MATERIAL SAFETY DATA SHEET CAUSTIC LYE MBC GRADE

1. Product Identification

Trade Name	Sodium Hydroxide Flake / Solution
Chemical Family	Alkali Hydroxide
Chemical Name	Sodium Hydroxide
Molecular Formula	NaOH
Synonyms	Caustic Soda Flake / Lye
Chemical Abstracts No.	1310-73-2
EINECS No.	215-185-5
HAZCHEM CODE	2R
UN No.	1824

2. Hazard Identification

Classification of the substance or mixture

GHS-US classification

Skin corrosion/irritation,	Category 1A H314 Causes severe skin burns and eye damage.
Serious eye damage/eye irritation,	Category 1 H318 Causes serious eye damage.
Hazardous to the aquatic environment Category 3	H402 Harmful to aquatic life — Acute Hazard,

GHS-US labelling

Hazard pictograms (GHS-US)



GHS05

Signal word (GHS-US)	Danger
Hazard statements (GHS-US)	H314 - Causes severe skin burns and eye damage. H402 - Harmful to aquatic life
Precautionary statements (GHS-US)	P260 - Do not breathe dust, vapours. P264 - Wash exposed skin thoroughly after handling. P273 - Avoid release to the environment. P280 - Wear eye protection, face protection, protective clothing, protective gloves. P301+P330+P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting. P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. 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/doctor P363 - Wash contaminated clothing before reuse. P405 - Store locked up. P501 - Dispose of contents/container to Comply with applicable regulations
EEC HAZARD CLASSIFICATION:	Corrosive [C]
RISK PHRASES	R35- Causes severe burns.
SAFETY PHRASES	S1/2, S26-S37/39-S45 –

Keep locked out of the reach of children. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable gloves. Wear eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).

Main Hazards

Flash Point:	Not applicable
USA TLV (TWA):	2 mg/m3
USA TLV (STEL):	Not available
Hazard Rating:	(NFPA 704)
Health:	3 Hazard Rating Scale:
Fire:	0 0=Minimal 3= Serious
Reactivity:	1 1=Slight 4=Severe
Special:	ALK

3. Composition

Composition:

Name	CAS #	% by Weight
Caustic soda lye	1310-73-2	≥47.00 – ≤51.50 %W/W

EC Number: 215-185-5

Biological Hazards Sodium hydroxide is irritating and corrosive to all tissues. Most frequent exposures involve direct skin and eye contact, although inhalation of mist or dust can occur. Cases of ingestion are unlikely in industry, but may occur accidentally in young children, or intentionally.

Health Effects - Eyes

Sodium hydroxide is extremely corrosive to the eye and splashes are especially hazardous. Damage can range from severe irritation and mild corneal scarring to fluid accumulation, disintegration, ulceration, and severe corneal scarring and clouding. Permanent blindness may result in severe cases (25-28), and immediate first aid is vital to avoid permanent damage (25,27).

"Burning/redness" has been reported by workers exposed to airborne concentrations as low as 0,005-0,7 mg/m3, although other solvents, including Stoddard solvent were also present at concentrations up to 780 mg/m3 (20).

Eye watering has been noted by persons briefly exposed to concentrations of 0,24, 1,86 and 0,8 mg/m3(21).

Health Effects - Skin Solid sodium hydroxide and concentrated solutions are highly corrosive to the skin (29), and although skin contact may not lead to immediate pain, damage begins at once (30,31). Severe ulceration and scarring may result in serious cases. Skin biopsies from volunteers having 1N sodium hydroxide applied to their arms for 15 – 180 minutes showed progressive changes beginning with the dissolution of cells in the horny layer and progressing through oedema to total destruction of the epidermis in 60 minutes (32). Solutions as weak as 0,12% may damage healthy skin within an hour (29). A concentrated solution dripped onto a worker's head caused dissolution of hair, reversible baldness and scalp burns as treatment was delayed for several hours (30). A 5% aqueous solution resulted in severe necrosis when applied to the skin of rabbits for 4 hours (33), and skin corrosion occurred with a 2% solution, but not with 1% potassium hydroxide (34). Although little published information is available on the effects of chronic exposure, drying, cracking, and dermatitis are likely.

Health Effects - Ingestion The oral LD50 in rabbits is 500 mg/kg of a 10% solution (35). A value for the LD50 mouse ip intraperitoneal) is given in the literature as 40 mg/kg. Ingestion will cause severe mouth burns, and if swallowed, extensive damage to the oesophagus (36,37) and may lead to vomiting, prostration, collapse, and constrictive scarring.

