

Calcium Hypochlorite



Direct Use Chemical

(solid) 

Inputs to Manufacturing Process:
 Calcium Hydroxide Chlorine
 Sodium Hydroxide

% of Total Domestic Consumption Attributed to Water Sector:
 Greater than 10%

Product Family:
 Chlor-alkali Calcium

Derivative Water Treatment Chemicals:
 None

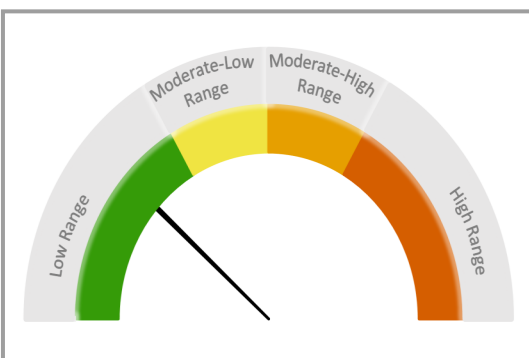
[Understanding Chemical Supply Chains](#)
[Map of Suppliers & Manufacturers](#)

CAS No.: 7778-54-3

Shelf Life:
 24 Months

RISK OF SUPPLY DISRUPTION (Assessed in 2022)

RISK RATING: Low



RISK DRIVERS

Production of calcium hypochlorite depends on supply of the chlor-alkali products chlorine and sodium hydroxide. Domestic manufacturing locations are co-located with chlor-alkali manufacturing sites. Imports are almost exclusively supplied by one country, and anti-dumping measures are in place for imports from China.

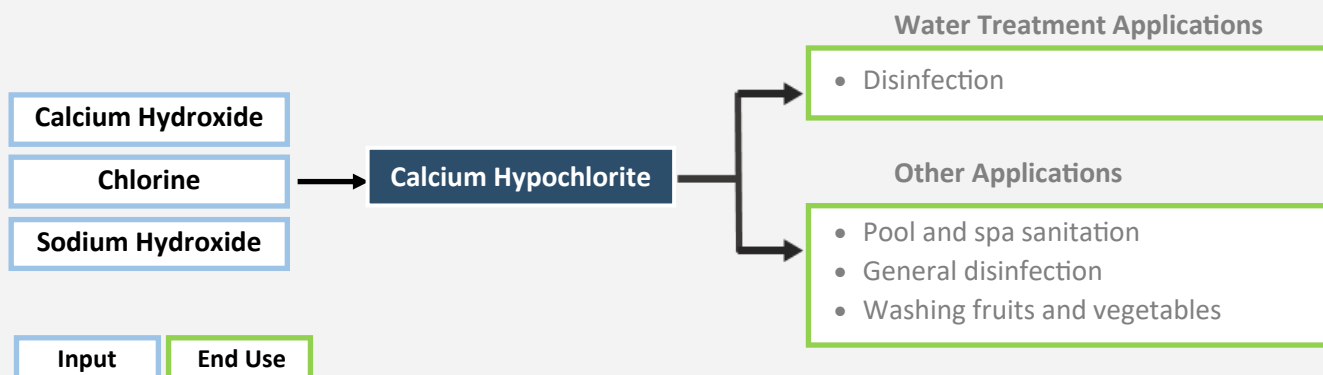
RISK PARAMETERS

Criticality: Moderate-High. Used for disinfection, though not as widely as other chlorine-based products.

Likelihood: Low. No history of supply disruptions between 2000 and 2022.

Vulnerability: Moderate-Low. Domestic manufacturing is limited to two locations, and imports are almost exclusively supplied by India. Production is heavily dependent on chlor-alkali products.

MANUFACTURING PROCESS



DOMESTIC PRODUCTION AND CONSUMPTION, AND INTERNATIONAL TRADE

Domestic Manufacturing Locations (2015):
 2, located in Tennessee and West Virginia

International Trade (2019)
 Primary Trading Partner (Imports): India
 Primary Trading Partner (Exports): Mexico

Domestic Production and Consumption
 Domestic manufacturing volume of calcium hypochlorite was not reported under the TSCA CDR and was not available from independent sources. Due to this data gap, U.S. consumption of calcium hypochlorite could not be estimated.

