

Hydrogen Peroxide




(liquid) 


Direct Use Chemical **P**recursor Chemical

 **Inputs to Manufacturing Process:**
Hydrogen Anthraquinone


 **% of Total Domestic Consumption Attributed to Water Sector:**
Approximately 10%

 **Product Family**
Petroleum Byproducts

CAS No.: 7722-84-1

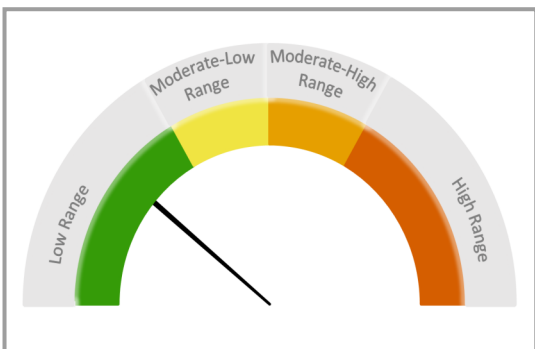
 **Derivative Water Treatment Chemicals:**
Sodium Chlorite

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

 **Shelf Life:**
12+ Months

RISK OF SUPPLY DISRUPTION (Assessed in 2022)

RISK RATING: Low



RISK DRIVERS

Use of hydrogen peroxide in pulp and paper processing accounts for the majority of consumption of domestic production. Long-distance transport of hydrogen peroxide, a hazardous substance, may be limited. This can create logistical gaps between production locations and point of use.

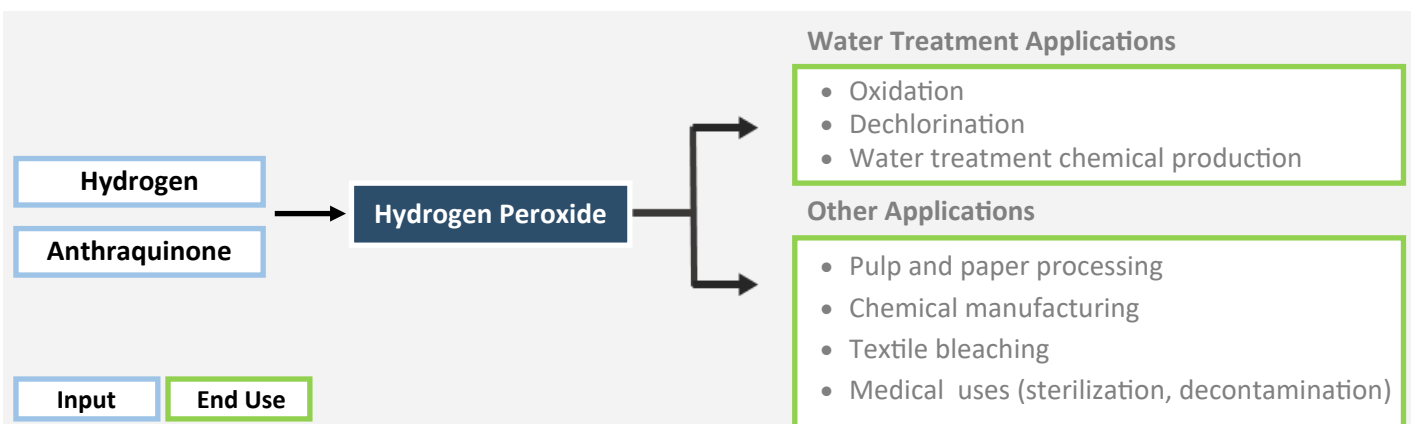
RISK SCORE PARAMETERS

Criticality: High. Essential for oxidation, dechlorination, and production of water treatment chemicals.


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

Vulnerability: Low. Distributed domestic manufacturing and supply.

