United States Department of Agriculture
Agricultural Marketing Service | National Organic Program
Document Cover Sheet
https://www.ams.usda.gov/rules-regulations/organic/national-list/petitioned

Document Type:

☐ **National List Petition or Petition Update**

A petition is a request to amend the USDA National Organic Program's National List of Allowed and Prohibited Substances (National List).

Any person may submit a petition to have a substance evaluated by the National Organic Standards Board (7 CFR 205.607(a)).

Guidelines for submitting a petition are available in the NOP Handbook as NOP 3011, National List Petition Guidelines.

Petitions are posted for the public on the NOP website for Petitioned Substances.

☒ **Technical Report**

A technical report is developed in response to a petition to amend the National List. Reports are also developed to assist in the review of substances that are already on the National List.

Technical reports are completed by third-party contractors and are available to the public on the NOP website for Petitioned Substances.

Contractor names and dates completed are available in the report.

Calcium Carbonate

Handling/Processing

Identification of Petitioned Substance

Chemical Names:
Calcium carbonate
Marble
Limestone
Vaterite
Calcite
Carbonic acid, calcium salt
Chalk

Other Name:
E 170
Aragonite
Dolomite
Calcium milk

Trade Names:
Caltrate
Maalox
Tums
Oyster Shell Calcium
Alcalak

CAS Numbers:
471-34-1 (calcium carbonate)
308068-21-5 (marble)
1317-65-3 (limestone)
13701-58-1 (vaterite)
13397-26-7 (calcite)
72608-12-9 (carbonic acid, calcium salt)
13397-25-6 (chalk)

Other Codes:
CI: 77220 (calcium carbonate)
INS: 170(i) (calcium carbonate)
ICSC: 1193 (calcium carbonate)
UNII: H0G9379FGK (calcium carbonate)
EC: 207-439-9 (calcium carbonate)
EC: 215-279-6 (limestone)
EC: 603-785-3 (calcite)
EC: 615-782-4 (carbonic acid, calcium salt)
EC: 603-784-8 (chalk)

Summary of Petitioned Use

Calcium carbonate is currently allowed under the National Organic Program (NOP) regulations at 7 CFR 205.605(a) as a nonagricultural nonsynthetic substance that may be used as an ingredient in or on processed products labeled "organic" or "made with organic (specified ingredients or food group(s))." Within food production, calcium carbonate has many applications including use as a coloring agent, acidity regulator (pH), food stabilizer, anticaking agent, and for nutritional fortification (EFSA, 2011c).

Characterization of Petitioned Substance

Composition of the Substance:
Calcium carbonate is an inorganic salt of natural (nonsynthetic) origin found in mineral deposits such as limestone and chalk. Calcium carbonate is among the most abundant matter in the earth's crust, with a composition of approximately 10% of sediments (Al Omari et al., 2016). Calcium carbonate is commercially available as a white microcrystalline powder of varying particle sizes, with a purity ≥98% (EFSA, 2011c).

Source or Origin of the Substance:
Calcium carbonate is isolated from natural mineral formations, primarily limestone and chalk, and from oyster shells. Calcium carbonate is isolated from raw minerals by calcination, a process of "heating to high temperatures in air or oxygen," during which the calcium carbonate ($CaCO_3$) is converted to calcium oxide (CaO), with carbon dioxide (CO_2) gas being released during the process (Al Omari et al., 2016; IUPAC, 2014). Calcination is followed by slaking, a process in which the calcium oxide (CaO) is hydrated through the addition of water (H_2O) to form the more stable form of lime, calcium hydroxide ($Ca(OH)_2$) (Hassibi, 1999). Finally, calcium carbonate is reformed in a purified state through the process of carbonation, in which carbon dioxide (CO_2) gas is bubbled through an aqueous slurry of calcium hydroxide ($Ca(OH)_2$),

resulting in the formation and precipitation of calcium carbonate ($CaCO_3$) (Domingo et al., 2004; EFSA, 2011c). Calcium carbonate may also be produced by crystallization of $CaCO_3$ formed via a salt metathesis reaction (Weiss et al., 2014).

Properties of the Substance:

The properties of calcium carbonate are summarized in Table 1.

