



## SAUDI FACTORY FOR CHLORINE & ALKALIES

Document No: MSDS-02

Issue Status: 004

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Approved by: General Manager

Author: HSE Manager

Dev. Date: 17-05-23

Issued To: All Concerned

Title: Material Safety Data Sheet Caustic Soda Flakes

### MSDS CAUSTIC SODA FLAKES

## SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT IDENTIFIER: SODIUM HYDROXIDE, FLAKE (F-NaOH)**

**RECOMMENDED USAGE:** NEUTRALIZING AGENT, INDUSTRIAL CLEANER, PULPING AND BLEACHING, CATALYST, Dust generation

**MANUFACTURER:**

**COMPANY INFORMATION** Saudi Factory for Chlorine & Alkalies

Building #2101, Unit # 2, Riyadh 14545-8762, Kingdom of Saudi Arabia.

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## SECTION 2: COMPOSITION, INFORMATION & SPECIFICATIONS

**Synonyms:** Caustic soda flakes; sodium hydroxide solid; sodium hydrate

**CAS No.:** 1310-73-2

**Molecular Weight:** 40.00

**Chemical Formula:** NaOH

Sr. #	Parameters	Unit	Limits
1	NaOH	% wt	98.4 Min.
2	NaCl	PPM	< 130
3	Na <sub>2</sub> CO <sub>3</sub>	% wt	< 0.5
4	Iron	PPM	< 8.0
5	Ni	PPM	< 5
6	Thickness	mm	0.8 to 1.2
7	Bulk density	Ton/m <sup>3</sup>	0.7 to 0.9

## SECTION 3: HAZARDS IDENTIFICATION

**Emergency Overview:**

**DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES SEVERE SKIN BURNS AND EYE DAMAGE (H314). REACTS WITH WATER, ACIDS, AND OTHER MATERIALS.**

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### GHS (GLOBAL HARMONIZED SYSTEM) LABELING FOR CAUSTIC SODA FLAKES:



Corrosive



Health Hazard

Code	Word	Hazard Statement
H314	Danger	Causes severe skin burns and eye damage.
H318	Danger	Causes serious eye damage
H290	Warning	May be corrosive to Metal.

### GHS Precautionary Statements:

#### Prevention:

- P260 – Do not breathe mist/vapors. (New)
- P264 – Wash skin thoroughly after handling. (New)
- P280 – Wear protective gloves/clothing/eye/face protection. (Existing)
- P284 – Wear respiratory protection. (New, if airborne risk exists)

#### Response (First Aid):

- P301 + P330 + P331 – If swallowed: Rinse mouth. Do NOT induce vomiting. (Existing)
- P303 + P361 + P353 – If on skin: Remove clothing, rinse immediately. (New, critical for NaOH)
- P305 + P351 + P338 – If in eyes: Rinse cautiously, remove contacts. (Existing)
- P310 – Call poison center/doctor. (Existing)

#### Storage/Disposal:

- P405 – Store locked up. (New, often required for corrosives)
- P501 – Dispose per local regulations. (New, ensures compliance)

#### NFPA Rating:

Health Rating: 3 - Severe (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 1

Contact Rating: 4 - Extreme (Corrosive)

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

Storage Color Code: White Stripe (Store Separately)





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*Note: NFPA ratings are provided for informational purposes. GHS classification takes precedence for compliance.*

### Potential Health Effects

#### Inhalation:

Severe irritant. Effects from inhalation of dust or mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonitis may occur.

#### Ingestion:

Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appear days after exposure.

#### Skin Contact:

Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.

#### Eye Contact:

Corrosive! Causes irritation of eyes, and with greater exposures it can cause burns that may result in permanent impairment of vision, even blindness.

#### Chronic Exposure:

Prolonged contact with dilute solutions or dust has a destructive effect upon tissue.

#### Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

## SECTION 4: FIRST AID MEASURES

#### Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician. Symptoms include sneezing, sore throat, coughing, or lung damage (from dust).

#### Ingestion:

Do NOT induce vomiting. Rinse mouth with water/milk (if conscious). Monitor for esophageal stricture. Symptoms include mouth/throat burns, vomiting, or esophageal perforation.

#### Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse. Symptoms include burns, ulceration, or white eschars.



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#### **Eye Contact:**

Immediately with ANSI-compliant eye wash for 15+ minutes. Hold eyelids open. Seek medical attention even if symptoms are delayed. Symptoms include severe pain, corneal damage, or blindness.

#### **Note to Physician:**

Perform endoscopy in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes, and fluid intake are also required. Brush off dry flakes before rinsing to avoid exothermic reaction.

### SECTION 5: FIRE FIGHTING MEASURES

#### **Fire:**

Not considered to be a fire hazard. Hot or molten material can react violently with water. Can react with certain metals, such as aluminum, to generate flammable hydrogen gas.

