

21 CFR 170.3(n)(1)	< 0.3% in Baked goods
21 CFR 170.3(n)(10)	< 0.3% in Dairy product
21 CFR 170.3(n)(3)	< 0.22% in Nonalcoholic beverages and beverage bases
21 CFR 170.3(n)(5)	< 0.2% in Cheese
21 CFR 170.3(n)(35)	< 0.2% in Processed fruit and fruit juices
21 CFR 170.3(n)(7)	< 0.32% in Coffee and tea
21 CFR 170.3(n)(8)	< 0.4% in Condiments and relishes
21 CFR 170.3(n)(24)	< 0.2% in Gravies and sauces
21 CFR 170.3(n)(28)	< 0.1% in Commercial Jams and Jellies
21 CFR 170.3(n)(29)	< 0.25% in Meat Products
21 CFR 170.3(n)(33)	< 2.0% in Plant Protein Products
21 CFR 170.3(n)(36)	< 0.4% in Vegetables and Vegetable Juices
21 CFR 170.3(n)(36)	< 0.05% in all other food categories

While OxyChem's Calcium Chloride product meet all of the requirements as stated in the Food Chemicals Codex Standard, Third Edition, 1981, OxyChem does not represent or warrant general compliance of this product for food uses other than for those applications noted above and adhering to the noted appropriate restrictions.

# OxyChem®

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**CALCIUM CHLORIDE STATUS UNDER  
THE FEDERAL FOOD, DRUG, AND COSMETIC ACT (FDA)**

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FDA designates Calcium Chloride as a "Direct Food Substance Affirmed As Generally recognized As Safe" (21 CFR 184.1193), when used in accordance with good manufacturing practice" (21 CFR 184.1) in the below noted applications (21 CFR 184.1193 (c) and that conforms to the noted restrictions (21 CFR 184.1193 (d).

Good manufacturing practice is defined to include the following:

1. The quantity of substance added to food does not exceed the amount reasonably required to accomplish its intended physical, nutritional, or other technical effect in food.
2. The quantity of a substance that becomes a component of food as a result of its use in the manufacturing, processing, or packaging of food, and which is not intended to accomplish any physical or other technical effect in the food itself, shall be reduced to the extent reasonably possible.
3. The substance is of appropriate food grade and is prepared and handled as a food ingredient.

Noted approved applications:

21 CFR 170.3(o)(1)	Anticaking Agent
21 CFR 170.3(o)(2)	Antimicrobial Agent
21 CFR 170.3(o)(5)	Curing or Pickling Agent
21 CFR 170.3(o)(10)	Firming Agent
21 CFR 170.3(o)(11)	Flavor Enhancer
21 CFR 170.3(o)(16)	Humectant
21 CFR 170.3(o)(20)	Nutrient Supplement
21 CFR 170.3(o)(23)	pH Control Agent
21 CFR 170.3(o)(24)	Processing Aid
21 CFR 170.3(o)(28)	Stabilizer and Thickener
21 CFR 170.3(o)(29)	Surface-active Agent
21 CFR 170.3(o)(31)	Synergist
21 CFR 170.3(o)(32)	Texturizer



**Occidental Chemical Corporation**  
Basic Chemicals Group  
Development Center  
P.O. Box 344, Niagara Falls, NY 14302-0344  
1-800-733-1165



## CALCIUM SALTS\*

Calcium Acetate, Chloride, Gluconate, Hydroxide, Oxide, Phosphate

These salts consist of calcium—an important nutrient needed for bones and teeth, as well as for blood coagulation and many metabolic functions in the body—and certain normal constituents present in the diet. The acetate portion of *calcium acetate* is present in acetic acid (see p. 463). The chloride part of *calcium chloride* is a component of sodium chloride (see p. 626). *Calcium gluconate* is calcium and gluconic acid (see p. 553). *Calcium phytate* is calcium and phytic acid, a relatively inert constituent found in many plant foods such as cereals, nuts, legumes, and potatoes. *Calcium oxide* is calcium combined with oxygen. *Calcium hydroxide* is formed by adding water to calcium oxide. *Calcium carbonate* is calcium oxide with the addition of carbon dioxide.

