

Product Safety Summary

Hydrogen Peroxide

CAS No. 7722-84-1

This Product Safety Summary is intended to provide a general overview of the chemical substance. The information on the summary is basic information and is not intended to provide emergency response information, medical information or treatment information. The summary should not be used to provide in-depth safety and health information. In-depth safety and health information can be found on the Material Safety Data Sheet (MSDS) for the chemical substance.

Names

- Hydrogen peroxide
- Peroxide
- Hydroperoxide
- Hydrogen dioxide

Product Overview

Hydrogen peroxide is used in applications ranging from paper pulp bleaching and the synthesis of other chemicals to a wide variety of environmental treatment applications. It is also used as a household disinfectant and is contained in consumer products ranging from teeth whiteners to hair bleach.

Solvay Chemicals, Inc. does not sell hydrogen peroxide directly to consumers. Most hydrogen peroxide is used in industrial applications and in other processes where workplace exposures can occur. A relatively small amount (< 5%) is used in consumer applications where the consumer may be exposed or is intentionally exposed to lower concentrations of hydrogen peroxide. In the United States, most of these applications are regulated by the United States Department of Agriculture (USDA), the Food and Drug Administration (FDA), or the Environmental Protection Agency (EPA).

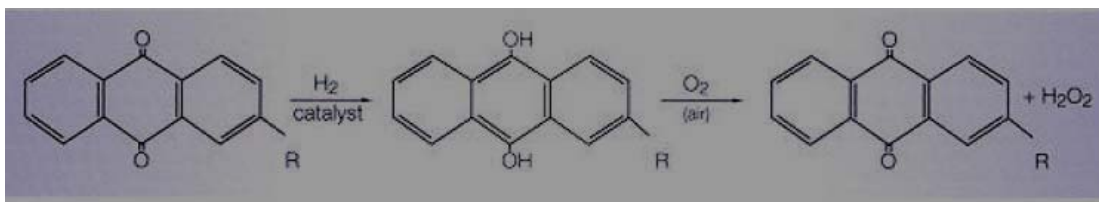
At the lower concentrations ($\leq 6\%$) typically contained in consumer products, hydrogen peroxide may be an irritant to eyes. Exposure to industrial strength concentrations (typically $\geq 34\%$) can cause severe irritation or burns to the skin, eyes, and respiratory tract.

Ingestion should be avoided at all concentrations. **Solvay Chemicals, Inc. does not condone the ingestion or any other internal use of hydrogen peroxide at any concentration or for any purpose.**

Most hydrogen peroxide is consumed in the applications where it is used; however, it is not persistent in the environment and readily decomposes to water and oxygen when exposed to soils, sediments, and surface or ground waters.

Manufacture of Product

- Hydrogen peroxide production capacity in North America is approximately 1.6 billion pounds (726 thousand metric tons), of which Solvay Chemicals, Inc. has a capacity share of approximately 25% (410 million pounds). Solvay Chemicals, Inc. production facilities are strategically located along the Gulf Coast and in the Pacific Northwest.
- Solvay Chemicals, Inc. manufactures hydrogen peroxide using the autoxidation or AO process. The process reduces substituted anthraquinone to anthraquinol, then oxidizes it back to form hydrogen peroxide (H_2O_2) and the original anthraquinone (see below).



The hydrogen peroxide is extracted from the organic anthraquinone with water and then concentrated to produce the commercial grades of product sold to customers.

Product Description

Hydrogen peroxide (H_2O_2) is manufactured and sold in aqueous solutions. These solutions are clear, colorless liquids that have very little odor at the lower concentrations found in consumer products. However, they have a slightly sharp, pungent odor in higher strength industrial concentrations. Common industrial strength concentrations are 35%, 50% and 70%. Typical physical properties for these solutions are provided in Table 1.

Table 1: Typical physical properties for 35%, 50% and 70% hydrogen peroxide solutions

H ₂ O ₂ Content (% in water)	35%	50%	70%
Freezing point (° C)	-33	-52	-40
Boiling point (° C)	108	115	125
Density (lbs/gal @ 20° C)	9.4	10.0	10.8
Flash point (° C)	Non- flammable		
Vapor Pressure	9 mm Hg (50% H ₂ O ₂ @ 20° C)		
Vapor Density	1.0 (same as air)		
pH	Acidic (1.0 – 4.0)		

Product Uses

More than two-thirds of the hydrogen peroxide produced in the United States and Canada is used by the pulp and paper industry to bleach wood pulp prior to making paper. Other major uses include textile bleaching, chemical synthesis and environmental applications such as wastewater treatment and the control of odor at waste treatment facilities.

