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**SODIUM HYDROXIDE
(ANHYDROUS)**

Safety Data Sheet
According to REACH Regulation (1907/2006/EC) and Regulation (EU) 453/2010

Date of issue: 01-12-2010

Revision: 00

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Name: (Anhydrous) Sodium Hydroxide

Index number under Regulation (EC) No 1272/2008 on classification, labelling and packaging: 011-002-00-6

CAS number: 1310-73-2

REACH Registration number: 01-2119457892-27-0057

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses:

- Manufacture of chemical products.
- Celluloses.
- Soap.
- Detergents.

Uses advised against:

There are no uses advised against providing that the instructions described in this Safety Data Sheet are observed.

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SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 on classification, labeling and packaging:

Skin corrosive: Category 1A, H314

H314: Causes severe skin burns and eye damage.

Classification according to Directive 67/548/EEC:

C; R35: Causes severe burns.

2.2. Label elements



DANGER

H314: Causes severe skin burns and eye damage.

P264: Wash hands and face thoroughly after handling.

P301 + P330 + P331: IF SWALLOWED: rinse mouth. Do NOT induce vomiting.

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

P310: Immediately call a POISON CENTER or doctor/physician.

P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position 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.

2.3. Other hazards

The substance does not meet the criteria for PBT or vPvB (see section 12).

Physicochemical hazards:

Highly exothermic reaction with strong acids and water.

When coming into contact with aluminium, tin and zinc, it gives off hydrogen (a gas that is inflammable at between 4 and 75% in volume in the air).

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SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Name: Sodium hydroxide (min. 99 %).

CAS number: 1310-73-2

EC number: 215-185-5

IUPAC name: Sodium hydroxide

Index number under Regulation (EC) No 1272/2008 on classification, labelling and packaging: 011-002-00-6

Index number R. 1272/2008	EC number	CAS number	Name	Concentration	Classification Directive 67/548/EEC	Classification Regulation (EC) 1272/2008	Specific concentration limits
011-002-00-6	215-185-5	1310-73-2	Sodium hydroxide	min. 99 %	C; R35	Skin Corr. 1A, H314	Skin Corr. 1A; H314: C ≥ 5 % Skin Corr. 1B; H314: 2 % ≤ C < 5 % Skin Irrit. 2; H315: 0,5 % ≤ C < 2 % Eye Irrit. 2; H319: 0,5 % ≤ C < 2 %

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

4.1.1. In case of inhalation:

Move the affected party to a ventilated area and keep them warm. Seek urgent medical help.

4.1.2. After skin contact:

Wash the affected area with copious amounts of water for at least 15 minutes, and remove any contaminated clothing or footwear. Seek urgent medical help.

4.1.3. After eye contact:

Wash the eyes with copious amounts of water for at least 30 minutes. Seek urgent medical help.

4.1.4. In case of ingestion:

Do not provoke vomiting.

If conscious, give water to drink and seek urgent medical help.

4.1.5. Recommended personal protective equipment for first aid responders:

Use independent breathing apparatus to protect the respiratory system, along with the suitable clothing, gloves and footwear to protect the skin.

4.2 Most important symptoms and effects, both acute and delayed

Inhalation: Irritation of the respiratory system.

Skin contact: Intense burning and ulcers penetrating the skin.

Eye contact: Burns to the eyes. Can cause ulceration of the conjunctiva and cornea.

Ingestion: Burns to the mouth, oesophagus, can cause intestinal perforation.

4.3. Indication of any immediate medical attention and special treatment needed

Need of immediate medical attention.

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SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media:

Non-flammable product. Use water spray to cool containers exposed to fire.

Unsuitable extinguishing media:

CO2 powder (Carbon dioxide snow)

5.2. Special hazards arising from the substance or mixture

Control run-off water and prevent it from entering water courses or drainage systems.

The heat generated by contact with water (heat of dilution) may be sufficient to ignite other combustible materials.

5.3. Advice for firefighters

Use independent breathing apparatus to protect the respiratory system, along with the suitable clothing, gloves and footwear to protect the skin.

Ensure that you always have your back to the wind.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Avoid contact with the eyes, skin and respiratory system. Do not act without the proper protective equipment (see section 8).

6.2. Environmental precautions

Prevent the product from reaching the drainage system or ground waters. If the product reaches a natural water course, advise the Civil Protection authorities.

6.3. Methods and material for containment and cleaning up

Mechanically collect as much of the product as possible.

Absorb any spillage using sand, earth or clay.

Move these absorbent products to a controlled waste disposal or secure storage site so that they can be treated by an authorised waste manager.

6.4. Reference to other sections

See protection measures in section 8.

