

GPS Safety Summary

Substance Name:

SODIUM HYPOCHLORITE

1. General Statement

Sodium hypochlorite is sold as a water solution. It is manufactured by reaction of chlorine with caustic soda (sodium hydroxide solution) or directly by electrolysis of sodium chloride solutions. First produced in 1789, it is a powerful oxidant. It is used in many industrial or professional applications and is a very popular household disinfectant.

2. Chemical Identity

Name:	Sodium Hypochlorite
Brand names:	Sodium Hypochlorite, Bactivel, Javel Standard
Chemical name (IUPAC):	Sodium Hypochlorite
CAS number(s):	7681-52-9
ES number:	231-668-3
Molecular formula:	NaOCl
Structure:	



3. Use and applications

Sodium hypochlorite is a basic inorganic chemical with a wide variety of uses. It is used within industry to manufacture other substances, to treat textiles and as a powerful biocide for industrial sites (such as treatment of water for cooling systems). The substance is used professionally to disinfect public swimming pools and public water supplies, and as a disinfectant by professional cleaners. It is used by the public as a general all-purpose disinfectant, cleaner and bleach within the home. Some consumer formulations include a spray bottle, which can form weak sodium hypochlorite aerosols.

4. Physical / Chemical properties

Sodium hypochlorite is only found as a solution in water, due to manufacturing process. Solid sodium hypochlorite is unstable at room temperature and so does not typically exist. It is typically found at a concentration of 12-16% active chlorine for industrial use, and is most often sold for domestic household use at 1-3% active chlorine. Stronger solutions are available to consumers in some countries (up to 25% active chlorine).

Property	Value
Form	Solution
Physical state (Liquid/solid/gaseous)	Liquid at 20°C at 1013 hPa
Colour	Colourless to light yellow
Odour	Characteristic odour
Density	About 1.2 g/cm ³ (depending on concentration and temperature)
Melting / boiling point	It is only found as a solution in water
Flammability	Not flammable
Explosive properties	Not explosive
Self-ignition temperature	No relative self-ignition temperature
Oxidising properties	Not oxidising according to regulatory criteria
Vapour pressure	2500 Pa at 20°C
Mol weight	74.4 g/mol
Water solubility	Completely miscible in water
Flash point	No flash point
Octanol-water partition coefficient (LogKow)	Log Kow < -3.42

5. Health Effects

The substance is corrosive and can cause burns to unprotected skin and eyes. Additionally, fumes or aerosols from the substances can cause respiratory irritation. The substance should never be mixed with acid cleaners or other acids, as toxic fumes may result.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Based on the available test data, acute toxicity is considered to be low.
Irritation / corrosion Skin / eye/ respiratory tract	Severely irritating, or even corrosive to skin. Can cause severe irritation and serious damage to eyes with possible after effects if not washed immediately. Irritating to nose, throat and respiratory system.
Sensitisation	Based on the available test data, not expected to cause allergic skin reaction.
Toxicity after repeated exposure Oral / inhalation / dermal	Based on the available test data, not expected to cause significant target organ toxicity after repeated exposure.
Genotoxicity / Mutagenicity	Based on the available test data, not expected to cause adverse genetic effects.
Carcinogenicity	Based on the available test data, not expected to cause cancer.
Toxicity for reproduction	Based on the available test data, did not cause adverse effects on reproduction or on the development of offspring.

6. Environmental Effects

Sodium hypochlorite is very toxic to aquatic organisms. However, as the substance is extremely reactive, any sodium hypochlorite which is poured into the drain from household use will react with organic matter and will be removed before reaching the environment. Sodium hypochlorite is often added deliberately to drinking water supplies and swimming pools for disinfection and destruction of almost all harmful microorganisms. Industrial use sometimes results in the discharge of weak solutions of sodium hypochlorite directly into the environment, which is rapidly removed by reaction. The substance can be handled at all stages of manufacture and use with a minimal impact on the aquatic environment. Additionally, the substance is not bioaccumulative, is rapidly degraded and will not persist in the environment.

Effect Assessment	Result
Aquatic Toxicity	The substance is very toxic for aquatic compartment (very toxic to fish and daphnia).