MANUFACTURING PROCESS



DOMESTIC PRODUCTION AND CONSUMPTION, AND INTERNATIONAL TRADE

Domestic Manufacturing Locations (2015):
 **13, distributed throughout the U.S.**

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



Domestic Consumption (2019):
336 M kg

- Domestic Production (324 M kg)
- Imports for Consumption (103 M kg)
- Export of Domestic Production (91 M kg)

Product Description

Hydrogen peroxide (H₂O₂), a highly soluble, inorganic oxidant is used as an oxidizing agent. It is a widely used oxidant and dechlorinating agent in water and wastewater treatment. The majority of hydrogen peroxide manufactured in the U.S. is used in paper and textile bleaching.

Use in Water Treatment

Hydrogen peroxide is used in water treatment as an oxidizing agent and for dechlorination.

Use as a Precursor to Other Water Treatment Chemicals

Hydrogen peroxide is used to manufacture sodium chlorite.

Other Applications

Hydrogen peroxide has a wide range of applications. The leading uses of hydrogen peroxide are pulp and paper processing, chemical manufacturing, textile bleaching, medical applications such as sterilization and decontamination, food processing, medicines and pharmaceuticals, a component of rocket fuel, and agricultural and livestock applications (FTC, 2019; NCBI, 2021).

Primary Industrial Consumers

Most domestically produced hydrogen peroxide is used for bleaching of paper products, deinking of recycled paper, and bleaching textiles. Collectively, these activities account for approximately 65% of domestic consumption. Approximately 10% of domestic consumption is used in water treatment (FTC, 2019; NCBI 2021).

Manufacturing, Transport, & Storage

Manufacturing Process

The most common raw materials for the production of hydrogen peroxide are a source of hydrogen and anthraquinone, which is a polyacrylic aromatic hydrocarbon derived from coal tar or combustion of oil or gas.

In the U.S., hydrogen peroxide is most commonly produced in an autoxidation process in proximity to a source of hydrogen, historically from coal, oil or natural gas. The process is energy intensive. The reactions for this process are shown in Figure 1. In this process, anthraquinone reacts with hydrogen in the presence of a catalyst to form anthrahydroquinone. The subsequent step removes the hydrogen from the anthrahydroquinone through oxidation with atmospheric oxygen to produce hydrogen peroxide, which is extracted with water. The crude hydrogen peroxide is diluted, filtered, and stabilized.

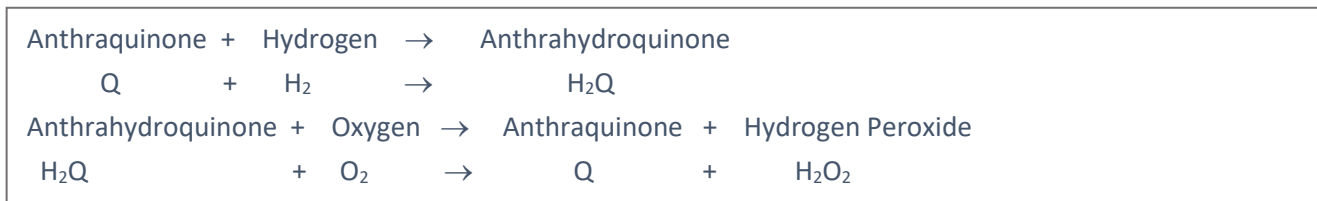


Figure 1. Chemical Equation for the Reaction to Manufacture Hydrogen Peroxide

Product Transport

Hydrogen peroxide is considered a hazardous material when the solution concentration is greater than 8% by weight. While transport across the U.S. may be primarily by rail or truck, hydrogen peroxide can be transported in bulk or smaller containers by other means including barge or ship. Bulk quantity consumers may rely exclusively on regional production to avoid high transportation costs and risk of interruptions to supply (FTC, 2019; Solvay, 1998).

Storage and Shelf Life

Hydrogen peroxide is stable under recommended storage conditions, but degrades when exposed to direct sun and heat. When stored properly, hydrogen peroxide can have a shelf life greater than twelve months, though stability may depend upon many factors (Solvay, 2020).

