

Taiwan Chlorine Industries Ltd.
SAFETY DATA SHEET (SDS)

SDS-TCI-Rev.5

I. Identification

Product Name : Liquid Caustic Soda 32%, 45% ; Sodium Hydroxide 32%, 45%
Other Names : Sodium Hydroxide
Recommended use and restrictions on use : 1. Chemical manufacturing, food processing, rayon, cotton, pulp, aluminum refining, detergents, water treatment, etc. 2. Avoid contacting with organic substances or concentrated acids, or that may lead to violent reaction. 3. Reacting with magnesium, aluminum, zinc, copper and other metals will release flammable hydrogen gas and lead to explosion.
Names, addresses, and phone numbers of the manufacturer or supplier : Taiwan Chlorine Industries Ltd. 25 Chung Chih Street, Hsiao Kang District, Kaohsiung Tel. (07) 8715171
Emergency contact phone numbers/fax numbers : Tel: 07-8716923 Fax: 07-8717289

II. Hazards identification

A. Product hazard class : Acute toxicity: skin (category 4); Corrosive to metals (category 1); Skin corrosion/irritation (category 1); Serious eye damage/eye irritation (category 1)
B. Label content : Hazard Symbol :  Signal Words : Danger Hazard Statements : Harmful in contact with skin May be corrosive to metals Causes severe skin burns and eye damage Cause serious eye damage PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORAGE : 1. Wear appropriate personal protective equipment when handling this product. 2. Avoid contacting with eyes or skin. Once it happens, rinse with clean water for at least 15 minute and rush to hospital for further treatment. 3. Neutralize the spill with diluted acid and flush into waste water system.
Other hazards : Symptoms : Irritation, pulmonary edema, ulcers, severe redness, bruising, vomit, diarrhea and prostration. Special hazards : Hazardous carbon monoxide gas can form upon contact with food and beverage products in enclosed vessels.

Taiwan Chlorine Industries Ltd.
SAFETY DATA SHEET (SDS)

SDS-TCI-Rev.5

III. Composition/information on ingredients

Pure material :

Chinese and English name : 氫氧化鈉 / SODIUM HYDROXIDE
Synonyms : Liquid Caustic Soda, Caustic soda, Sodium Hydroxide; NaOH, Sodium hydrate, Soda lye.
Chemical Abstract Service No. (CAS NO.) : 1310-73-2
The hazardous ingredient (% of the content) : 32%, 45%

IV. First-aid measures

<p>The first aid measures for different exposure routes :</p> <p>A. Inhalation:</p> <ol style="list-style-type: none">1. Wear appropriate personal protective equipment to rescue the injured.2. Remove the pollutant.3. Remove the injured to fresh air place, and 「Oxygen」 may be supplied if required.4. The symptoms of pulmonary edema normally may not appear at once, so it is necessary to have a medical treatment as soon as possible. <p>B. Skin contact :</p> <ol style="list-style-type: none">1. Wear rubber gloves to remove polluted clothes and shoes leather materials.2. Continue flushing the skin with clean water at least 15 minutes till the slippery caustic is gone.3. Contact a physician right away as further treatment is needed. <p>C. Eye contact :</p> <ol style="list-style-type: none">1. If wear contact lenses, then remove them first.2. Flush the affected eye with a gentle stream of warm water for at least 15 minutes.3. Be careful not to let the effluent flow into the unaffected eye.4. Contact a physician right away as further treatment is needed. <p>D. Ingestion :</p> <ol style="list-style-type: none">1. Never feed an unconscious or convulsing person anything via mouth.2. Gently wipe or rinse the mouth cavity with water. Do not induce vomit.3. The injured may drink some water if they are fully conscious.4. Contact a physician right away as further treatment is needed.
<p>The most important symptoms and hazardous effects :</p> <p>It will cause severe burns to eyes and skin or result in irreversible eye damage. It may severely irritate the respiratory tract and mucous membranes. Harmful or fatal if inhale or swallow.</p>
<p>The protection of first-aiders : Wear [C] class suit in the warm zone for emergency treatment .</p>
<p>Notes to physicians : 「Oxygen」 may be supplied if inhaled. Do not induce vomit.</p>

V. Fire-fighting measures

<p>Suitable fire extinguishing media :</p> <p>Small fires : Dry chemical, carbon dioxide or water spray.</p> <p>Large fires : Dry chemical, carbon dioxide, alcohol-resistant foam or water spray</p>

Taiwan Chlorine Industries Ltd.
SAFETY DATA SHEET (SDS)

SDS-TCI-Rev.5

Specific hazards may be encountered during fire-fighting : <ol style="list-style-type: none">1. Come into contact with warm or hot water, it will generate a violent eruption or explosive reaction which may result in a fire.2. Come into contact with the metals (particularly magnesium, aluminum and galvanized zinc), it will rapidly generate explosive hydrogen.
Special fire-fighting methods : <ol style="list-style-type: none">1. Stay at a safe and isolated area to put out the fire.2. Wear SCBA and fully protective clothes when fighting chemical fires.
Special equipment for the protection of firefighters : <p>Fire-fighters must wear self-contained breathing apparatus and full protective clothing when fighting chemical fires.</p>