Product Description

Calcium hypochlorite ($\text{Ca}(\text{ClO})_2$), an inorganic chemical and strong oxidant, is a widely used pool disinfectant. It is a derivative product of the chlor-alkali industry, and production relies on supply of both chlorine and sodium hydroxide.

Use in Water Treatment

Calcium hypochlorite is utilized in disinfection in drinking water and wastewater treatment (AWWA, 2018), most often at very small systems since it is easier and safer to handle than gaseous chlorine or sodium hypochlorite.

Use as a Precursor to Other Water Treatment Chemicals

Calcium hypochlorite is not used to manufacture other water treatment chemicals.

Other Applications

Calcium hypochlorite is widely used in many industries and a variety of settings as a general disinfectant. It is most widely used for pool and spa disinfection. For this purpose it may be sold as a pure calcium hypochlorite solid, or as a blend with other ingredients such as calcium chloride and calcium hydroxide. Other uses include surface disinfection and washing fruits and vegetables (USITC, 2015).

Primary Industrial Consumers

The primary use of calcium hypochlorite is swimming pool disinfection, which has been estimated at 75% of domestic consumption. Municipal and industrial disinfection and bleaching have historically accounted for the majority of the remaining domestic consumption (NCBI, 2021; USITC, 2015).

Manufacturing, Transport, & Storage

Manufacturing Process

Calcium hypochlorite is produced using one of two methods: the calcium method or the sodium method. The sodium method, the most common method of domestic production, is based on the reaction of sodium hydroxide, chlorine, and calcium hydroxide. The calcium method reacts gaseous chlorine with calcium hydroxide to produce calcium hypochlorite, calcium chloride, and water.

The sodium method may begin with the production of sodium hypochlorite or may proceed with sodium hypochlorite as a starting material. As described in the manufacturing process for the sodium hypochlorite supply chain (EPA, 2022a), chlorine is reacted with sodium hydroxide to yield sodium hypochlorite, sodium chloride, and water. Sodium hypochlorite is then reacted with calcium hydroxide and chlorine through a series of reactions to produce a calcium hypochlorite paste which is filtered and dried to produce a granular or powdered calcium hypochlorite (USITC, 2020). The overall equation for this process is outlined in Figure 1.

Sodium Method

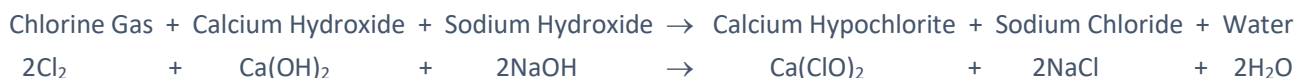


Figure 1. Chemical Equation for the Total Chemical Reaction to Manufacture Calcium Hypochlorite

Product Transport

Calcium hypochlorite may be transported in container by truck, rail, barge, and ship; however, purities above

39% chlorine content by weight are considered hazardous materials and require special handling (CINS and P&I, 2016).

Storage and Shelf Life

Calcium hypochlorite should be stored in a tightly closed container and kept in cool, dry conditions. When stored properly, calcium hypochlorite can have a shelf life of 24 months (ACI, 2015).

Domestic Production & Consumption

Domestic Production

Production data was unavailable from the EPA Toxic Substances Control Act (TSCA) Chemical Data Reporting (CDR) and other independent sources. Trade data was collected from the U.S. International Trade Commission (USITC) Dataweb, as characterized in Table 1. Trade data are specific to calcium hypochlorite.

Table 1. Calcium Hypochlorite Production and Trade Data Sources

Production and Trade Data			
Category	Data Source	Identifier	Description
Domestic Production	Not Available	CAS No.: 7778-54-3	Calcium Hypochlorite
Imports and Exports	U.S. International Trade Commission	HS Code: 2828.10	Calcium Hypochlorite

Total U.S. domestic manufacturing of calcium hypochlorite could not be estimated. There are two known domestic producers, one in Tennessee and the other in West Virginia, and neither producer has made production volume public (EPA, 2016; EPA 2020). This is in part due to a history of trade challenges and foreign product antidumping measures (USITC, 2015; USITC, 2020). Both domestic production facilities are co-located with chlor-alkali manufacturing sites. Supply of NSF/ANSI Standard 60 certified calcium hypochlorite for use in drinking water treatment is available at 14 locations in the continental U.S., as shown in Figure 2 (NSF International, 2021). For a more current listing of manufacturing locations and supplier locations, visit the U.S. Environmental Protection Agency's (EPA's) [Chemical Locator Tool](#) (EPA, 2022a).