Some of these calcium salts are used in foods as agents to deactivate mineral substances that otherwise could cause undesirable flavor, color, or texture changes in the food; to alter the alkali-acid (pH) balance; or to firm up the texture. Among the large variety of products containing calcium salt additives are baked goods and baking mixes, carbonated fruit beverages, beer and wine, cheese, and processed vegetables. The salts are also used as nutrients or dietary supplements.

**SAFETY:** In 1975 the average daily intake per person of these added calcium salts, based on reported usage by the food industry, was estimated at about 41 milligrams in total, or somewhat less than 0.7 milligram per kilogram of body weight (kg/bw) for a person weighing 60 kg (132 lbs.). Calcium chloride accounted for 70 percent of this.

The contribution of these six additives toward body calcium needs represented 3 to 5 percent of the 800 to 1200 milligrams of calcium recommended daily for children and adults by the National Academy of Sciences-National Research Council.

**MAJOR REFERENCES:** Evaluation of the health aspects of certain calcium salt food ingredients. FASEB/SCOGS Report 45 (NTIS PB 254-539) 1975; Evaluation of the health aspects of calcium oxide and calcium hydroxide as food ingredients. FASEB/SCOGS Report 72 (NTIS PB 254-540) 1975.

\*Additional calcium salts are discussed elsewhere: see p. 513 for calcium chloride, p. 503 for calcium carbonate, p. 600 for calcium phosphate, and p. 652 for calcium sulfate.

The safety of these salts relates to the other parts of the compound combined with the calcium. Acetate and gluconate, as acetic acid and gluconic acid, are made by the body regularly in large quantities in its metabolism of carbohydrates. Chloride is an essential nutrient that helps to regulate the blood's acid-alkaline balance and pressure. The oxide and hydroxide readily form calcium carbonate, or chalk, itself a useful nutrient source. These calcium salts thus are substances that the body manufactures or requires in order to meet its needs.

At the high level of about 1500-2000 milligrams per kg/bw of calcium chloride, thousands of times human intake of all of these calcium salts, rabbits experienced an "acidosis" and damage to the stomach lining due to the excessive concentration of the salt solution. However, even at the same high levels, calcium chloride fed to rats for several months had no effect on thyroid size, and microscopic investigation did not reveal any abnormal changes. No adverse effects were seen in the heart, kidney, and liver of rats fed calcium gluconate or calcium chloride at levels of 400 milligrams of calcium per kg/bw. Calcium phytate, at about 300 milligrams per kg/bw, fed to rats as a diet supplement, successfully provided calcium for bone deposition, and the animals remained healthy.

Humans have taken as much as 10 grams of calcium gluconate as a calcium source, and the only deleterious effect was some diarrhea if the salt was taken on an empty stomach. Relevant studies of calcium oxide and hydroxide have not been made. However, these compounds when used in food change from caustic, alkaline materials to simple calcium salts.

No long-term studies appear to have been made on any of these calcium salts, and none on possible effects on cancer or on chromosome damage. Tests indicate that calcium chloride and calcium gluconate do not appear to cause embryo malformation.

**ASSESSMENT:** Calcium is a nutrient needed in substantial quantities in the diet. The acid components of its salts are normal food constituents and participate in metabolic processes in humans. The alkaline compounds, calcium oxide or hydroxide, change over to calcium salts when incorporated into foods and are then metabolized normally. The use of these various calcium compounds as food additives poses no hazard to the consumer.