Table 1. Properties of Calcium Carbonate

CAS Registry Number	471-34-1
Molecular Formula	$CaCO_3$
Molecular Weight	100.09 g/mol
Appearance	A white or nearly white powder or microcrystalline powder
Bulk Density	ca. 400 – 1,400 kg/m^3
Melting Point	825 °C (decomposition)
Water Solubility	0.14 g/L (20 °C)

Sources: PubChem 10112; Al Omari et al., 2016; Millipore-Sigma, 2015; EFSA, 2011c.

Specific Uses of the Substance:

Calcium carbonate is used for a wide range of applications in the food and agriculture industries. These applications include use as a coloring agent, food stabilizer, anticaking agent, gelling agent, glazing and release agent, thickener, bulking agent, acidity regulator, dough conditioner, and nutritional fortification additive (Al Omari et al., 2016; EFSA, 2011c; NOSB, 1995; NOSB, 2015). In addition to being a nutritional additive to food, calcium carbonate is also used as a dietary supplement, and in antacids (EFSA, 2011c; NOSB, 2015; PubChem 10112).

Calcium carbonate is also used in agricultural practices for the treatment and conditioning of soils, primarily as a means of adjusting soil pH. These treatment and conditioning practices may use calcium carbonate in a variety of forms, ranging from the precipitated salt to ground limestone (USGS, 2008). Moreover, calcium carbonate has been used in formulations to protect trees and their fruits (in orchards) from browsing game damage, when applied as a liquid solution that hardens to form a protective coating (EFSA, 2011a, b).

Approved Legal Uses of the Substance:

The United States Department of Agriculture (USDA) NOP has approved the usage of calcium carbonate at 7 CFR 205.605(a) as a nonagricultural, nonsynthetic substance that may be used as an ingredient in or on processed products labeled "organic" or "made with organic (specified ingredients or food group(s))."

The United States Environmental Protection Agency (EPA) allows the use of calcium carbonate as an "inert ingredient permitted in minimum risk pesticide products," at 40 CFR 152.25. The EPA also allows calcium carbonate as an "inert ingredient applied to animals," at §180.930.

The United States Food and Drug Administration (FDA) allows the use of calcium carbonate as a "color additive mixture for coloring drugs" at 21 CFR 73.1070, and as a "color additive mixture for coloring foods" at §73.70. The FDA allows the use of calcium carbonate in "lakes (Ext. D&C)" for "eternally applied drugs and cosmetics," at §82.2051. Calcium carbonate is also approved for use as a "colorant for polymers" at §178.3297. The FDA allows the use of calcium carbonate as a "component of the food-contact surface of paper and paperboard" at §176.170.

The FDA allows the use of calcium carbonate as an "active ingredient" in "antacid products for over the counter (OTC) human use" at §331.11. The FDA allows the use of calcium carbonate as a food stabilizer at §181.29 and §169.115. The FDA allows the use of calcium carbonate as a binding agent in meat and poultry pieces at §424.21.

The FDA has allowed the usage of calcium carbonate for the production of calcium citrate by the neutralization of citric acid at §184.1195, the production of calcium gluconate by the neutralization of gluconic acid at §184.1199, the production of calcium glycerophosphate by the neutralization of glycerophospjoric acid at §184.1201, the production of calcium lactate by the neutralization of lactic acid at §184.1207, and for the production of calcium oxide (CaO) by "calcination at temperatures of 1,700-2,450 °F" at §184.1210.

The Alcohol and Tobacco Tax and Trade Bureau (TTB) of the United States Department of the Treasury allows the use of calcium carbonate for the "treatment of wine and juice" at 29 CFR 24.246(2b).

Action of the Substance:

Calcium carbonate has several uses, with the primary applications being for regulation of acidity and for nutritional fortification of foods. In terms of regulation of acidity, there are several venues for this application, including the regulation of the gastrointestinal pH of humans, the acid contents in food and beverages (e.g., wine), and the pH of soils. In these applications, the carbonate anion acts as a base, which is able to neutralize both strong and weak acids, resulting in the formation of a new calcium salt and carbon dioxide (CO_2) gas (Al Omari et al., 2016; EFSA, 2011c; Holman and Stone, 2001; Oates, 1998). Although calcium carbonate has very low water solubility, the ionic compound is broken up by acids, greatly increasing the solubility of the calcium cation, and providing access to the basic properties of the carbonate anion (EFSA, 2011c; Oates, 1998).

Calcium carbonate is also used for nutritional fortification of food, as well as a dietary supplement. When used in this capacity, the water insoluble calcium carbonate is broken into its corresponding ions by stomach acid, as described above in acid regulation. Once the calcium ion has been liberated from the carbonate anion, it can be absorbed by the body via both active transport and passive diffusion, with the remainder of the ion being excreted in feces (Heaney, 2002). Once absorbed by the body, the majority of calcium is stored in the skeleton (EFSA, 2011c).