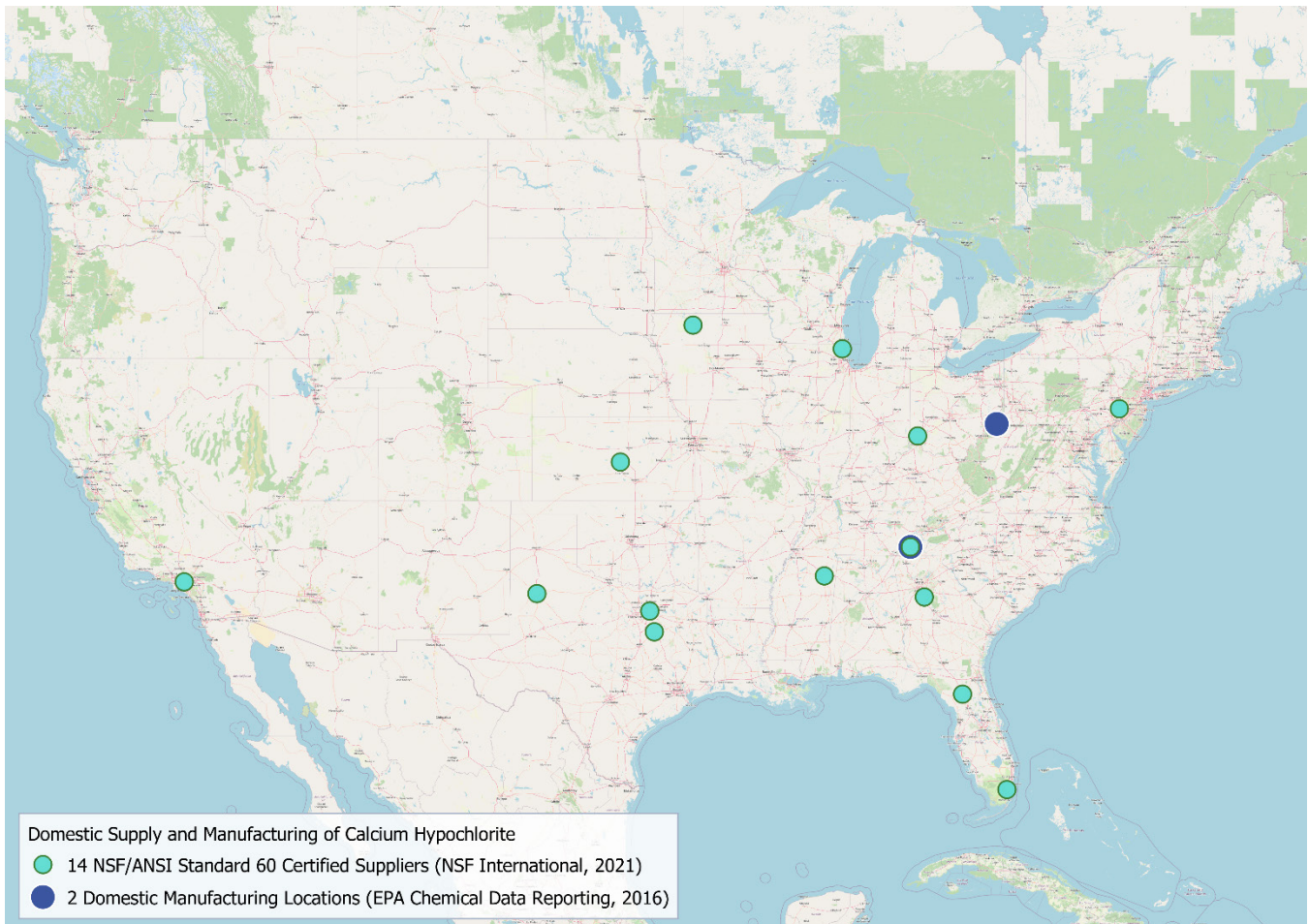


Figure 2. Domestic Supply and Manufacturing of Calcium Hypochlorite

Domestic Consumption

Due to lack of available production data, domestic consumption of calcium hypochlorite could not be estimated.