**RATING:** S.



U.S. FOOD AND DRUG ADMINISTRATION  
FOOD ADDITIVE SAFETY PROFILE

CALCIUM CHLORIDE

AS#:	010035048	HUMAN CONSUMPTION:	14.1242	MG/KG BW/DAY/PERSON
ASP#:	1792	MARKET DISAPPEARANCE:	16666666.666	LBS/YR
PE:	ASP	MARKET SURVEY:	87	
AS#:	0039	JECFA:	NL	
MA#:		JECFA ADI:		MG/KG BW/DAY/PERSON
AS#:		JECFA ESTABLISHED:	1973	
		LAST UPDATE:	931015	
D:	110.98	DENSITY:		LOGP:

STRUCTURE CATEGORIES: A7

COMPONENTS: 010043524  
010035048

NONYMS:  
 CALCIUM CHLORIDE DIHYDRATE  
 CALCIUM DICHLORIDE  
 CALCIUM CHLORIDE (CACL2), DIHYDRATE  
 CALCIUM CHLORIDE, DIHYDRATE

CHEMICAL FUNCTION: D

TECHNICAL EFFECT:

PROCESSING AID  
 FUMIGANT  
 FIRMING AGENT  
 MALTING OR FERMENTING AID  
 ENZYME  
 PH CONTROL AGENT  
 FREEZING OR COOLING AGENT, DIRECT CONTACT  
 ANTICAKING AGENT OR FREE-FLOW AGENT  
 DRYING AGENT  
 HUMECTANT

REG NUMBERS:

145.145	155.200	150.161
PART 133	150.141	172.560
182.6193	182.90	184.1193

MINIMUM TESTING LEVEL: 3

COMMENTS: STUDIES 1-9 FROM SCOGS-45

OCNUM=1792

OX 7: ACUTE TOXICITY INFORMATION

TUDY: 13  
 PECIES: RAT  
 SOURCE: CAN J COMP MED VET SCI 12:216  
 YEAR: 1948  
 LD50: 1000 MG/KG BW

OMMENTS: STUDY 13 TEST COMPOUND = CALCIUM CHLORIDE, ANHYDROUS  
 STUDY 9 LD50 = 5000 MG/KG  
 STUDY 10 LD50 = 1760 MG/KG  
 STUDY 14 LD50 = 4000 MG/KG

TUDY: 9  
 PECIES: RABBIT  
 SOURCE: GRM 000010 4:10  
 YEAR: 1964  
 LD50: 1390 MG/KG BW

OMMENTS: STUDY 11 LD50 = 1690 MG/KG

OX 9: ORAL TOXICITY STUDIES (OTHER THAN ACUTE)

TUDY: 1  
 YPE: SHORT TERM  
 PECIES: RAT  
 URATION: 84 DAYS  
 FFECTS: NO EFFECTS  
 ITES:  
 OMMENTS: ADMINISTERED IN DRINKING WATER

COMPLETEENESS: SOURCE: J NUTR 25:119-126  
 YEAR: 1943  
 LEL: > MG/KG BW/DAY  
 HNEL: 1000 MG/KG BW/DAY

TUDY: 2  
 YPE: SHORT TERM  
 PECIES: RAT  
 URATION: 84 DAYS  
 FFECTS: NO EFFECTS  
 ITES:  
 OMMENTS: ADMINISTERED IN BASAL DIET

COMPLETEENESS: SOURCE: J NUTR 25:119-126  
 YEAR: 1943  
 LEL: > MG/KG BW/DAY  
 HNEL: 2000 MG/KG BW/DAY

TUDY: 3  
 YPE: SHORT TERM  
 PECIES: RAT  
 URATION: 65 DAYS  
 FFECTS: MORTALITY INCREASE  
 ITES:  
 OMMENTS: HEART, LIVER AND KIDNEYS EXAMINED  
 5/10 ANIMALS DIED PRIOR TO SACRIFICE

COMPLETEENESS: SOURCE: J LAB CLIN MED 25:1018-1021  
 YEAR: 1940  
 LEL: 400 MG/KG BW/DAY  
 HNEL:

TUDY: 7  
 YPE: TERATOGENICITY  
 PECIES: RAT  
 URATION: 10 DAYS  
 FFECTS: NO EFFECTS

COMPLETEENESS: SOURCE: GRM 000010 4:817  
 YEAR: 1974  
 LEL: > MG/KG BW/DAY  
 HNEL: 176 MG/KG BW/DAY