Health Effects - Inhalation

Inhalation of the dust or concentrated mist may cause irritation and damage to the respiratory tract. Although prolonged exposure to high concentrations may cause discomfort and even ulceration of

the nasal passages, subjective symptoms are often relied upon as an indication of the need for control. A concentration of 2 mg/m3 is reported as being noticeably but not excessively irritant. Other reports indicate noticeable irritation at concentrations below 2 mg/m3 (19), with burning/redness of the nose and throat noted by some workers exposed to airborne concentrations of 0,005 - 0,7 mg/m3

(Solvents including Stoddard solvent were also present up to 780 mg/m3) (20). Throat irritation has been reported in persons briefly exposed to 0,24, 1,86 and 0,8 mg/m3 (21).

While exposure to 0,28 mg/m3 has been reported as not producing irritation (21).

In animal studies severe damage to the respiratory tract has been reported after chronic exposure (22, 23).

However, in an investigation into causes of death of 291 men occupationally exposed to sodium hydroxide dust for about 30 years, no significant correlation was found between cause of death and exposure (24).

Carcinogenicity Sodium hydroxide has been implicated as a possible cause of cancer of the oesophagus 12 to 42 years after ingestion (38-43). Carcinogenesis in these cases, however, may be due to tissue destruction and scar formation rather than sodium hydroxide itself.

Mutagenicity Sodium hydroxide has been found to be non-mutagenic (44, 45).

Reproductive Hazards

Sodium hydroxide was not teratogenic in mice (46).

4. First Aid Measures

Product In Eye Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 30 minutes, holding the eyelid(s) open. Take care not to rinse contaminated water into the non-affected eye. If irritation persists, repeat flushing. If available a neutral saline solution may be

used to flush the contaminated eye(s) an additional 30 minutes. Obtain medical attention immediately.

Product On Skin Avoid direct contact with this chemical. Wear impervious protective gloves. As quickly as possible, flush contaminated area with lukewarm, gently running water for at least 30 minutes. Under running water, remove contaminated clothing, shoes, and leather goods. If irritation persists, repeat flushing. Obtain medical attention immediately. Completely decontaminate clothing, shoes and leather goods before re-use or discard.

Product Ingested Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing. Rinse mouth thoroughly with water. Do not induce vomiting. If victim can swallow, have him/her drink ± 300 ml of water to dilute material in stomach. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration.

Repeat administration of water. Obtain medical attention immediately.

Product Inhaled Remove casualty from area of exposure. If unconscious does not give anything to drink, place in recovery position and administer oxygen. If conscious place the casualty in a semi-upright position. Give oxygen if available. Obtain medical attention immediately

5. Fire Fighting Measures

Special Hazards Sodium hydroxide and its solutions will not burn or support combustion. However, reaction of sodium hydroxide with several commonly encountered materials such as strong acids, water, metals, organohalogen compounds, and nitro and chloro organic compounds can generate sufficient heat to ignite nearby combustible materials. Sodium hydroxide can react with metals, such as aluminium, tin and zinc, to form flammable hydrogen gas.

Extinguishing Media Use extinguishing media suitable for the surrounding fire. If water is used, care should be taken, since it can generate heat and cause spattering if applied directly to sodium hydroxide.

Fire Fighting Instructions Evacuate area and fight fire from a safe distance or a protected location. Approach the fire from upwind. If possible, isolate materials not involved in the fire and protect personnel. Move containers from fire area if it can be done without risk. Water can be used with extreme caution to extinguish a fire in an area where sodium hydroxide is stored. The water must not encounter the sodium hydroxide. Water can be used in flooding quantities as a spray or fog to keep fire-exposed containers cool and absorb heat. At high temperatures, fuming may occur, giving off a strong, corrosive gas. Do not enter without wearing specialized protective equipment suitable for the situation.

Protective Clothing Protective clothing should be worn, boots, splash suit, apron, gloves, safety goggles with side shields, if the possibility of splashing exists a full-face shield should be worn.

Butyl or natural rubber gloves are recommended.

Firefighter's normal protective clothing (Bunker Gear) will not provide adequate protection. Chemical resistant clothing (e.g., chemical splash suit) and a positive pressure self-contained breathing apparatus (MSHA/NIOSH approved or equivalent) may be necessary.

6. Accidental Release Measures

Personal Precautions Chemical resistant clothing should be worn, boots, splash suit, apron, gloves, safety goggles with side shields, if the possibility of splashing exists a full-face shield should be worn.

Butyl or natural rubber gloves are recommended.