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SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Do not smoke, eat or drink when handling the product.
Before handling the product, ensure that the recipient to be used is clean, dry and suitable.
Recipients should be properly sealed and correctly labelled.
Take special precautions if there is any residue from products such as aluminium, zinc, tin, acid products or organic products.
Prevent any possibility of contact between the product and the skin or eyes. Avoid the formation of dust.
Always use the recommended protective clothing.

7.2. Conditions for safe storage, including any incompatibilities

Recommended materials for warehouse storage and containers: Carbon steel, carbon steel drums, polythene sacks or Big-Bags.
Incompatible materials for warehouse storage: Aluminium, tin, zinc and alloys (bronzes), chrome and lead.
Storage conditions: A cool, well ventilated location, protected from damp and kept apart from acids, halogenated hydrocarbons, nitroparaffins, etc. The floor must be waterproof and anti-slip. A water supply or source must be provided in the place of storage. Emergency showers and eye-washes must be available.
Temperature and humidity range/limits: Not applicable.
Special conditions: Prevent the product from becoming damp or aerated. Hygroscopic product. Becomes carbonated in contact with the air or moisture.

7.3. Specific end use(s)

When used in its various applications, the product must be prevented from coming into uncontrolled direct contact with other products such as acids and metals. Never neutralise the solid product.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

VLA-EC: 2 mg/m³ (INSHT).
TLV-STEL: 2 mg/m³ (ACGIH).
WEL-Limit value - Short term: 2 mg/m³ (UK)

Human exposure:

Workers:

DNEL (local effects): 1 mg/m³ (inhalation; long-term toxicity)

General population:

DNEL (local effects): 1 mg/m³ (inhalation; long-term toxicity)

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8.2. Exposure controls

8.2.1. Appropriate engineering controls

No data available.

8.2.2. Individual protection measures, such as personal protective equipment

Respiratory protection: In the case of sodium hydroxide powder emissions, use mask with dust filter (EN 143 P2 or P3).

Hand protection: Gloves for chemical hazards (EN 374).

Eye protection: Use safety goggles (EN 166).

Skin protection: Suit or plastic apron providing protection against acids (EN 340).

8.2.3. Environmental exposure controls

Do not allow leakage into the drainage system and/or groundwater.

Measuring system: Acid-base volumetry.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance (physical state and colour):	Solid white, translucent, taking the form of beads or blocks.
Odour:	Odourless
Odour threshold:	No data available.
pH:	14
Melting point/freezing point:	323°C at 101 325 Pa.
Initial boiling point and boiling range:	1388°C at 101 325 Pa
Flash point:	Not applicable (inorganic substance).
Flammability (solid, gas):	Inorganic oxides in which the inorganic element is in its

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	highest possible oxidation state are incapable of further reaction with oxygen and can thus be designated as non-flammable.
Upper/lower flammability or explosive limits:	No data available.
Explosive properties:	There are no chemical groups associated with explosive properties present in the molecule.
Oxidising properties:	There are no chemical groups associated with oxidizing properties present in the molecule.
Vapour pressure:	It is not required to determined this property since the melting point is above 300°C
Relative density:	2.13 g/cm ³ at 20°C
Water solubility:	100 g/100 g H ₂ O at 25°C
Partition coefficient: n-octanol/water:	Not applicable (inorganic substance).
Viscosity:	Not applicable (the substance is a solid).
Vapour density:	No data available.
Evaporation rate:	Not applicable.
Auto-ignition temperature:	The study does not need to be conducted since the substance is a solid and the preliminary results exclude self-heating of the substance up to 400°C.
Decomposition temperature:	No data available.

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9.2. Other information

Organic peroxide: Not classified (based on structure).

Self-heating: The preliminary results exclude self-heating of the substance up to 400°C. In the molecule there are no chemical groups that would indicate explosive or self-reactive properties.

Pyrophoric liquid/solid: Not classified. The substance is known to be stable at room temperature for prolonged periods of time.

Corrosive to metals: No data available.

Substance which in contact with water emits flammable gases: Not classified (based on structure).

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

See section 10.3.

10.2. Chemical stability

The substance is stable under normal environmental conditions and foreseeable conditions of temperature and pressure during the storage and handling.

10.3. Possibility of hazardous reactions

Reacts with aluminium, tin, zinc and their alloys, copper, lead, etc. giving off hydrogen.

Highly exothermic reaction with strong acids.

Reacts dangerously with acetic acid, allyl chloride, chlorine trifluoride, chloroform, methylic alcohol, chloronitrotoluene, chlorosulphonic acid, glyoxal, cyanohydrin, hydrochloric acid, hydrofluoric acid, hydroquinone, nitric acid, sulphuric acid and oleum, nitropropane, phosphorous, propiolactone, phosphorous pentoxide, tetrachlorobenzene, tetrahydrofuran, etc.

