

GPS Safety Summary

Substance Name:

Hydrogen peroxide

1. General Statement

Hydrogen peroxide is a clear, colourless liquid with a characteristic odour that is always present in aqueous solution in different concentrations. It has a variety of industrial, professional, and consumer applications such as intermediate for the production of other chemicals and bleaching agent in the pulp and paper industry. Consumer uses include disinfectant and hair bleach.

The environmental effects, ecotoxicology and toxicology information available for Hydrogen peroxide is provided based on studies and/or a reliable evaluation of its hazardous properties. The hazards of hydrogen peroxide depend strongly on the concentration used.

2. Chemical Identity

Name:	Hydrogen peroxide, Hydrogen dioxide, Perhydrol, Eau Oxygénée
Brand names:	Valsterane®, Albone®, Peroxal®
Chemical name (IUPAC):	Hydrogen peroxide
CAS number:	7722-84-1
EC number:	231-765-0
Molecular formula:	H ₂ O ₂

3. Use and applications

Hydrogen peroxide has a variety of industrial, professional and consumer applications. These include synthesis of various peroxides and other chemicals, bleaching and de-inking in the pulp and paper industry and bleaching of textiles, fibrous and non-fibrous materials. It is also used in the treatment of industrial process water, wastewater, drinking water and exhaust gases, as etching agent in the electronic industry, as oxidizer in the mining industry or in surface finishing of metals. Furthermore it is used as a cleaning agent, in hair dyeing and bleaching and many other miscellaneous uses (e.g. dental care products, biocide product, medicinal products, aseptic, detergent or other cosmetic products).

4. Physical / Chemical properties

Hydrogen peroxide is always present as an aqueous solution of varying concentration. Aqueous solutions of hydrogen peroxide are clear, colourless liquids at standard temperature and pressure with a characteristic odour. The density of a 50 % (w/w) solution is approx. 1.19 g/cm³, which is higher than that of water. Hydrogen peroxide does not react with water or oxygen. Hydrogen peroxide is not classified as a flammable liquid, but it is classified as an oxidizer and may explode in contact with organic materials, catalysts or impurities. The substance does not self-ignite.

Property	Value
Physical state	Liquid
Colour	Clear, colourless
Odour	Characteristic
Density	1.196 g/cm ³ (at 20°C) [50% (w/w) aqueous solution] 1.131 g/cm ³ (at 20°C) [35% (w/w) aqueous solution]
Melting / Boiling point	-52°C / 114°C [50% (w/w) aqueous solution] -33°C / 108°C [35% (w/w) aqueous solution]
Explosive properties	Not explosive
Self-ignition temperature	Not ignitable / not spontaneously flammable
Vapour pressure	80 Pa (at 30°C) – partial vapour pressure ; 2400 Pa (at 30°C) – total vapour pressure – H ₂ O ₂ and water [both 50% (w/w) aqueous solution]
Molecular weight	34.02
Water solubility	Completely miscible with water in all proportions
Flashpoint	Not flammable
n-octanol-water partition coefficient	Log pow: - 1,57 at 20°C (calculated using QSAR method)

5. Health Effects

Hydrogen peroxide is a local irritant. It is harmful if swallowed or inhaled. However, the effects depend on the concentration and are characterised by irritations of the mucous membranes of mouth, oesophagus, stomach and intestinal tract as well as the lung. Hydrogen peroxide has a low dermal toxicity. Concentrated hydrogen peroxide ($\geq 50\%$) causes severe skin burns and eye damage. Concentrations of 35 - < 50% cause skin irritation and may cause respiratory irritation. Up to concentrations of 5%, no eye irritation is expected. Higher concentrations cause eye irritation, 8% and more cause severe eye damage.

After repeated exposure, mainly local effects (gastrointestinal tract, respiratory tract, lung) are relevant. Due to the rapid degradation at the first site of contact by endogenous enzymes, systemic effects are considered to be negligible.

Hydrogen peroxide showed genotoxic potential in different cell culture tests which could not be confirmed in further in vivo tests. Therefore, hydrogen peroxide is not considered to be genotoxic or mutagenic.

Hydrogen peroxide is considered not to be a carcinogen of practical relevance.

There is no evidence for reprotoxic effects. Due to the rapid degradation, it is not expected that hydrogen peroxide reaches the germ cells or the fetus.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Harmful if swallowed (products with concentrations $\geq 8\%$ hydrogen peroxide) or inhaled (products with concentrations $\geq 50\%$), low dermal toxicity.
Irritation / corrosion Skin / eye/ respiratory tract	Products with concentrations of 35 - < 50% cause skin, and may cause respiratory irritation. Products with concentrations $\geq 50\%$ cause severe skin burns and eye damage, in concentrations $\geq 70\%$ even with short-term contact with skin. Causes serious eye damage in concentrations $\geq 8\%$

Sensitisation	No evidence of skin-sensitizing properties.
Toxicity after repeated exposure Oral / inhalation / dermal	Local effects after prolonged inhalative exposure. Local effects after prolonged oral exposure. No data for dermal exposure available.
Genotoxicity / Mutagenicity	Based on the available test data, did not cause adverse genetic effects.
Carcinogenicity	Not known to be a human carcinogen.
Reproductive / Developmental Toxicology	Based on the available test data, did not cause adverse effects on reproduction.

6. Environmental Effects

Based on available data for the substance, hydrogen peroxide is toxic to aquatic organisms. The product can be considered as readily biodegradable. Hydrogen peroxide is a reactive and short-lived polar substance and no bioaccumulation is expected.