#### **Explosion:**

Not considered to be an explosion hazard.

#### **Fire Extinguishing Media:**

Use any means suitable for extinguishing surrounding fire. **Do not use water** on solid NaOH fires (exothermic reaction).

#### **Special Information:**

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

### SECTION 6: ACCIDENTAL RELEASE MEASURES

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal.



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## SECTION 7: HANDLING AND STORAGE

Keep it in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture, and incompatibilities. Always add the caustic to water while stirring, never the reverse. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product. Do not store aluminum or magnesium. Do not mix with acids or organic materials.

**SHELF LIFE:** If properly stored, it has an infinite shelf-life if **kept dry**; caking may occur if exposed to moisture & will remain intact until it is reacted with other materials.

## SECTION 8: EXPOSURE CONTROLS, PERSONAL PROTECTION

### Airborne Exposure Limits:

Regulatory Agency / Standard	Exposure Limit	Notes
OSHA PEL (29 CFR 1910.1000)	2 mg/m <sup>3</sup> (Ceiling)	Do not exceed at any time
ACGIH TLV (2024)	2 mg/m <sup>3</sup> (Ceiling)	Ceiling limit (not to be exceeded)
NIOSH REL	2 mg/m <sup>3</sup> (Ceiling)	Avoid skin & eye contact

### APPROPRIATE ENGINEERING CONTROLS:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Local exhaust ventilation ( $\geq 100$  CFM per hood) per ACGIH Industrial Ventilation Manual.

### Personal Respirators (NIOSH Approved):

NIOSH-approved APR dust masks for dust; SCBA for unknown concentrations. If the exposure limit is exceeded, a half-face dust/mist respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece dust/mist respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

### Skin Protection:

Wear impervious protective clothing, including boots, gloves “nitrile or butyl rubber ( $\geq 0.4$  mm thickness; EN 374-3 certified)”, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

### Eye Protection:

Use chemical safety goggles and/or a full-face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

**PHYSICAL STATE:** Solid Flake

**COLOR:** white

**CHANGE IN APPEARANCE:** hygroscopic

**ODOR:** odorless

**ODOR THRESHOLD:** Not available

**MOLECULAR FORMULA:** NaOH

**MOLECULAR WEIGHT:** 40.00

**PH:** 14 (5% solution)

**MELTING POINT:** 604 F (318 C)

**BOILING POINT:** 2534 F (1390 C)

**FLASH POINT:** Not available

**EVAPORATION RATE:** Not applicable

**FLAMMABILITY (solid, gas):** Not available

**VAPOR PRESSURE:** Not Available

**VAPOR DENSITY:** Not applicable

**RELATIVE GRAVITY (water=1):** 2.130

**SOLUBILITY IN WATER:** VERY soluble (111 g/100 mL at 20 ° C(68°F))

**SOLVENT SOLUBILITY:**

**Soluble:** alcohol, glycerol

**Insoluble:** acetone, ether

**PARTITION COEFICIENT n-octanol / water:** Not available

**AUTO-IGNITION TEMPERATURE:** Not available

**DECOMPOSITION TEMPERTURE:** Not available

## SECTION 10: STABILITY AND REACTIVITY

### CHEMICAL STABILITY:

Stable at room temperature. Rapidly absorbs carbon dioxide from the air, forming sodium carbonate. Slowly absorbs moisture from the air.

### POSSIBILITY OF HAZARDOUS REACTIONS:

**REACTIVITY:** May react with evolution of heat on contact with water.



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**CONDITIONS TO AVOID:** Water, moisture, and air. Dangerous gases may accumulate in confined spaces. May ignite or explode on contact with combustible materials.

**INCOMPATIBILITIES:** combustible materials, acids, halo carbons, metals, halogens, oxidizing materials, peroxides, metal salts

**HAZARDOUS DECOMPOSITION PRODUCTS:** Thermal decomposition; SODIUM OXIDE

**POLYMERIZATION:** Will not polymerize. However, it can induce hazardous polymerization of acetaldehyde, acrolein, and acrylonitrile.

### SECTION 11: TOXICOLOGICAL INFORMATION

#### IRRITATION DATA:

1 percent/24-hour(s) eyes-monkey severe; 500 mg/24-hour(s) skin-rabbit severe; 400 ug eyes-rabbit mild; 1 percent eyes-rabbit severe; 50 ug/24hour(s) eyes-rabbit severe; 1 mg/24 hour(s) eyes-rabbit severe; 1 mg/30second(s) rinsed eyes-rabbit severe

#### TOXICITY DATA:

1350 mg/kg skin-rabbit LD50; 104-340 mg/kg oral-rat LD50; 40 mg/kg intra peritoneal-mouse LD50; 500 mg/kg oral-rabbit LDLo

#### LOCAL EFFECTS:

Corrosive: inhalation, skin, eye, ingestion

#### ACUTE TOXICITY LEVEL:

**Toxic:** ingestion

**Moderately Toxic:** dermal absorption

**Oral LD50 (rat):** 140–340 mg/kg.

**Dermal LD50 (rabbit):** 1,350 mg/kg.

#### Carcinogenicity/Mutagenicity:

Not classified as carcinogenic (IARC/NTP). No data on reproductive toxicity.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** eye disorders, skin disorders and allergies.