Trade & Tariffs

Worldwide Trade

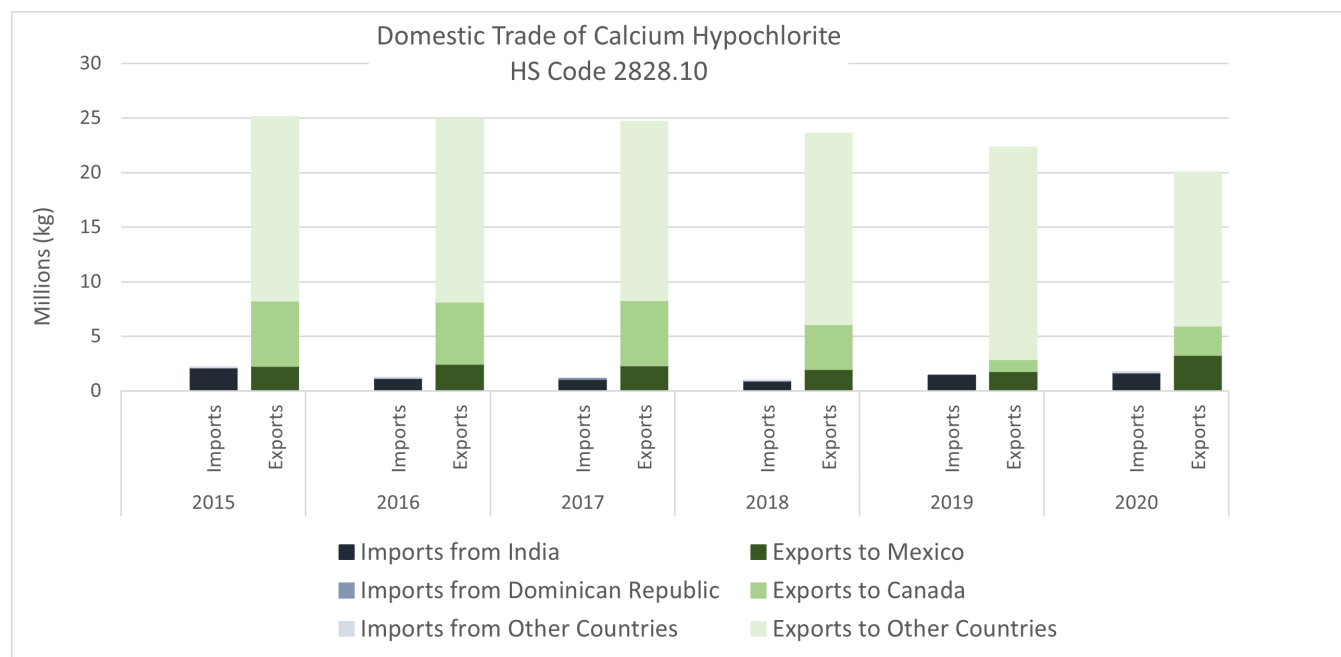
Worldwide import and export data for calcium hypochlorite are reported through the World Bank’s World Integrated Trade Solutions (WITS) software, as a category specific to commercial calcium hypochlorites. In 2021, the U.S. ranked fifth worldwide in total exports and 14th in total imports. In 2021, China ranked first worldwide in total exports while Vietnam ranked first in total imports (WITS, 2022), as shown in Table 2.

Table 2. WITS Worldwide Export and Import of Calcium Hypochlorite in 2021

2021 Worldwide Trade Commercial Calcium Hypochlorites (HS Code 2828.10)			
Top 5 Worldwide Exporters		Top 5 Worldwide Importers	
China	95 M kg	Vietnam	24 M kg
India	37 M kg	France	17 M kg
South Africa	19 M kg	Philippines	12 M kg
Japan	18 M kg	Brazil	9 M kg
United States	18 M kg	Canada	8 M kg

Domestic Imports and Exports

Domestic import and export data are reported by USITC in categories specific to calcium hypochlorite. Figure 3 summarizes imports for consumption¹ and domestic exports² of calcium hypochlorite between 2015 and 2020. During this period, the overall quantity of exports gradually decreased while the quantity of imports remained steady, with domestic exports consistently exceeding imports for consumption. Over this five-year period, Mexico and Canada were the primary recipients of domestic exports, though the U.S. exports to numerous countries. India was the source of greater than 98% of imports for consumption throughout this period. Prior to 2015, China was the primary source of imports (USITC, 2021).