Combinations of the Substance:

Calcium carbonate is commercially available as a white or nearly white powder or microcrystalline powder without additional substances (e.g., inert ingredients, stabilizers, preservatives, carriers, anticaking agents, or other materials), with a purity ≥98%. When sold as ground limestone, the majority of the product is comprised of calcium carbonate (≥94%), although it has been noted that due to the natural formation of limestone, other minerals, including aluminum and magnesium, may be present in variable amounts (Al Omari et al., 2016; EFSA, 2011c; USGS, 2008).

Calcium carbonate is also a precursor to the substance calcium citrate, which is identified on the National List. As described above in **Approved Legal Uses of the Substance**, calcium citrate is formed by the neutralization of citric acid by the base calcium carbonate, as outlined at 21 CFR 184.1195.

Status

Historic Use:

Calcium carbonate has been used in organic agricultural production with a range of applications. These include its use as an acidity regulator (both in food and in soil), as a stabilizer, and for general use in the processing and preparation of foods.

Organic Foods Production Act, USDA Final Rule:

Calcium carbonate is not listed in the Organic Foods Production Act of 1990.

Calcium carbonate is listed at 7 CFR 205.605(a) as a nonagricultural nonsynthetic substance that may be used as an ingredient in or on processed products labeled "organic" or "made with organic (specified ingredients or food group(s)," and is also allowed for use in organic crop and livestock production at §205.105.

International

Canada - Canadian General Standards Board Permitted Substances List.

Calcium carbonate is listed in the Canadian General Standards Board Permitted Substances List (CAN/CGSB-32.311-2015) in Table 4.2 as allowed for "soil amendments and crop nutrition," with the exception that the calcium carbonate must be "mined," and from a "non-synthetic source." Calcium carbonate is also described as being allowed to "protect plants from harsh environmental conditions, such as frost and sunburn, infection, the buildup of dirt on leaf surfaces, or injury by a pest."

The Canadian General Standards Board Permitted Substances List (CAN/CGSB-32.311-2015) also identifies calcium carbonate in Table 6.3 as a "food additive," with the exception "prohibited for use as a colouring agent," and in Table 6.5 as a "processing aid." Calcium carbonate is also described as being in the form of lime as a "cleaner, disinfectant and sanitizer permitted on organic product contact surfaces for which a removal event is mandatory."

CODEX Alimentarius Commission, Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods (GL 32-1999) -
Calcium carbonate appears under CODEX GL 32-1999 guidelines as an allowed substance in "Table 1: Substances for use in Soil Fertilizing and Conditioning," without additional conditions, in "Table 3.1 Food additives, including carriers," without additional conditions, for use in "livestock and bee products," with specific conditions of "Milk products. Not as a colouring agent," and also for use in plant products, without additional conditions.

European Economic Community (EEC) Council Regulation, EC No. 834/2007 and 889/2008
Calcium carbonate is allowed under EC No. 889/2008 as a "fertilizer and soil conditioner," with the condition that it be "only of natural origin," as a "feed material of mineral origin," and as a "processing aid" for the "preparation of foodstuffs of plant origin," without specific conditions.

Japan Agricultural Standard (JAS) for Organic Production
Calcium carbonate is listed in the Japanese Agricultural Standard for Organic Plants (notification no. 1605) in Table 1 as a "fertilizer and soil improvement substance," with the exception that it must be "derived from natural sources, or natural sources without the use of chemical treatment." Calcium carbonate as a "wettable powder" is listed in Table 2 as a "substance for pant pest and disease control," which is "limited to the use for preventing harmful effects of copper wettable powder."

Calcium carbonate is listed in the Japanese Agricultural Standard for Organic Processed Foods (notification no. 1606) as a "food additive" in Table 1, with the exception that the substance is "limited to be used for dairy products (except for coloring) and for cheese as a coagulating agent."

Calcium carbonate is listed in the Japanese Agricultural Standard for Organic Feeds (notification no. 1607) in Article 4 in the form of limestone as a "production method for organic feeds."

International Federation of Organic Agriculture Movements (IFOAM) –
Calcium carbonate is listed in the IFOAM Norms in Appendix 4, Table 1, as an allowed "additive and processing/post-harvest handling aid" with a limitation of "not for coloring."