#### MUTAGENIC DATA:

Cytogenetic analysis - grasshopper parenteral 20 mg; cytogenetic analysis hamster lung 10 mmol/L;

Cytogenetic analysis - hamster ovary 16 mmol/L

#### HEALTH EFFECTS:

##### INHALATION:

**ACUTE EXPOSURE:** Effects due to inhalation of dusts or mist may vary from mild irritation of the nose at 2 mg/m<sup>3</sup> to severe pneumonitis depending on the severity of exposure. Low concentrations may cause mucous membrane



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irritation with sore throat, coughing, and dyspnea. Intense exposures may result in destruction of mucous membranes and delayed pulmonary edema or pneumonitis. Shock may occur.

**CHRONIC EXPOSURE:** Prolonged exposures to high concentrations of dusts or mists may cause discomfort and ulceration of the nasal passages. Repeated exposures of 5000 mg/L were harmless to rats, but 10,000 mg/L led to nervousness, sore eyes, diarrhea and retarded growth. Rats exposed 30minutes/day to unmeasured concentrations of sodium hydroxide aerosols suffered pulmonary damage after 2-3 months. Death occurred in 2 of 10 rats exposed to an aerosol of 40% aqueous sodium hydroxide for 30 minutes, twice a week for 3 weeks. Histopathological examination showed mostly normal lung tissue with foci of enlarged alveolar septae, emphysema, bronchial ulceration, and enlarged lymph adenoidal tissues. An epidemiologic study of 291 workers chronically exposed to caustic dusts for 30 years or more found no significant increase in mortality in relation to duration or intensity of such exposures.

#### INGESTION:

**ACUTE EXPOSURE:** The reported lethal dose in rats is 140-340 mg/kg. Ingestion may cause a burning sensation in the mouth, corrosion of the lips, mouth, tongue and pharynx, and severe esophageal and abdominal pain, vomiting of blood and large pieces of mucosa, and bloody diarrhea. Asphyxia can occur from swelling of the throat. Mediastinitis, alkalemia, pallor, weak, slow pulse, cardiovascular collapse, shock, coma and death may occur. Perforation of the alimentary tract and constrictive scarring may result. Esophageal stricture may occur weeks, months, or even years later to make swallowing difficult. The estimated fatal dose in man is 5grams. Cases of squamous cell carcinoma of the esophagus have occurred with latent periods of 12 to 42 years after ingestion. These cancers were believed to be sequela of tissue destruction and possibly scar formation rather than the result of direct carcinogenic action of sodium hydroxide.

**CHRONIC EXPOSURE:** Depending on the concentration, repeated ingestion of alkaline substances may result in inflammatory and ulcerative effects on the oral mucous membranes and other effects as with acute ingestion.

#### SKIN CONTACT:

**ACUTE EXPOSURE:** Upon contact with the skin, damage including redness, cutaneous burns, skin tissues and white eschars may occur without immediate pain. Exposure to solutions as weak as 0.03 N (0.12%) for 1 hour has caused injury to healthy skin. With solutions of 0.4-4%, irritation does not occur until after several hours. Solutions of 25-50% caused no sensation of irritation within 3 minutes in human subjects. Skin biopsies from human subjects having 1 N sodium hydroxide applied to their arms for 15 to 180 minutes showed progressive changes beginning with dissolution of the cells in the horny layer and progressing through edema to total destruction of the epidermis in 60 minutes. A 5% aqueous solution caused severe necrosis to the skin of rabbits when applied for 4 hours. Alkalies penetrate the skin slowly. The extent of injury depends on the duration of contact. If sodium hydroxide is not removed from the skin, severe burns with deep ulceration may occur. Exposure to the dust or mist may cause multiple small burns and temporary loss of hair. Pathologic findings due to alkalies may include gelatinous, necrotic areas at the site of contact.

**CHRONIC EXPOSURE:** Effects are dependent upon concentration and duration of exposure. Dermatitis or effects similar to those for acute exposure may occur.

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### **EYE CONTACT:**

**ACUTE EXPOSURE:** Contact may cause disintegration and sloughing of conjunctival and corneal epithelium, corneal opacification, marked edema and ulceration. After 7 to 13 days either gradual recovery begins or there is progression of ulceration and corneal opacification. Complications of severe eye burns are symblepharon with overgrowth of the cornea by a vascularized membrane, progressive or recurrent corneal ulceration and permanent corneal opacification. Blindness may occur.