Fate and behaviour	Result
Biodegradation	Sodium hypochlorite persistence cannot be assessed by standard biodegradability methods as it is an inorganic substance. However, the substance is a highly reactive compound, which reacts rapidly with organic matter, e.g. in sewage or soil. The ultimate fate of hypochlorite in soil is its reduction to chloride. In water, depending on the pH there is an equilibrium between chlorine, hypochlorous acid and the hypochlorite anion.
Bioaccumulation potential	Hypochlorite does not bioaccumulate due to its high reactivity and hydrophilic behaviour.
PBT/vPvB conclusion	Not considered to be PBT or vPvB.

7. Exposure

7.1 Human health

The different uses identified for the substance have been assessed as safe under several regulatory programs.

Some concern has been raised due to the presence of by-products from reaction of sodium hypochlorite with organic matter in swimming pools and drinking water, and the possible toxicity of these by-products. By-product formation was assessed in the OECD HPV program and found no to pose a risk. In practice measures are taken to reduce by-product formation as much as possible, without compromising the water quality.

Consumers

Consumers can come into contact with the substance through use as a household disinfectant and cleaner. Some consumer formulations include a spray bottle, which can form weak sodium hypochlorite aerosols.

The exposure has been assessed as safe if the substance is used as directed on the label, in particular avoiding mixing the substance with acids and avoiding splashes onto skin and into eyes.

Workers

Sodium hypochlorite is manufactured in a closed process, which minimizes the employee exposure potential. Workers who might accidentally come into contact with the undiluted substance should follow the safety measures recommended in the extended safety data sheet.

The substance has been assessed as safe for professional and industrial use, when the provisions laid down in the extended safety data sheet are followed carefully (Chapter 8 and exposure scenario).

7.2 Environment

Sodium hypochlorite is harmful to the aquatic environment, but exposure rarely occurs. Household waste flushed down the drain or toilet is destroyed by reaction before reaching the environment.

Professional or industrial waste generally enters into waste water treatment plants, where the substance reacts and is removed before reaching the environment. Weak solutions are sometimes released directly into the environment from industrial sites such as power plants, but these levels have been assessed as being safe and not causing damage to the wider environment, due to the rapid reaction of the substance with organic matter.

Based on the risk assessment, the use of sodium hypochlorite is safe under conditions recommended in the extended safety data sheet (Chapter 8 and exposure scenario).

8. Risk Management recommendations

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. Ensure regular inspection and maintenance of equipments and machines. Handle and store according to the indications of the Safety Data Sheet.
Protection	Eye/Face protection: Safety glasses with side-shields
	Skin protection: Waterproof suit, boots
	Hand protection: Splash contact, intermittent and prolonged PVC gloves. Glove thickness: 1 – 1.2 mm
	Respiratory protection: In case of hazardous fumes, wear self contained breathing apparatus.
Engineering controls	Provide appropriate local exhaust ventilation at points of emission. Minimize manual phases. Should be handled in well ventilated areas. Ensure that eyewash stations and safety showers are close to workstation locations. Ensure that self-contained breathing apparatus are located nearby.
Environment protective measures	
Do not release into the environment. Incinerate or treat any release.	

9. Regulatory Information / Classification and Labelling

9.1 Regulatory Information

This substance is currently assessed or has been registered under:

- EU Regulation EC 1907/2006 (REACH)
- EU Directive EC 98/8 (Biocidal Products Directive)
- OECD HPV program
- EU Regulation EC 793/93 (European Priority Lists and Risk Assessment)

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"> – Corrosive to metals; Category 1; May be corrosive to metals – Skin corrosion: Category 1B; Causes severe burns and eye damage – Serious eye damage: Category 1; Cause serious eye damage – Specific target organ toxicity – single exposure: Category 3; May cause respiratory irritation – Acute aquatic toxicity: Category 1; Very toxic to aquatic life – Chronic aquatic toxicity: Category 1; Very toxic to aquatic life with long lasting effects. 	
Signal Word	
Danger	
Pictogram	
– GHS05: Corrosion	
– GHS07: Exclamation mark	
– GHS09: Environment	
Hazard statement	
<ul style="list-style-type: none"> – H290: May be corrosive to metals – H314: Causes severe skin burns and eye damage – H335: May cause respiratory irritation – H410: Very toxic to aquatic life with long lasting effects Supplemental information: <ul style="list-style-type: none"> – EUH031: Contact with acids liberates toxic gas. 	

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: 2013/02/10
- 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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