Evaluation Questions for Substances to be used in Organic Handling

Evaluation Question #1: Describe the most prevalent processes used to manufacture or formulate the petitioned substance. Further, describe any chemical change that may occur during manufacture or formulation of the petitioned substance when this substance is extracted from naturally occurring plant, animal, or mineral sources (7 U.S.C. § 6502 (21)).

Calcium carbonate is a naturally occurring mineral which is prevalent in the earth's crust (approximately 10%) and is found in all regions of the globe (Al Omari et al., 2016). Calcium carbonate is the major component of limestone and can be isolated and used as ground limestone. However, limestone is naturally occurring and may also contain other minerals (e.g., aluminum, magnesium, etc.) in varying amounts (Al Omari et al., 2016; EFSA, 2011c; USGS, 2008).

In the production of synthetic calcium carbonate, the ground limestone then undergoes a calcination process, during which the calcium carbonate limestone ($CaCO_3$) is converted to calcium oxide quicklime (CaO), with the loss of carbon dioxide (CO_2) gas (Domingo et al., 2004). The quicklime is then slaked, through the controlled addition of water (H_2O), resulting in the formation of calcium hydroxide slaked lime ($Ca(OH)_2$), which undergoes carbonation for the formation and precipitation of calcium carbonate ($CaCO_3$) (Domingo et al., 2004).

According to the FDA at 21 CFR 184.1191, calcium carbonate can be prepared "(1) as a byproduct in the 'Lime soda process;' (2) by precipitation of calcium carbonate from calcium hydroxide in the 'Carbonation process;' or (3) by precipitation of calcium carbonate from calcium chloride in the 'Calcium chloride process'."

In the "Lime soda process," a water softening procedure, slaked lime (calcium hydroxide ($Ca(OH)_2$)) is reacted with soda ash (sodium carbonate (Na_2CO_3)) in a salt metathesis, from which calcium carbonate is precipitated (Britannica, 2018).

In the carbonation of calcium hydroxide, slaked lime ($Ca(OH)_2$)) is added to a solution of carbonic acid (H_2CO_3), which has been prepared by the high-pressure injection of carbon dioxide (CO_2) gas into water (H_2O). Upon mixing, the solutions undergo a salt metathesis reaction, from which calcium carbonate is precipitated (Al Omari et al., 2016; Domingo et al., 2004; Brecevic and Kralj , 2007).

In the "calcium chloride process," calcium chloride ($CaCl_2$) and magnesium chloride ($MgCl_2$) solutions are adjusted to reach a pH of 7, at which point a solution of sodium carbonate (Na_2CO_3) is mixed in, resulting in the formation and precipitation of calcium carbonate (Al Omari et al., 2016; Montes-Hernandez et al., 2007).

Calcium carbonate may also be formed synthetically via a salt metathesis reaction, such as the combination of solutions of ammonium carbonate ($(NH_4)_2CO_3$) and calcium acetate ($Ca(CH_3COO)_2$) under an atmosphere of carbon dioxide (CO_2) gas (Al Omari et al., 2016; Weiss et al., 2014).

Evaluation Question #2: Discuss whether the petitioned substance is formulated or manufactured by a chemical process or created by naturally occurring biological processes (7 U.S.C. § 6502 (21)). Discuss whether the petitioned substance is derived from an agricultural source.

The majority of isolated calcium carbonate is derived from marine life, as calcium carbonate is a major component of the shells of marine organisms, pearls, and egg shells (Beruto and Giordan, 1993). The mineral deposits of calcium carbonate are then composed of the "skeletal remains and other biological constituents that include fecal pellets, lime mud (skeletal), and microbially mediated cements and lime muds." (Al Omari et al., 2016).

Calcium carbonate is also naturally formed by biomineralization processes of photosynthetic microalgae. The biomineralization process is achieved by enzymatic fixation of carbon dioxide (CO_2) gas, to form bicarbonate ions (HCO_3^-), which are then converted to calcium carbonate ($CaCO_3$) in the presence of calcium sources (Al Omari et al., 2016).

Calcium carbonate is isolated from the natural mineral deposits described above, and then is processed according to one of the methods described above in **Evaluation Question #1**, for the precipitation of purified calcium carbonate for commercial uses.

Evaluation Question #3: If the substance is a synthetic substance, provide a list of nonsynthetic or natural source(s) of the petitioned substance (7 CFR § 205.600 (b) (1)).