Domestic Production & Consumption

Domestic Production

Production data was collected from 2020 EPA Chemical Data Reporting (CDR), while trade data was collected from the U.S. International Trade Commission (USITC) Dataweb, as shown in Table 1. Both production and trade data are specific to hydrogen peroxide.

Table 1. Hydrogen Peroxide Production and Trade Data Sources

Production and Trade Data			
Category	Data Source	Identifier	Description
Domestic Production	2020 EPA Chemical Data Reporting	CAS No.: 7722-84-1	Hydrogen Peroxide
Imports and Exports	U.S. International Trade Commission	HS Code: 2847.00	Hydrogen Peroxide

Total U.S. domestic production of hydrogen peroxide was approximately 324 million kilograms (M kg) in 2019 (EPA, 2020). The primary domestic manufacturers include *Evonik*, *MGC Pure Chemicals*, and *Solvay*. Solvay indicates they are one of the largest worldwide hydrogen peroxide manufacturers (Solvay, 2022). The number of domestic manufacturing locations shown in Figure 2 represents operating facilities as of 2015 (EPA, 2016). Supply of NSF/ANSI Standard 60 certified hydrogen peroxide for use in drinking water treatment is widely distributed throughout the U.S. (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).

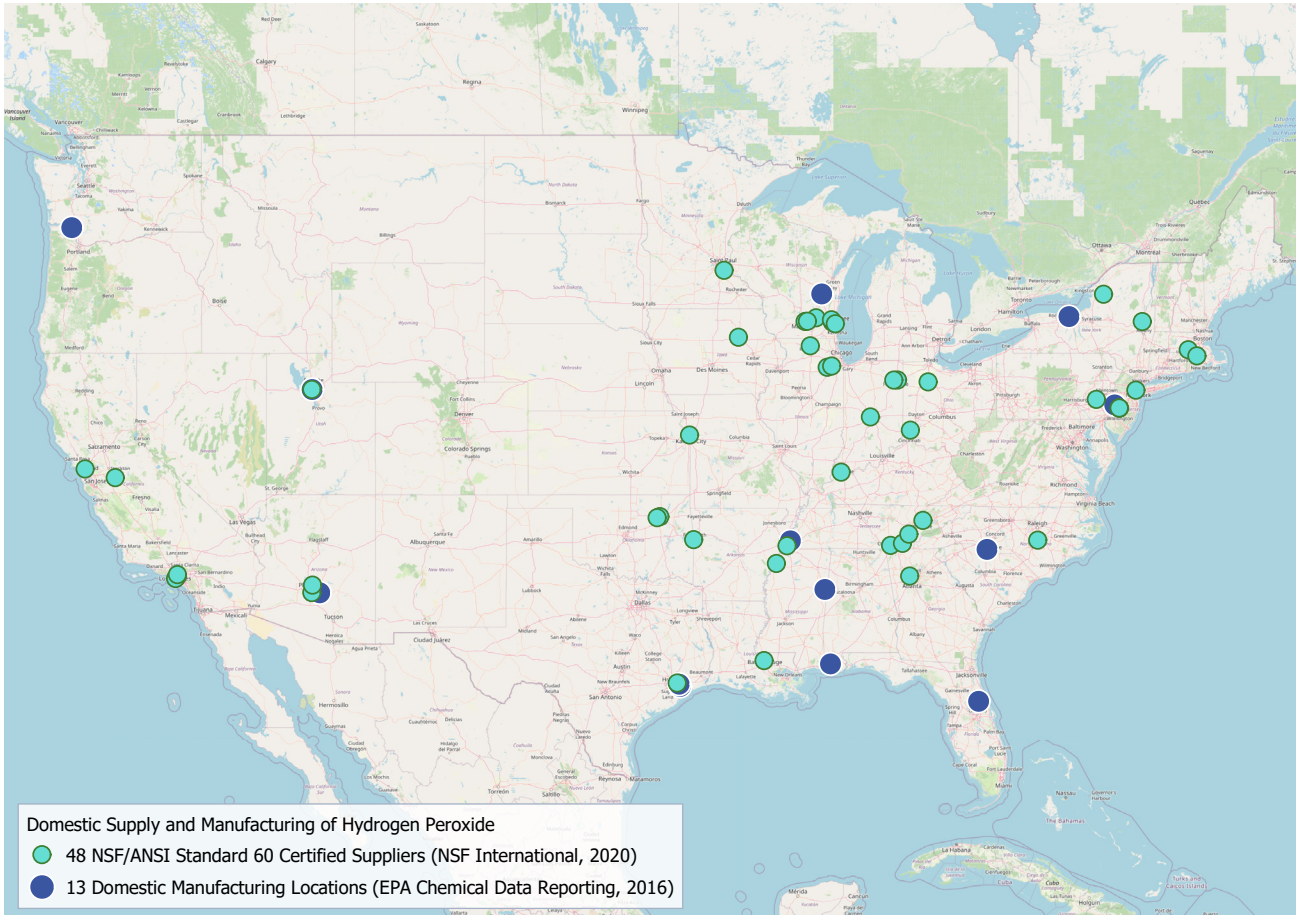


Figure 2. Domestic Supply and Manufacturing of Hydrogen Peroxide

Domestic Consumption

U.S. consumption of hydrogen peroxide in 2019 is estimated at 336 M kg. This estimate includes production of 324 M kg, import of 103 M kg, minus export of 91 M kg (EPA, 2020; USITC, 2021), as shown in Figure 3.