Approved respiratory protection such as a positive pressure self-contained breathing apparatus (MSHA/NIOSH approved or equivalent) should be worn

Environmental Precautions Dangerous to aquatic life in high concentrations. Do not allow un-neutralized spillage to enter rivers or water systems.

Notify local Health and Pollution Control Authorities

Clean-Up Methods

Small Spills Ventilate the area and wear chemical resistant overalls, safety glasses, gloves, and an approved respirator.

Neutralise with dilute hydrochloric acid (10-15%), mop up with plenty of water and run to waste. Sweep up spilled caustic flake and transfer to a dry container.

Large Spills Wear chemical resistant overalls, safety glasses, gloves, and an approved respirator. Spilled solutions should be contained by diking with inert material, such as sand or earth. Solutions can be recovered or carefully diluted with water and cautiously neutralised with acids such as acetic acid or hydrochloric acid. Contact fire and emergency services and supplier for advice.

Sweep up spilled caustic flake and transfer to a dry container. Neutralise residue with dilute acids such as hydrochloric or acetic acid. Flush area well with water

7. Handling and Storage

Suitable Materials Sodium hydroxide should be kept in a dry place, protected against moisture, water, and physical damage, and away from acids, metals, explosives, organic peroxides and easily ignitable materials. Protective clothing should be worn, especially approved respiratory protection, butyl or natural rubber, Neoprene or nitrile gloves (NOT polyethylene), and safety goggles. Sodium hydroxide should only be used in a chemical fume hood.

Handling/Storage Precautions Storage Conditions Store in water-tight containers in a cool, dry place separate from the normal work area. Materials that react violently with sodium hydroxide and easily ignitable materials should not be stored in the same area. Use corrosion-resistant structural materials and lighting and ventilation systems in the storage area. Store in suitable, labelled containers. Keep containers tightly closed when not in use and when empty. Protect from damage.

Containers made of nickel alloys are preferred. Steel containers are acceptable if temperatures are not elevated.

Storage tanks for solutions should be above ground and surrounded with dikes capable of holding entire

contents. Avoid any dust build-up by frequent cleaning and suitable construction of storage area. Limit quantity of material in storage. Restrict access to storage area. Post warning signs when appropriate. Keep storage area separate from populated work areas. Inspect periodically for deficiencies such as damage or leaks.

Handling Avoid generating mist or dust. Keep solid sodium hydroxide away from water. Post "DO NOT USE WATER" signs in area of use. When diluting or preparing solution, add caustic to water in small amounts to avoid boiling and splattering. Label containers. Keep containers closed when not in use. Empty containers may contain residues which are hazardous. Use smallest possible amounts in designated areas with adequate ventilation.

Have emergency equipment (for fires, spills, leaks, etc.) readily available.

8. Exposure Controls/Personal Protection

Occupational Exposure Standards

HSE:	No data available
MAK:	2 mg/m3
ACGIH:	2 mg/m3

UK Exposure Limits:

Long-term (8 hr. TWA value):	2 mg/m3
Short-term (10 min TWA value):	2 mg/m3

Engineering Control Measures Engineering methods to control hazardous conditions are preferred. General methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions and process modification (e.g., substitution of a less hazardous material). Administrative controls and personal protective equipment may also be required. Use a corrosion-resistant ventilation system separate from other exhaust ventilation systems. Exhaust directly to the outside. Use local exhaust ventilation and process enclosure, if necessary, to control airborne dust and mist. Supply sufficient replacement air to make up for air removed by exhaust systems.

Personal Protection - Respiratory



Full respiratory protection should be readily available in case of spillage.

Personal Protection - Hand Wear butyl or natural rubber, Neoprene or nitrile gloves (NOT Polyethylene).

Personal Protection - Eye Safety goggles or approved safety glasses. Contact lenses should not be worn.

Personal Protection - Skin Wear overall, safety shoes/boots.

9. Physical and Chemical Properties

Information on basic physical and chemical properties

Form	Viscous
State of matter	Liquid; at 20 °C; 1,013 hPa
Colour	Clear to slightly turbid, colourless, viscous liquid.
Odour	Odourless
Odour Threshold	No data available
pH	14
Melting point/range	6 - 12 °C; 101.3 kPa

Boiling point/boiling range	140 °C
Flash point	Non-flammable
Evaporation rate	No data available
Flammability (solid, gas)	No data available
Relative vapour density	No data available
Density	1.5 g/cm3
Water solubility	Completely miscible
Partition coefficient: n-octanol/water	log Pow: 0
Viscosity, dynamic	23 mPa.s; 40 °C