Calcium carbonate is a natural, nonsynthetic substance, although it may also be manufactured via salt metathesis reactions, such as the combination of solutions of ammonium carbonate ($(NH_4)_2CO_3$) and calcium acetate ($Ca(CH_3COO)_2$) to produce calcium carbonate as a precipitate, as described in **Evaluation Question #1** (Al Omari et al., 2016; Weiss et al, 2014).

Evaluation Question #4: Specify whether the petitioned substance is categorized as Generally Recognized as Safe (GRAS) when used according to FDA's good manufacturing practices (7 CFR § 205.600 (b)(5)). If not categorized as GRAS, describe the regulatory status.

Calcium carbonate has been listed as GRAS by the FDA at 21 CFR 184.1191 "with no limitation other than good manufacturing practice." Calcium carbonate has also been listed as GRAS as a "food additive," by the FDA at §582.1191, and as a "nutrient and/or dietary supplement" at §582.5191. Furthermore, ground limestone has been given GRAS status by the FDA at §184.1409 as long as it is composed of "not less than 94 percent" calcium carbonate.

Evaluation Question #5: Describe whether the primary technical function or purpose of the petitioned substance is a preservative. If so, provide a detailed description of its mechanism as a preservative (7 CFR § 205.600 (b)(4)).

Calcium carbonate does not function as a preservative.

Evaluation Question #6: Describe whether the petitioned substance will be used primarily to recreate or improve flavors, colors, textures, or nutritive values lost in processing (except when required by law) and how the substance recreates or improves any of these food/feed characteristics (7 CFR § 205.600 (b)(4)).

Calcium carbonate has been used as a coloring or whitening agent, with applications including paints, soaps, paper, cement, cosmetic products (e.g., mouth washes, creams, lotions), and medical and food products (DDW, 2014; Oregon DHS, 1998). However, in historic organic food processing, both within the United States and internationally, calcium carbonate is not allowed for coloration purposes (see **Status** section).

One of the major applications of calcium carbonate is for nutritional fortification, and it is also used directly as a dietary supplement for nutritional purposes. In this mode of action, the insoluble slat is broken down by stomach acid into its ions. Once in ionic form, the calcium cation (Ca^{2+}) may be absorbed into the body via active transport and/or passive diffusion, where it is then stored primarily in the skeleton (Heaney, 2002; EFSA, 2011c).

Evaluation Question #7: Describe any effect or potential effect on the nutritional quality of the food or feed when the petitioned substance is used (7 CFR § 205.600 (b)(3)).

The incorporation of calcium carbonate into food or feed will result in an enhancement of calcium ions (Ca^{2+}), which is absorbed and stored in the skeleton, as described above in **Evaluation Question #6**.

Evaluation Question #8: List any reported residues of heavy metals or other contaminants in excess of FDA tolerances that are present or have been reported in the petitioned substance (7 CFR § 205.600 (b)(5)).

No residues of heavy metals or other contaminants have been reported in the commercially available precipitated calcium carbonate. However, it has been noted that ground limestone (which is essentially calcium carbonate) may contain varying amounts of aluminum and magnesium (EFSA, 2011c; USGS, 2008).

Evaluation Question #9: Discuss and summarize findings on whether the manufacture and use of the petitioned substance may be harmful to the environment or biodiversity (7 U.S.C. § 6517 (c) (1) (A) (i) and 7 U.S.C. § 6517 (c) (2) (A) (i)).

The processing of calcium carbonate has the potential to provide negative environmental outcomes. These are largely centered on the resulting impacts to water systems, both above and below ground. Many mineral deposits containing calcium carbonate can serve as aquifers, which yield water to wells (USGS, 2008). Their possible contamination may be the result of natural contaminants, or from spills or other contaminants produced in the mining process (USGS, 2001). The disruption to ground water may also result in the decline of the local water table, which can have far-reaching effects. If the quarry site is in contact with the water table, flooding of the operation may result, causing the water to be pumped out and rerouted (USGA, 2001).

Mining may also have negative effects on biodiversity. As described above, mineral extraction efforts may result in the decline or reorganization of the water table and pumping of the sites may also change the state of surface water. These changes will result in a range of impacts to the surrounding ecosystems, depending on the scope and the identity of the ecosystem. There are also potential impacts to the disruption of subterranean environments (e.g., caves), which house species that may not be able to cope with habitat loss (USGS, 2001).