High purity hydrogen peroxide is used in the manufacture of semiconductors and some hydrogen peroxide is used to make other peroxygen compounds such as sodium percarbonate, often used as a dry bleach, and peracetic acid, which is most often used as a disinfectant or pesticide.

Consumer uses of hydrogen peroxide include teeth whitening products and as a household antiseptic. Hydrogen peroxide is also used to treat drinking water and as a microbial control agent in aseptic packaging lines.

Exposure Potential

- **Workplace exposure** - Exposure can occur at either a hydrogen peroxide manufacturing facility, a manufacturing, packaging or municipal treatment facility that stores, packages or uses hydrogen peroxide, or during transport. The systems used to manufacture hydrogen peroxide are closed as are most of the manufacturing processes in which it is used. Persons involved in maintenance, sampling and testing activities, or in the loading and unloading of hydrogen peroxide transport vessels are at greater risk of

exposure. Following good industrial hygiene practices will minimize the likelihood of exposure; however, persons involved in higher risk activities should always wear proper personal protective equipment such as rubber gloves and boots, an acid or slicker suit, goggles and a hard hat. In instances where the potential for splashes is high, a face shield should also be worn.

In concentrations at or above 52%, the US Occupational Safety and Health Administration (OSHA) lists hydrogen peroxide as a Process Safety Hazard (PSM) chemical. As such, it is subject to the rules regarding PSM facilities.

- **Consumer exposure to products containing hydrogen peroxide** - Although Solvay Chemicals, Inc. does not sell hydrogen peroxide directly to consumers, it is used in a variety of consumer products. In some instances, the directions for the use of these products require direct application to skin (brown bottle antiseptic) or other parts of the body (teeth whiteners). Most of these applications are governed to some extent by the FDA, USDA or EPA rules and the user should only use these products in strict compliance with the manufacturer's use and/or label instructions.
- **Solvay Chemicals, Inc. does not condone the ingestion, injection or any other internal use of hydrogen peroxide.** Such uses have been condemned by the American Medical Association, the United States Food and Drug Administration, and Health Canada. For more information on the warnings concerning the human consumption of hydrogen peroxide, please consult the Solvay Chemicals, Inc. technical data sheet "[Warning Against Human Consumption of Hydrogen Peroxide](#)".
- **Environmental releases** - Spills of hydrogen peroxide should be contained and isolated from waterways, sewer drains, and any flammable or combustible materials. Small spills should be diluted with large amounts of water and disposed of in accordance with applicable local, state or federal regulations. Do not use absorbents or adsorbents to soak up hydrogen peroxide spills. Absorbents and adsorbents may contain organics that can react with hydrogen peroxide. Rinse hydrogen peroxide contaminated cloth or paper towels with water until they are free of residual hydrogen peroxide. Failure to do so may result in a fire once they dry. Persons attempting to clean up hydrogen peroxide spills should wear proper personal protective equipment (See guidelines in the Workplace exposure section of this document or the [Material Safety Data Sheet](#)).
- **Large spills** - Large spills of hydrogen peroxide are rare and are usually contained. When large spills do occur, they should be contained and isolated from waterways, sewer drains, and any flammable or combustible materials by constructing dikes of

earth, sand or some other inert material. Diluting large spills with water will reduce the evolution of steam, oxygen gas, and entrained hydrogen peroxide. Emergency responders should wear proper personal protective equipment and should only approach hydrogen peroxide spills from up wind. Once the spill is contained, the hydrogen peroxide should be allowed to decompose before being collected and disposed of in accordance with applicable local, state, and federal regulations. If required, report spills to the appropriate state or federal authorities.

- **Fires** - Fires involving hydrogen peroxide should be extinguished with water. Containers of hydrogen peroxide involved in a fire should be cooled with water sprays. If the container begins to discolor or vent violently, emergency responders should evacuate the area.

For additional information concerning hydrogen peroxide emergency response procedures, please consult the [Material Safety Data Sheet](#).