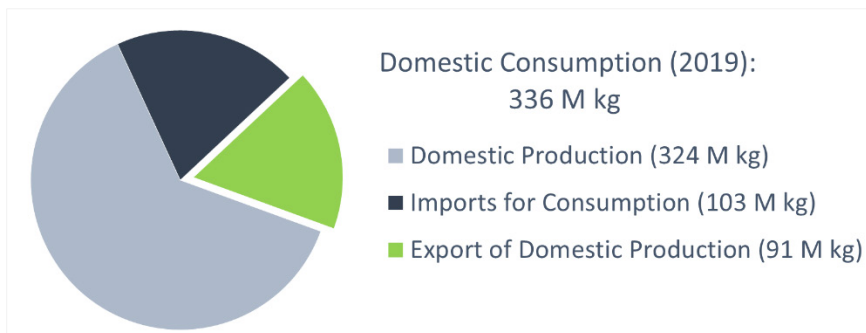


Figure 3. Domestic Production and Consumption of Hydrogen Peroxide in 2019

Trade & Tariffs

Worldwide Trade

Worldwide import and export data for hydrogen peroxide are reported through the World Bank’s World Integrated Trade Solutions (WITS) software, as a category specific to hydrogen peroxide. Export and import quantities were not reported to WITS for numerous countries including China, Japan, and India. In 2021, the U.S.

ranked eighth worldwide in total exports and second in total imports of hydrogen peroxide. In 2021, Brazil ranked first worldwide in total exports and Italy ranked first worldwide in total imports (WITS, 2022), as shown in Table 2.

Table 2. WITS Worldwide Export and Import of Hydrogen Peroxide in 2021

2021 Worldwide Trade Hydrogen Peroxide (HS Code 2847.00)			
Top 5 Worldwide Exporters		Top 5 Worldwide Importers	
Brazil	148 M kg	Italy	97 M kg
Belgium	144 M kg	United States	90 M kg
Thailand	144 M kg	Netherlands	68 M kg
Sweden	139 M kg	France	59 M kg
Germany	103 M kg	Israel	56 M kg

Domestic Imports and Exports

Domestic imports and export data are reported by USITC in categories specific to hydrogen peroxide. Figure 4 summarizes imports for consumption¹ and domestic exports² of hydrogen peroxide between 2015 and 2020. During this period, the overall quantity of exports and imports remained relatively steady, with imports for consumption exceeding domestic exports in all years between 2015 and 2020 apart from 2018. Over this five-year period, Mexico was the primary recipient of domestic exports and Canada the primary source of imports (USITC, 2021).

