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Caustic Soda

The Global Product Strategy (GPS) Safety Summary gives an overview of information on chemical products in the framework of the International Council of Chemicals Association (ICCA) initiative and is focused on the products' basic characteristics related to safe use. All the information for health, safety and environment for this specific product can be found in the extended Safety Data Sheet (e- SDS) provided by Hellenic Petroleum SA to its customers.

GENERAL INFORMATION

Pure caustic soda is solid at room temperature and is generated from sodium chloride (common salt) by electrolysis. It is a hydrophilic alkaline substance (high pH) and therefore it is corrosive and hazardous to human health. It is most commonly found as a liquid, which has a concentration of between 20% and 50 % sodium hydroxide in water and is usually referred to as caustic soda liquor. If the recommendations under the section below "Risk Management Measures" are applied, the substance can be handled safely.

CHEMICAL IDENTITY

Name	Sodium hydroxide
Trade name	Caustic soda
IUPAC Name	Sodium hydroxide
CAS Number	1310-73-2
EC Number	215-185-5
Molecular formula	NaOH

USES AND APPLICATIONS

Caustic soda has many different functions and uses. Within industry it can be used to adjust the pH, to produce biodiesel from vegetable oils, to clean food processing equipment and bottles, in paper industry, to dry air, to absorb CO₂ from gases, in aluminum industry, to remove grease and paint from metal, in textile industry, to peel leather, to peel vegetables, to manufacture chemicals (intermediate use), to regenerate resins. Consumer uses include paint stripping or drain cleaning.

PHYSICAL AND CHEMICAL PROPERTIES

Pure caustic soda is solid at room temperature, though it is often sold as a liquid (aqueous solution). It is a strong alkaline substance that dissociates completely in water into the sodium ion (Na⁺) and hydroxide ion (OH⁻). The dissolution/dissociation in water is strongly exothermic (releases heat), so a vigorous reaction occurs when sodium hydroxide is added to water. The vapor pressure of the substance is very low and the melting point is high. Caustic soda solutions attack aluminum and its alloys, giving off hydrogen gas. It can be neutralized with acids (e.g. hydrochloric acid) giving the sodium salts of the acids, which are usually pH neutral and non-corrosive.

Property	Value
Physical State	Solid
Color	White
Odour	No specific odour
Density	2,13 g/cm ³ at 20 °C
Boiling point	1388 ⁰ C
Melting point	323 ⁰ C
Flash point	Not applicable
Explosive properties	No explosive properties
Self-ignition temperature	N/A
Vapor pressure	N/A (melting point above 300 °C)
Water solubility	100 at 25°C in g/100g H ₂ O
Viscosity (kinematic)	Not applicable
Octanol-Water partition coefficient (logKow)	Not applicable

HEALTH EFFECTS

Human health hazard assessment

Depending on the concentration, solutions of caustic soda in water can be corrosive, irritating or non-irritating and they cause direct local effects at the site of contact with the body. Because of the corrosive properties of caustic soda, a high uptake via the mouth can be fatal. When a very large part of the skin is exposed to the substance, it can also result in death. Caustic soda does not cause skin allergies. It does not cause systemic toxicity in any organs, including the reproductive system. Furthermore, sodium hydroxide is not carcinogenic or genotoxic. The table below gives an overview of the health effects assessment results for caustic soda.

Effect Assessment	Result
Acute toxicity	It is a corrosive substance and for this reason there is no need for further acute toxicity testing
Irritation/corrosion	Causes severe burns and eye damage ($c \geq 5\%w/w$). The concentration range for eye/skin irritation is $0,5\% \leq c < 2\% w/w$. The Derived No Effect Level (DNEL) for long-term inhalation is 1.0 mg/m^3 for workers and general population (respiratory irritation).
Sensitization	Negative
Toxicity after repeated exposure	No specific target organ toxicity was detected
Genotoxicity/mutagenicity	Negative
Carcinogenicity	Not considered to be a human cancer concern
Toxic for reproduction	No adverse effects on fertility and not selectively toxic to the fetus.

ENVIRONMENTAL EFFECTS

The hazard of caustic soda for the environment is caused by the hydroxide ion (pH effect). A high concentration in water will result in toxic effects for aquatic organisms e.g. fish. However, a low concentration in water will not result in effects on aquatic organisms because the caustic soda will be neutralized by other substances present in water (for example dissolved carbon dioxide, organic acids) and thus the pH will not increase.

Because caustic soda is neutralized in the environment, the substance is not persistent and it will not accumulate in organisms or in the food chain. The table below gives an overview of the environmental assessment results for caustic soda.

Effect Assessment	Result
Aquatic Toxicity	Not classified as toxic to aquatic life
Fate and behavior	Result
Biodegradation	Not applicable for inorganic substances
Bioaccumulation potential	Not bio-accumulative
PBT/vPvB conclusion	Neither considered to be PBT nor vPvB

EXPOSURE

Human health

Worker: Caustic soda is extensively used in the industry and also by other professionals. Skin contact with solutions containing a low concentration in caustic soda ($<0.5\%$ in water) is not a concern for human health because, in this case, the substance is not irritating or corrosive.

The caustic soda which is manufactured and used in industry applications is usually corrosive and therefore automated and closed systems are used in order to prevent direct contact. If exposure could occur, appropriate personal protective equipment should be used. Consult the extended Safety Data Sheet to obtain specific advice.