Evaluation Question #10: Describe and summarize any reported effects upon human health from use of the petitioned substance (7 U.S.C. § 6517 (c) (1) (A) (i), 7 U.S.C. § 6517 (c) (2) (A) (i)) and 7 U.S.C. § 6518 (m) (4)).

There are limited studies on the impact of calcium carbonate on humans. In the reported studies, increased intake of calcium can result in hypercalcemia and the formation of kidney stones when total daily calcium intake reaches levels at or above 2000 mg (Al Omari et al., 2016; EFSA, 2011c). The potential for hypercalcemia and alkalosis has been noted when subjects ingested calcium carbonate 2.0 to 16.5 g/day in the form of dietary supplements in concert with "large amounts" of milk or cream for the treatment of peptic ulcers (Martindale, 2002). Robson and Heading reported acute hypercalcemia and recurrent nephrolithiasis in three subjects that regularly ingested large quantities (7 to 15 g/day) of a calcium carbonate/sodium bicarbonate powder for 10 years (EFSA, 2011c; Robson and Heading, 1978). Bolland et al. report the increased risk of myocardial infraction in subjects whose intake calcium was above 805 mg/day, although it was noted that there was no effect below this threshold (Bolland et al., 2010).

Evaluation Question #11: Describe any alternative practices that would make the use of the petitioned substance unnecessary (7 U.S.C. § 6518 (m) (6)).

Due to the many applications of calcium carbonate, both in food and other industries, there are no alternative practices that reduce the value of calcium carbonate, which has become an integral part of agricultural production, processing, as well as human nutrition and health.

Evaluation Question #12: Describe all natural (nonsynthetic) substances or products which may be used in place of a petitioned substance (7 U.S.C. § 6517 (c) (1) (A) (ii)). Provide a list of allowed substances that may be used in place of the petitioned substance (7 U.S.C. § 6518 (m) (6)).

Sodium bicarbonate ($NaHCO_3$) and sodium carbonate (Na_2CO_3) are both natural substances that, like calcium carbonate, can be used for acid regulation (increasing pH). Sodium carbonate is a naturally-formed substance, which is found in the naturally occurring mineral trona, a mixture of hydrated sodium carbonate (Na_2CO_3) and sodium bicarbonate ($NaHCO_3$) (Solvay, 2014). Trona is a feedstock for the production of soda ash (sodium carbonate (Na_2CO_3)), and following extraction, the mineral is ground and calcined to produce sodium carbonate monohydrate ($Na_2CO_3 \bullet H_2O$), which can undergo further calcination to remove the hydrate (water molecule) (Kirk-Othmer, 2012). Sodium bicarbonate can be formed from the isolated sodium carbonate by treatment with water (H_2O) and a carbon dioxide (CO_2) source (PubChem 516892). Like calcium carbonate, both sodium carbonate and sodium bicarbonate are

effective acid regulators and are sometimes found in the same products and procedures for acid regulation (PubChem 10340).

Evaluation Information #13: Provide a list of organic agricultural products that could be alternatives for the petitioned substance (7 CFR § 205.600 (b) (1)).

Calcium hydroxide ($Ca(OH)_2$) (listed as hydrated lime), sodium carbonate (Na_2CO_3), and potassium bicarbonate ($KHCO_3$) are all listed as allowed nonsynthetic substances at 7 CFR 205.601. Calcium hydroxide provides the best alternative for calcium carbonate, as it provides both major functions of acid regulation (increasing pH), as well as a nutritional additive. (NOSB, 2002). However, calcium hydroxide has increased water solubility, and increased basicity compared to calcium carbonate, making it less desirable for some food processing applications (PubChem 6093208). Calcium hydroxide acts as a firming agent in addition to acid regulation (JECFA, 1965).

Sodium carbonate (Na_2CO_3) and potassium bicarbonate ($KHCO_3$) can also be used for acid regulation (increasing pH). However, like calcium hydroxide, these bases have much higher water solubility than calcium carbonate, and therefore do not require the presence of an acid to become soluble and 'active,' making them less desirable for some applications (PubChem 10340; PubChem 516893; PubChem 6093208; PubChem 10112).

Report Authorship

The following individuals were involved in research, data collection, writing, editing, and/or final approval of this report:

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All individuals are in compliance with Federal Acquisition Regulations (FAR) Subpart 3.11—Preventing Personal Conflicts of Interest for Contractor Employees Performing Acquisition Functions.

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