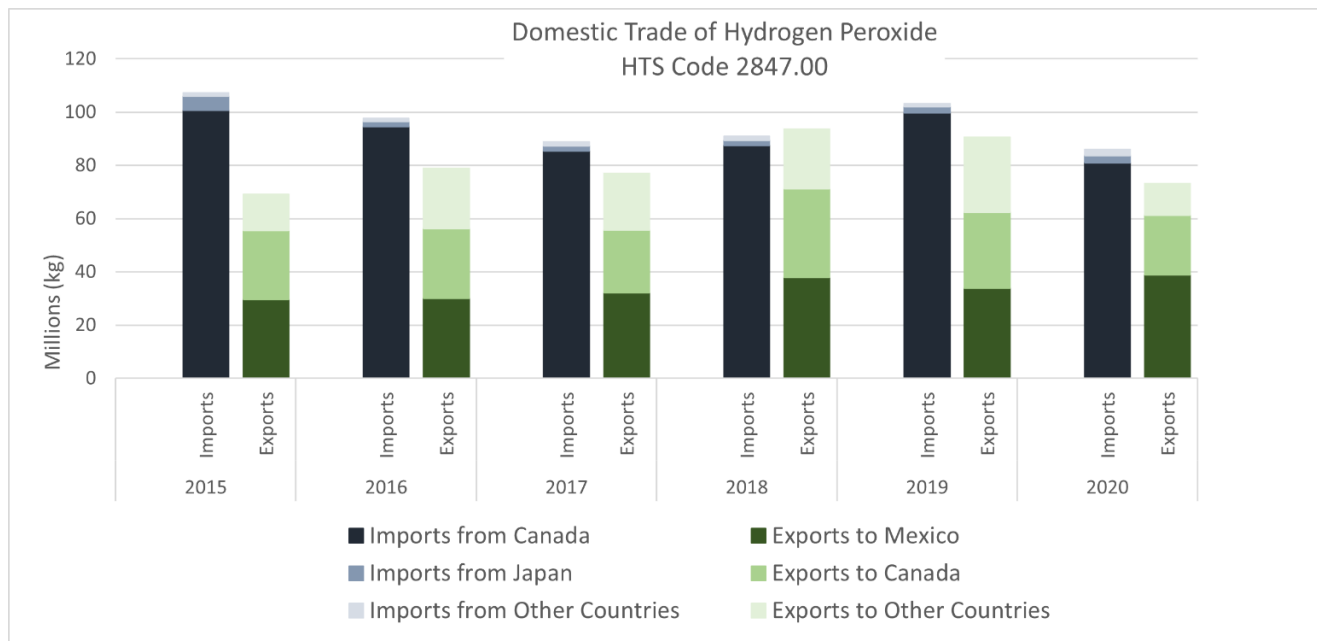


Figure 4. USITC Domestic Import and Export of Hydrogen Peroxide between 2015 and 2020

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 3.7% general duty, and 25% additional duty on imports from China (USITC, 2022), as summarized in Table 3.

Table 3. 2020 Domestic Tariff Schedule for Hydrogen Peroxide

HS Code	General Duty	Additional Duty – China (Section 301 Tariff List)	Special Duty
2847.00	3.7%	25%	Free (A, AU, BH, CL, CO, D, E, IL, JO, KR, MA, OM, P, PA, PE, S, SG) ³

Market History & Risk Evaluation

History of Shortages

There were no identified hydrogen peroxide supply chain disruptions between 2000 and 2022.

Risk Evaluation

The complete risk evaluation 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 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 Hydrogen Peroxide

Risk Parameter Ratings and Drivers					
Criticality	High	Likelihood	Low	Vulnerability	Low
Hydrogen peroxide has widespread application for as an oxidizing agent and as a dechlorinating agent. It is a precursor in the production of sodium chlorite.		The water sector has not experienced hydrogen peroxide supply chain disruptions between 2000 and 2022.		Strong domestic manufacturing capabilities and a distributed manufacturing base provide some resilience to supply disruptions.	
Risk Rating: Low					

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