VI. Accidental release measures

Personal precautions : <ol style="list-style-type: none">1. No one is allowed to access to the spilled area until it is cleaned.2. Only the trained people are responsible for cleaning up.3. Put on appropriate personal protective equipment.
Environmental precautions : <ol style="list-style-type: none">1. Keep good ventilation in leakage area.2. Remove all ignition sources.3. Remove other chemicals that may react with the spill.4. Notify the labour inspection and environmental protection offices.
Methods for cleaning up : <ol style="list-style-type: none">1. Use proper plastic containers to load leakage and suitable tools to stop leaking. Cover on the ground with sand, mud or other inert materials.2. Avoid the spilled caustic flowing into sewers and ditches directly.3. After neutralized the caustic, flush and dilute the spilled area with a great amount of water.4. The spilled caustic soda can be re-loaded, diluted with water or neutralized with acetic acid/hydrochloric acid.5. Get into contact with the suppliers, fire and emergency response units to help transfer to empty containers for a severe leakage.

VII. Handling and storage

Handling : <ol style="list-style-type: none">1. For it is corrosive, the engineering controls and personal protective equipment are needed. The operators should have been trained and informed of the danger, how to use safely, and fully complied with the confined space operation regulations as well.2. Avoid contacting the chemical without wearing any protective equipment. While handling the chemical, it is required to use the corrosion-resistant tools or equipment.3. Do not mix this chemical together with other incompatible materials.4. Containers should be labeled. Make a careful check of any spill prior to handle this chemical. After used, keep container closed tightly to avoid leaking or damage.5. Do not pour water into the caustic containers.6. The emergency tools for preventing fire or spill should be available and close to the handling and storage area.

Taiwan Chlorine Industries Ltd.
SAFETY DATA SHEET (SDS)

SDS-TCI-Rev.5

Storage :

1. Put the storage containers in a cool, dry and well-ventilated area and keep away from any incompatible materials.
2. It is required to clearly post up warning marks at the storage areas and there should be no obstructions inside the areas. The operators should have been well-trained.
3. The storage containers should be labeled and closed tightly to avoid being damaged. It is necessary to have a regular inspection to make sure there is no spill, break or corrosion.
4. Store the chemical in appropriate storage barrels/tanks as recommended by manufacturers. Tanks should be labeled and maintained on the visible location.
5. Keep empty tanks away from storage areas and workplace. The ground should be impervious without cracks.
6. The best material for storage container is nickel alloy. However it can be made of stainless steel or lined carbon steel if the area temperature is not over 40 °C.
7. Storage areas should be put on the ground floor with dikes around and have preventable fire/spill equipment available.
8. The construction materials to build storage area should be corrosion-resistant and lighting and ventilation system should be in good condition.

VIII. Exposure controls/personal protection

Engineering control :

1. The ventilation system should be anti-corrosive and separated from other exhaust system.
2. Use the local exhaust devices connecting with outside exhaust outlets.
3. Supply sufficient fresh air to fill up the air out of the exhaust system.

Control parameters :

1. 8-hour Time-Weighted Average (TWA) : 2mg/m³
2. Short-Term Exposure Limit (STEL) : 4mg/m³
3. Maximum exposure limits (CEILING) : --
4. Biological indicators BEIs : --

Personal protective equipment :

Respiratory protection:

1. Below 10 mg/m³ : Use a regulatory compliant full face piece air purifying respirator with appropriate chemical cartridges or positive-pressure, air-supplied respirator.
2. Unknown concentration : Positive-pressure, air-supplied respirator.

Hand protection : Impermeable gloves.

Eye protection : Goggles, face shield, sprinkler.

Skin and body protection : Chemical suits, boots, aprons.

Hygiene measures :

1. Smoking or eating is prohibited in workplace; Wash hands thoroughly after handling of this chemical.
2. Polluted clothes is discarded or well cleaned before re-put on, and make sure the laundry people are informed of the dangers of pollutants.
3. Maintain the workplace clean.

IX. Physical and chemical properties

Appearance : Water white and slightly turbid liquid

Odor : Odorless

Taiwan Chlorine Industries Ltd.
SAFETY DATA SHEET (SDS)

SDS-TCI-Rev.5

Odor threshold : Odorless	Melting point : 318.4°C(Solid caustic soda)
pH value : 14	Boiling point/Boiling point range : 118 °C (32%) , 142 °C (45%) @STD
Flammability (solid / gas) : --	Flashing point : Noncombustible
Decomposition temperature : --	Test method : <input type="checkbox"/> open cup <input type="checkbox"/> closed Cup
Auto-ignition temperature : /	Explosive limits : -
Vapor pressure : 12mmHg(32%) , 4.5mmHg (45%)	Vapor density (air=1) : --
Specific Gravity (Water=1): 1.349(32%), 1.468(45%) @ 20°C	Solubility : 111 g/100ml @ 20°C(water)
Partition coefficient : n-Octanol / water : (log/Kow)--	Evaporation rate : /