Effect Assessment	Result
Aquatic Toxicity	Harmful to aquatic life with long lasting effects.

Fate and behaviour	Result
Biodegradation	Readily degradable
Bioaccumulation potential	Not bio accumulative
PBT / vPvB conclusion	Not considered to be PBT or vPvB

7. Exposure

7.1 Human health

Hydrogen peroxide is used in various applications, where exposure may arise for workers as well as for professionals and consumers.

Systemic availability is considered as negligible due to the rapid degradation to oxygen and water at the site of first contact.

Workers can be predominantly exposed by inhalation and dermal contact.

Specific operational conditions and risk management measures assure limited workplace exposure. These practices include handling with good ventilation. When containers and tanks are cleaned, residues are disposed of as hazardous waste. All workers are trained in the safety measures of handling the substance including using personal protective equipment to exclude local irritant effects.

The concentration of hydrogen peroxide in consumer products is limited to 12%.

7.2 Environment

Environmental releases from anthropogenic sources may take place during production, formulation, processing and consumer use of products. However any exposure will generally be lower than levels of concern.

8. Risk Management recommendations

Hydrogen peroxide, which is manufactured and used in industrial applications, is usually corrosive or irritant (depends on concentration of substance). Avoid contact with skin and eyes. When exposure to an irritating or corrosive product is possible, all personal protective measures (respiratory protection, hand protection, eye protection, skin and body protection) should be used. All work is performed by regularly trained personnel. The requirements for disposal are strictly monitored. Workers should consult the manufacture's Safety Data Sheet to obtain specific advice.

Human health measures	
Organizational	A basic standard of occupational hygiene is recommended; Ensure operatives are well informed of the hazards and trained to minimise exposures.
Protection	Eye/Face protection: Safety glasses with side-shields
	Skin protection: Protective clothing (prohibited: textiles, leather), rubber or plastic boots.
	Hand protection: PVC or neoprene gloves (suitable gloves tested to EN374). Do not wear leather gloves.
	Respiratory protection: In case of insufficient ventilation, wear suitable respiratory equipment. In case of spillage, wear a mask.
Engineering controls	Provide appropriate exhaust ventilation at machinery. Ensure that eyewash stations and safety showers are close to workstation locations. Provide self-contained breathing apparatus nearby.
Environment protective measures	
Dilute with large quantities of water before discharging into sewers or into the environment Provide a catch-tank in a bunded area.	




9. Regulatory Information / Classification and Labelling

9.1 Regulatory Information

- This substance has been registered under EU Regulation EC 1907/2006 (REACH)
- A dossier was generated during the High Production Volume Program
- IPCS International Chemical Safety Card

9.2 Classification and labelling

Under GHS substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the eSDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use. Substances registered for REACH are classified according CLP (EC) 1272/2008, implementation of the GHS in the European Union.

Classification		
According to REGULATION (EC) no 1272/2008:		
<ul style="list-style-type: none"> — Oxidising Liquid; Category 1; May cause fire or explosion; strong oxidiser — Acute toxicity (inhalation); Category 4; Harmful if inhaled — Acute toxicity (oral); Category 4; Harmful if swallowed — Skin corrosive; Category 1A; Causes severe skin burns and eye damage — Chronic aquatic toxicity; Category 3; Harmful to aquatic life with long lasting effects 		
Signal Word		
Danger ≥ 8%		
Warning <8%		
Pictogram		
— GHS03: Flame over circle		≥ 50%
— GHS05: Corrosion		≥ 8%
— GHS07: Exclamation mark		≥ 5%
Hazard statement		
<ul style="list-style-type: none"> — H271 : May cause fire or explosion; strong oxidiser — H332 : Harmful if inhaled — H302 : Harmful if swallowed — H314: Causes severe skin burns and eye damage. — H412: Harmful to aquatic life with long lasting effects 		
Specific Concentration Limits		
C ≥ 70 %	Ox. Liq. 1; H271 : May cause fire or explosion; strong oxidiser	
50 % ≤ C < 70 %	Ox. Liq. 2; H272 : May intensify fire; oxidiser	
C ≥ 70 %	Skin Corr. 1A; H314 : Causes severe skin burns and eye damage.	
50 % ≤ C < 70 %	Skin Corr. 1B; H314 : Causes severe skin burns and eye damage.	
35 % ≤ C < 50 %	Skin Irrit. 2; H315 : Causes skin irritation	
8 % ≤ C < 50 %	Eye Dam. 1; H318 : Causes serious eye damage	
5 % ≤ C < 8 %	Eye Irrit. 2; H319 : Causes serious eye irritation	
C ≥ 35 %	STOT SE 3; H335 : May cause respiratory irritation	
C ≥ 25 %	Chronic Aq. 3 ; H412 : Harmful to aquatic life with long lasting effects	
Alternative classification according to Globally Harmonized System (GHS)		
According to GHS criteria, the substance should be classified Acute Aquatic 2, H401.		

10. Contact Information within Company

For further information on this substance or product safety summary in general, please contact:

- **ICCA portal where the GPS Safety Summary is posted:**
<http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>

11. Date of Issues / Revision

- Date of issue: 2013/07/15
- Date of revision:

12. Disclaimer

The information contained in this paper is intended as advice only and whilst the information is provided in utmost good faith and has been based on the best information currently available, is to be relied upon at the user's own risk.

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