**Figure 3. USITC Domestic Import and Export of Calcium Hypochlorite between 2015 and 2020**

¹ Imports for consumption are a subset of general imports, representing the total amount cleared through customs and entering consumption channels, not anticipated to be reshipped to foreign points, but may include some reexports.

² Domestic exports are a subset of total exports, representing export of domestic merchandise which are produced or manufactured in the U.S. and commodities of foreign origin which have been changed in the U.S.

Tariffs

There is a 2.4% general duty for import of calcium hypochlorite (USITC, 2022), as summarized in Table 3. Imports from China are subject to additional duties of 25% and 65.85% (Federal Register, 2020; USITC, 2022).

Table 3. Domestic Tariff Schedule for Calcium Hypochlorite in 2021

HS Code	General Duty	Additional Duty – China (Section 301 Tariff List)	Additional Duty – China ³	Special Duty
2828.10	2.4%	25%	65.85%	Free (A, AU, BH, CL, CO, D, E, IL, JO, KR, MA, OM, P, PA, PE, S, SG) ⁴

Market History & Risk Evaluation

History of Shortages

Production of calcium hypochlorite depends on the chlor-alkali industry to produce the manufacturing inputs. Changes to production of chlor-alkali products may impact production of calcium hypochlorite. However, no notable calcium hypochlorite domestic supply chain disruptions impacted the water sector between 2000 and 2022.

Risk Evaluation

The complete risk assessment methodology is described in *Understanding Water Treatment Chemical Supply Chains and the Risk of Disruptions* (EPA, 2022b). The risk rating is calculated as the product of the following three risk parameters:

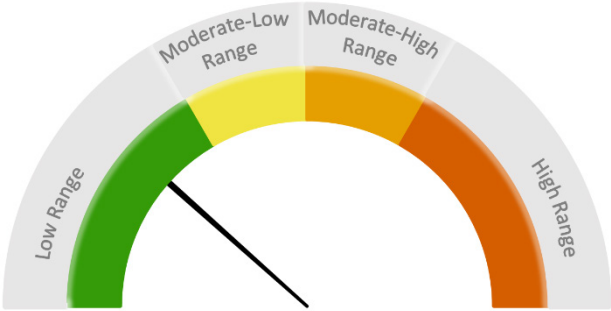
Risk = Criticality x Likelihood x Vulnerability	
Criticality	Measure of the importance of a chemical to the water sector
Likelihood	Measure of the probability that the chemical will experience a supply disruption in the future, which is estimated based on past occurrence of supply disruptions
Vulnerability	Measure of the market dynamics that make a chemical market more or less resilient to supply disruptions

The individual parameter rating is based on evaluation of one or more attributes of the chemical or its supply chain. The ratings and drivers for these three risk parameters are shown below in Table 4.

³ Calcium Hypochlorite From the People's Republic of China: Final Results of the Expedited First Sunset Review of the Countervailing Duty Order, 85 Fed. Reg. 67,19443 (April 7, 2020), the Department of Commerce published noticed that calcium hypochlorite imported from China would continue to be subject to countervailing import duties.

⁴ Symbols used to designate the various preference programs and trade agreements. A full list of special trade agreements and associated acronyms can be found at https://help.cbp.gov/s/article/Article-310?language=en_US and the General Notes Section of the Harmonized Tariff Schedule <https://hts.usitc.gov/current>

Table 4. Supply Chain Risk Evaluation for Calcium Hypochlorite

Risk Parameter Ratings and Drivers					
Criticality	Moderate- High	Likelihood	Low	Vulnerability	Moderate-Low
Calcium hypochlorite is used for disinfection, though not as widely as other chlorine-based disinfectants.		The water sector has not experienced calcium hypochlorite supply chain disruptions between 2000 and 2022.		Domestic manufacturing is limited to two location, and imports are almost exclusively supplied by one country (India). The production of calcium hypochlorite is heavily dependent on chlor-alkali products chlorine and sodium hydroxide.	
Risk Rating: Low					
					

References

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