Consumer: Many different consumer products containing caustic soda may be available. Direct skin contact with products or solutions containing a low concentration of caustic soda ($<0.5\%$ in water) is not a concern for human health. No other adverse effects on human health are expected to occur. Direct contact with products or solutions containing high concentrations of sodium hydroxide ($>2\%$ in water) should be prevented, because of the corrosive effects.

Environment

Compliance with relevant legislation for the pH control of waste water and surface water ensures that a significant pH increase of the aquatic environment (e.g. a river or a sea) is not expected due to the manufacture or use of caustic soda. Furthermore it is relatively easy to adapt the pH of waste water (to neutralize caustic soda in the water) and therefore significant effects of caustic soda to the aquatic environment are not expected. Emissions to air are also not a concern because the substance is rapidly neutralized in air due the presence of carbon dioxide in air.

RISK MANAGEMENT MEASURES

For the detailed Risk Management Measures (RMMs) please consult the extended Safety Data Sheet of this product

Industry use, production and formulation

Caustic soda should only be handled by knowledgeable and trained personnel. Make sure that there is adequate ventilation at workplace. Do not eat, drink or smoke where caustic soda is handled or stored. In cases where engineering controls cannot maintain airborne substance concentrations below exposure limits or in cases with a risk of accidental exposure, use a complete overall protecting against chemicals and respiratory protection. For professional use, specific dispensers and pumps to prevent splashes are recommended.






Consumer use

Use resistant package and label. Deliver in small amounts. The instructions on the label of the products should be read and followed carefully to ensure safe use.

Environment

Neutralize with acid before any discharge to the environment. Consult with environmental local authorities for guidance on acceptable disposal practices.

PERSONAL PROTECTIVE EQUIPMENT AND EMERGENCY MEASURES

		➤ In case of dust or aerosol formation, use respiratory protection with approved filter.
		➤ Chemical resistant protective gloves and protective work clothing.
		➤ Safety goggles, face shield.
First aid measures		➤ Implement emergency response procedures. Wash affected skin and eyes with plenty of water for at least 20 minutes. Contaminated clothing should be washed before reuse. In case of breathing difficulties, have the casualty inhale oxygen. Call a doctor.
Firefighting measures		➤ Use extinguishing media that are appropriate to local circumstances. Water may be ineffective.
Accidental release measures		➤ For containment: Keep in closed and properly labeled containers ➤ For clean up: Sweep up and shovel into suitable containers, avoid dust formation.

CLASSIFICATION AND LABELLING

EU-GHS Criteria (European Regulation, CLP No1272/2008) **Sodium Hydroxide**

Pictograms



Signal word

GHS05

Hazard class and category code

Warning

Met.Corr.1;H290

Hazard statement code

Skin Corr.1A;H314 (c≥5%w/w)

H290 May be corrosive to metals

H314 Causes severe skin burns and eye damage

Precautionary statements

Prevention

P280 Wear protective gloves/protective clothing/eye protection/face protection

P260 Do not breathe gas/mist/vapors/spray

Response

P303 + P361 + P353 IF ON SKIN (or hair): Remove /Take off immediately all contaminated clothing. Rinse skin with water/shower.

P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310 Immediately call a POISON CENTER or doctor / physician.

BASIC TRANSPORT INFORMATION

UN Number :1823 (SOLID) ,1824 (SOLUTION)

STATE AGENCY REVIEW

- European Regulation EU-GHS No. 1272/2008, Index-No. 017-001-00-7
- European Regulation No793/93 (risk assessment)
- The substance has been registered under REACH Regulation No 1907/2008
- OECD program for substances with High Production Volumes (HPV)
- International Chemical Safety Cards (ICSC)

CONCLUSIONS

- Caustic soda is used in large amounts in industry and consumer products.
- Due its alkaline properties, caustic soda is corrosive at high concentrations. Direct contacts with these products should be prevented. However, no effects on human health are expected when humans are in contact with non-corrosive and non-irritating concentrations of the substance. The substance is neutralized in the environment and therefore it is not persistent. Furthermore it does not accumulate in organisms.
- By applying the appropriate Risk Management Measures, the concentrations to be expected at workplaces and to the general public/consumer are below recommended exposure limits.

CONTACT INFORMATION

- E-mail address: reach@helpe.gr
- National Emergency Centre: 166, National Poison Centre : (+30)210 7793777
- For more information on the GPS Safety Summaries follow the link :
<http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>

ABBREVIATIONS

ICCA :International Council of Chemical Associations

GPS: Global Product Strategy

GHS: Globally Harmonized System

CLP: Classification, Labelling, Packaging

OECD: Organisation for Economic Co-operation and Development

REACH: Registration, Evaluation, Authorisation of Chemicals

PBT/vPvB: Persistent, Bio accumulative and Toxic/very Persistent and very Bio accumulative

UN: United Nations

DISCLAIMER

All information and recommendations provided in this GPS Safety Summary, only concern the specific product as described above, and may not apply for the same material if used in combination with any other material or in any process. They are provided in good faith as recommendations only, and are based on data which Hellenic Petroleum SA has available on the above date. They do not supersede or replace required documents by National or European Legislation. However, Hellenic Petroleum SA cannot guarantee their accuracy and validity and accepts no responsibility for any damage or loss that might arise in connection with the use of this material.