**CHRONIC EXPOSURE:** Effects are dependent upon concentration and duration of exposure. Conjunctivitis or effects similar to those for acute exposure may occur.

## **SECTION 12: ECOLOGICAL INFORMATION**

**ECOTOXICITY:** LC50 (fish, 96h): 240 µg/L., EC50 (algae): 765 µg/L.

**FISH TOXICITY:** 240 ug/L 96-hour(s) LC50 (Mortality) Bluegill (Lepomismacrochirus)

**INVERTEBRATE TOXICITY:** 330000-1000000 ug/L 48-hour(s) LC50 (Mortality) Cockle (Cerastoderma edule)

**ALGAL TOXICITY:** 765 ug/L 30-day(s) (Biomass) Algae, phytoplankton, algal mat (Algae)

**PHYTOTOXICITY:** 230 ug/L 21-week(s) (Biomass) Waterweed (Elodea Canadensis)

### **FATE AND TRANSPORT:**

### **BIOCONCENTRATION:**

1066 ug/L 32-hour(s) BCF (Residue) Fathead minnow (Pimephales promelas) 3.1 ug/L

**ENVIRONMENTAL SUMMARY:** Highly toxic to aquatic life, Highly alkaline; neutralization required before release.

## **SECTION 13: DISPOSAL CONSIDERATIONS**

Review federal, state and local government requirements prior to disposal. Neutralize with dilute acetic acid to pH 6–9. Dispose via **SWMC-licensed hazardous waste handlers (Reg. M/50, 2019)**. Do not dispose of waste with normal garbage, or to sewer systems. Whatever cannot be saved for recovery or recycling, including containers, should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options.

## **SECTION 14: TRANSPORT INFORMATION**

### **U.S. DOT 49 CFR 172.101:**

**PROPER SHIPPING NAME:** Sodium hydroxide, solid

**ID NUMBER:** UN1823

**HAZARD CLASS OR DIVISION:** 8

**PACKING GROUP:** II

**CANADIAN TRANSPORTATION OF DANGEROUS GOODS:** No classification assigned.

**LAND TRANSPORT ADR/RID:**





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**PROPER SHIPPING NAME:** Sodium hydroxide, solid

**UN NUMBER:** UN1823

**ADR/RID CLASS:** 8

**CLASSIFICATION CODE:** C6

**PACKING GROUP:** II

#### AIR TRANSPORT IATA/ICAO:

**PROPER SHIPPING NAME:** Sodium hydroxide, solid

**UN/ID NUMBER:** UN1823

**IATA/ICAO CLASS:** 8

**PACKING GROUP:** II

#### MARITIME TRANSPORT IMDG:

**PROPER SHIPPING NAME:** Sodium hydroxide, solid

**UN NUMBER:** UN1823

**IMDG CLASS:** 8

**PACKING GROUP:** II

**EMS No:** F-A, S-B

**Limited Quantity:** Not permitted

**Marine Pollutant:** No

**PIH Code:** Not applicable.

### SECTION 15: REGULATORY INFORMATION

#### U.S. REGULATIONS:

**CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):** 1000 LBS RQ

**SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):** Not regulated.

**SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):** Not regulated.

**SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):**

**ACUTE:** Yes

**CHRONIC:** No

**FIRE:** No

**REACTIVE:** Yes

**SUDDEN RELEASE:** No

**SARA TITLE III SECTION 313 (40 CFR 372.65):** Not regulated.

**OSHA PROCESS SAFETY (29CFR1910.119):** Not regulated.

#### CANADIAN REGULATIONS:

**WHMIS CLASSIFICATION:** Class E: Corrosive



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#### EUROPEAN REGULATIONS:

**EC CLASSIFICATION (ASSIGNED):** EU CLP Regulation (EC 1272/2008): C Corrosive (R35).

**EC Classification may be inconsistent with independently researched data.**

#### DANGER/HAZARD SYMBOL:

C Corrosive

**KSA:** Compliant with SASO 1503:2018 (GHS).

#### EC RISK AND SAFETY PHRASES:

R 35 Causes severe burns.

S ½ Keep locked-up and out of reach of children.

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 37/39 Wear suitable gloves and eye/face protection.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

#### CONCENTRATION LIMITS:

≥5%: Corrosive (Category 1) – H314 (Causes severe skin burns/eye damage).

2% to <5%: Corrosive (Category 1B) – H314.

0.5% to <2%: Skin/Eye Irritant (Category 2) – H315/H319.

#### GERMAN REGULATIONS:

##### WATER HAZARD CLASS (WGK):

STATE OF CLASSIFICATION: VwVwS

CLASSIFICATION UNDER HAZARD TO WATER: 1

#### NATIONAL INVENTORY STATUS:

U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

### SECTION 16: OTHER INFORMATION

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