10. Stability and Reactivity

Reactivity	Stable under normal conditions.
Chemical stability	No data available
Possibility of hazardous reactions	Violent polymerisation can occur when combined with acetaldehyde, acrolein and acrylonitrile
Conditions to avoid	Heat
Materials to avoid	Strong oxidizing agents' Strong acids. Organic materials

Hazardous decomposition products Sodium oxidesContact with metals (aluminum, zinc, tin) and Sodium tetrahydroborate liberates hydrogen gas

11. Toxicological Information

Acute oral toxicity	Sodium Hydroxide; Caustic Soda: LD50 Rabbit: 500 mg/kg; (literature value)
Acute dermal toxicity	No data available
Skin irritation	Sodium Hydroxide; Caustic Soda: Rabbit: Severe skin irritation;
Eye irritation	Sodium Hydroxide; Caustic Soda:

Rat: Causes serious eye damage.

Sensitisation	No data available
Repeated dose toxicity	No data available
Carcinogenicity	No data available
Mutagenicity	No data available

No data available;

Toxicity for reproduction	This information is not available.
Further Information	This information is not available.

12. Ecological Information

AQUATIC TOXICITY – FISH:	Dangerous to aquatic life in high concentrations. Notify local Health and Pollution Control authorities
AQUATIC TOXICITY – DAPHNIA:	No data available
AQUATIC TOXICITY – ALGAE:	No data available
BIODEGRADABILITY:	Expected to be biodegradable
BIO-ACCUMULATION:	Does not bioaccumulate.
MOBILITY:	No data available
GERMAN WGK:	No data available
RESULTS OF PBT AND VPVB ASSESSMENT	This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).
OTHER ADVERSE EFFECTS	This product has no known ecotoxicological effects.

13. Disposal Considerations

Disposal Methods This material is highly corrosive. Disposal must be made in accordance with the applicable Government regulations at approved chemical dumpsites.

Disposal Of Packaging Empty containers can contain residues, gases and mists and are subject to proper waste disposal.

Always obey hazard warnings and handle empty containers as if they were full.

14. Transport Information

ADR

UN number:	1824
Class:	8
Packaging group:	II; C5.
Proper shipping name:	SODIUM HYDROXIDE SOLUTION

RID

UN number:	1824
Class:	8
Packaging group:	II; C5.
Proper shipping name:	SODIUM HYDROXIDE SOLUTION

ADNR

UN number:	1824
Class:	8
Packaging group:	II; C5.
Proper shipping name:	SODIUM HYDROXIDE SOLUTION

IMDG

UN number:	1824
Class:	8
EmS:	F-A, S-B
Packaging group:	II
Proper shipping name:	SODIUM HYDROXIDE SOLUTION
Marine pollutant:	Not a Marine Pollutant

ICAO/IATA

UN number:	1824
Class:	8
Packaging group:	II
Proper shipping name:	SODIUM HYDROXIDE SOLUTION

15. Regulatory Information

EEC HAZARD CLASSIFICATION	Corrosive [C]
RISK PHRASES R35-	Causes severe burns.
SAFETY PHRASES	S1/2, S26-S37/39-S-45 – Keep locked out of the reach of children.

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Wear suitable gloves.

Wear eye/face protection.

In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).

NATIONAL LEGISLATION	Hazardous Substances Act 15 of 1973 and Regulations,

16. Other Information

CAS No.	1310-73-2

EINECS No.	215-185-5
EEC ANNEX 1 No.	Not available
MITI No.	Not available
FDA LIST No.	Not available
LISTING - TOSCA	Not available
LISTING - ACOIN	Not available

LISTING - CANADIAN DSL/NDSL Not available

NOTIFICATION - EEC Not available

NOTIFICATION - USA Not available

EXCLUSION OF LIABILITY “All information and instructions provided in this Material Safety Data Sheet (“MSDS”) in respect of the substance is given solely in terms of the provisions of the Occupational Health and Safety Act No 85 of 1993 and Regulations (“the Act”), is based on scientific and technical knowledge as at the date indicated on this MSDS and is presented in good faith to be correct.

The information and instructions provided in this MSDS apply only to the substance in its present form and not to any formulation or mix, in which event it is the sole responsibility of the user of the substance as formulated and/or mixed to investigate and establish any danger which may arise out of its use, wherever such user may be situated.

It is the sole responsibility of the person in receipt of this MSDS, wherever such recipient may be situated, to ensure that the information provided is communicated to and understood by any person who may come in contact with the substance in any place and in any manner whatsoever. If such recipient produces formulations or mixes using the substance, then it is such recipient’s sole responsibility to comply with the provisions of the Act in respect of the provision of the necessary MSDS, or to comply with any other applicable legislation.”