X. Stability and Reactivity

Stability: Stable
Possible hazardous reactions under specific conditions : <ol style="list-style-type: none"> 1. Strong acid, nitro aromatic, halogen organic compounds, ethylene glycol and peroxy organic – violent, explosive reaction. 2. Water– violent reaction, emit a great amount of heat. 3. Acetaldehyde, acrolein, propylene – violent polymerization. 4. Metals (such as aluminum, tin and zinc) – produce flammable, explosive hydrogen. 5. 1,2-dichloroethene, trichloroethylene, tetrachloroethylene – produce self-ignitable chemical substances. 6. Carbon hydrates (Fructose, lactose and maltose) – produce carbon monoxide.
Conditions to avoid : water, moisture, air.
Materials to avoid : strong acid, water, metals, organic halogen, nitrogen, chlorine organic compounds, aluminum, tin, zinc, nitro aromatic, nitro-methane, ethylene glycol, peroxide, acetaldehyde, acrolein, acrylamide, carbon hydrates.
Hazardous decomposition products : --

XI. Toxicological information

Routes of exposure : INHALATION, INGESTION, SKIN CONTACT, EYE CONTACT
Symptoms : Stimulating, fluid in the lungs, edema, ulcers, severe redness, bruising, vomit, diarrhea, prostration.
Acute toxicity : Skin : <ol style="list-style-type: none"> 1. Severe burns, ulcers and permanent redness. The injured may not feel painful right away until past a few hours. 2. If contact the solution containing 4% of caustic, the hard outer skin cells will be destroyed within 15 minutes and the skin layer will be completely destroyed within 60 minutes. If drip a few liquid drops with PH = 13.5 on the head, it will lead to hair loss, scalp burns, and become bald. 3. If drip the solution containing 0.12% of caustic on healthy skin, it will be impaired within one hour. Inhalation : <ol style="list-style-type: none"> 1. If inhale the corrosive dust and droplet, it will stimulate the nose and pharynx and lung.

Taiwan Chlorine Industries Ltd.
SAFETY DATA SHEET (SDS)

SDS-TCI-Rev.5

2. It is reported that inhaling smoke particles coming from pouring water into solid caustic had severely damaged to the lung (pneumonia).

3. Inhalation of caustic smoke can lead to fluid in the lungs and life will be threatened.

Ingestion :

Once ingest the caustic, it will cause severe pains and burn the mouth, pharynx and esophagus and appear the symptoms of vomiting, diarrhea, collapse or even death.

Eye :

1. The extent of injury depends on exposure time, concentration and penetration. The symptoms will be from a serious boost to moderate redness to swelling, ulcers, severe redness, bruising, and so on.

2. It may affect the eyes or eyesight such as having glaucoma or appear other symptoms later.

3. The worst condition is the severe ulcers and bruising will gradually damage the eyes tissues and lead to go blind permanently.

LD50 (Test animals, absorption means) : 1350 mg/kg (Rabbit, skin)

LC50 (Test animals, absorption means) : --

500mg/24H (Rabbit, skin) : Severe

50ug/24H (Rabbit, eye) : Severe

Chronic toxicity or long term toxicity :

Contact the chemical over a long period of time will cause skin dryness, cracks, and inflammation (like dermatitis).

XII. Ecological Information

Ecotoxicity :

LC50 (fish) : 43mg/l/96H

EC50 (aquatic life) : --

BCF : --

Persistence and degradability :

Half-life (air) : --

Half-life (water surface) : --

Half-life (groundwater) : --

Half-life (soil) : --

Bioaccumulative potential : --

Mobility in soil : If release the chemical to the soil, it will be absorbed by the soil gradually.

Other adverse effects : --

XIII. Disposal considerations

Methods of waste disposal :

1. Waste material must be disposed of in accordance with the government environmental control regulations.

2. The waste will be neutralized first and disposed of by a qualified hazardous waste disposal agency.

XIV. Transport Information

UN Number : 1824

Taiwan Chlorine Industries Ltd.
SAFETY DATA SHEET (SDS)

SDS-TCI-Rev.5

UN Proper Shipping Name : Sodium Hydroxide, Solution
Transport Hazard Class : 8 (Corrosive)
Packing Group : II
Marine Pollutant (Y/N) : N
Specific transportation measures and precautionary conditions : Transportation safety rule item 84.

XV. Regulatory Information

Applicable Regulations :	
1. Rules of Labor EHS facilities	4. Transportation safety rules
2. Rules of DG and Hazardous material labeling and identification	5. Storage and disposal regulations for industrial wastes
3. Hazardous material content in the atmosphere of labor working environment	

XVI. Other Information

Literature reference	ITRI Serial No. : 108 Sodium Hydroxide SDS	
Organization that prepared the SDS	Company : Taiwan Chlorine Industries Ltd.	
	Address / Tel. : 25 Chung Chih Street, Hsiao Kang District Kaohsiung / (07) 8715171	
Person	Title : QA & Logistic Manager	Name : M.S. Liu
Date issued	Revised on Jan. 7, 2019	
Remarks	The above-mentioned symbol "--" means "The information is not available."	

This SDS comes from Taiwan Chlorine Industries Ltd. and refers to the proper information and documents. It is for reference only.