Health Information

The concentrations of hydrogen peroxide typically found in consumer products ($\leq 6\%$) pose little risk of symptoms due to skin or inhalation exposure. Persons suffering from eye or ingestion exposure to consumer strength hydrogen peroxide products may experience symptoms similar to persons exposed to industrial strength hydrogen peroxide (see below).

Exposures to industrial strength hydrogen peroxide can produce the following adverse health affects:

- **Contact** - Skin exposures can cause symptoms ranging from minor skin irritation to painful redness and swelling. Severe burns can occur if treatment is delayed after exposure to concentrated solutions of hydrogen peroxide. Eye exposure to hydrogen peroxide may result in severe eye irritation, burns or even blindness.
- **Inhalation** - The inhalation of hydrogen peroxide can cause symptoms ranging from nose and throat irritation to coughing and difficulty breathing. Repeated or prolonged exposures may cause sore throat, nosebleeds and chronic bronchitis.
- **Ingestion** - The ingestion of hydrogen peroxide may cause bloating, belching, irritation of the upper digestive and respiratory tracts, nausea, vomiting, difficulty breathing, edema, excessive fluid in the mouth and nose, and shock. The ingestion of concentrated solutions of hydrogen peroxide may be fatal.
- **Other Effects** - The International Agency for Research on Cancer (IARC) has determined that hydrogen peroxide is carcinogenic in experimental animals at relatively high dose rates. Available epidemiologic studies do not confirm an increased risk of



cancer in exposed humans. Available evidence suggests that hydrogen peroxide is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

For more information on health effects and routes of exposure, or for information concerning proper first aid measures, please consult the [Material Safety Data Sheet](#).

Environmental Information

Trace amounts of hydrogen peroxide occur widely in nature and are produced naturally through photochemical processes and by many living organisms. However, hydrogen peroxide is known to be toxic to certain aquatic organisms.

Small amounts of hydrogen peroxide may be released to the aquatic environment from sites that manufacture or use hydrogen peroxide. Waste treatment facilities also receive hydrogen peroxide from household sources such as laundry effluents. Many laundry detergents contain peroxide based bleaches such as sodium percarbonate or sodium perborate.

Hydrogen peroxide is not known to bioaccumulate or persist in the environment more than a few days. The degradation products of hydrogen peroxide (water and oxygen) are also non-toxic. For more ecological and environmental information concerning this product, please consult the [Material Safety Data Sheet](#).

Physical Hazard Information

Hydrogen peroxide is an oxidizer and will support combustion. Industrial strength solutions of hydrogen peroxide can cause fires when left in contact with combustible materials such as paper, wood or cloth.

Industrial strength solutions of hydrogen peroxide can cause explosions and/or fires when mixed with flammable organic solvents. The explosive force of some of these mixtures can exceed that of TNT. Vessels containing hydrogen peroxide and certain volatile organics can also form explosive mixtures in the headspace of the vessel.

Exposure of hydrogen peroxide to impurities such as strong acids, bases, and transition metals (copper, manganese, chrome, etc.) can cause hydrogen peroxide decomposition. Hydrogen peroxide decomposition will result in the liberation of heat, oxygen gas, water,

and possibly steam. Systems used to store or transport hydrogen peroxide must be properly vented and must have enough emergency venting capacity to allow the contents of the system to withstand a catastrophic decomposition event.

For more information concerning the physical hazards of this product, please consult the [Material Safety Data Sheet](#). For information concerning the proper design of hydrogen peroxide systems, please contact Solvay Chemicals, Inc.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use and/or disposal of this chemical. These regulations can vary by city, state, country or geographic region. Information may be found by consulting the relevant [Material Safety Data Sheet](#) specific to your country or region.

Additional Information

- Solvay North America, LLC (www.solvaynorthamerica.com)
- Solvay Chemicals, Inc. (www.solvaychemicals.us)
- Material Safety Data Sheets (www.solvaychemicals.us/services/resourcelibrary)
- Contact Solvay Chemicals, Inc. (www.solvaychemicals.us/feedback)
- The [Agency for Toxic Substances and Disease Registry](#) (ATSDR) has a fact sheet and medical management guidelines for hydrogen peroxide that are available through this [link](#).
- The European Union (EU) has completed an EU risk assessment for hydrogen peroxide. A summary of this assessment is available through this [link](#). The full risk assessment is available through this [link](#).
- This summary was prepared February, 2009.

NOTICE

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