Caustic soda forms salts with nitromethane and nitroparaffins that explode on impact.

10.4. Conditions to avoid

Do not expose to the elements for excessive periods, to prevent degradation of the container.

10.5. Incompatible materials

Aluminium, tin, zinc and their alloys, copper, lead, etc.

Acetic acid, allyl chloride, chlorine trifluoride, chloroform, methylic alcohol, chloronitrotoluene, chlorosulphonic acid, glyoxal, cyanohydrin, hydrochloric acid, hydrofluoric acid, hydroquinone, nitric acid, sulphuric acid and oleum, nitropropane, phosphorous, propiolactone, phosphorous pentoxide, tetrachlorobenzene, tetrahydrofuran, nitromethane and nitroparaffins.

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10.6. Hazardous decomposition products

When the product decomposes, toxic sodium oxide gases are given off.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects:

11.2. acute effects (acute toxicity, irritation and corrosivity):

11.2.1. LD50 oral (lethal dose, 50%)	Acute toxicity testing does not need to be conducted since the substance is classified as corrosive to the skin. The substance is not expected to be systemically available and the effects are expected to be due to pH changes.
11.2.2. LD50 dermal (lethal dose, 50%)	Acute toxicity testing does not need to be conducted since the substance is classified as corrosive to the skin. The substance is not expected to be systemically available and the effects are expected to be due to pH changes.
11.2.3. LC50 inhalation (lethal dose, 50%)	Acute toxicity testing does not need to be conducted since the substance is classified as corrosive to the skin. The substance is not expected to be systemically available and the effects are expected to be due to pH changes.
11.2.4. Skin corrosion /irritation	Category 1A, H314. Causes severe skin burns and eye damage. Corrosive (<i>in vitro</i> study) (Method equivalent to ECD 435) (Stefano et al., 2003)
11.2.5. Serious eye damage/irritation	Category 1A, H314. Causes severe skin burns and eye damage. Corrosive (rabbit) (Corgan et al., 1987; Peer et al., 1987; Wentworth et al., 1987)
11.2.6 Specific target organ toxicity – single exposure	No data available.

11.3. Sensitisation:

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Respiratory sensitisation: No data available.

Skin sensitisation: a standard skin sensitization study does not need to be conducted since the substance is a strong base (pH > 11,5). Based on data obtained in a study with human volunteers the substance has no skin sensitisation potential (Park et al., 1995).

11.4. Repeated dose toxicity:

Specific target organ toxicity – repeated exposure: Corrosive substance. In addition the substance is not expected to be systemically available in the body under normal handling and use conditions and therefore systemic effects of the substance after repeated exposure are not expected to occur.

11.5 CMR effects (carcinogenicity, mutagenicity and toxicity for reproduction):

Carcinogenicity: The substance did not induce mutagenicity in *in vitro* and *in vivo* studies (EU RAR, 2007). Systemic carcinogenicity is not expected to occur because the substance is not expected to be systemically available in the body under normal handling and use conditions.

Germ cell mutagenicity: Both the *in vitro* and the *in vivo* genetic toxicity tests indicated no evidence of mutagenic activity. Furthermore the substance is not expected to be systemically available in the body under normal handling and use conditions and for this reason additional testing is considered unnecessary (EU RAR, 2007).

Reproductive toxicity: The substance is not expected to be systemically available in the body under normal handling and use conditions and for this reason it can be stated that the substance will not reach the foetus nor reach male and female reproductive organs.

Reproductive toxicity, effects on or via lactation: The substance is not expected to be systemically available in the body under normal handling and use conditions and for this reason additional testing is considered unnecessary.

11.6. Aspiration hazard:

No data available.

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SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

The hazard of the substance for the environment is caused by the hydroxyl ion (pH effect): For this reason the effect of the substance on the organisms depends on the buffer capacity of the aquatic or terrestrial ecosystem.

The high water solubility and low vapour pressure indicate that the substance will be found predominantly in the aqueous phase. Also the variation in acute toxicity for aquatic organisms can be explained for a significant extent by the variation in buffer capacity of the test medium. LC50 values ranged between 33 and 189 mg/l.

Acute toxicity to fish

LC50 (lethal concentration, 50%):

All available tests resulted in a range of LC50 values between 35 to 189 mg/l. However, in the majority of the test reports there were no data on pH variation.

Chronic toxicity to fish

NOEC (no observed effect concentration):

It is not required to conduct this study since the substance dissociates in water and the only possible effect would result from the pH effect. However, pH will remain within environmentally expected ranges.

Acute toxicity to crustaceans

EC50 (effect concentration, 50%):

Species: *Ceriodaphnia*
40.4 mg/l (48 h; based on immobility).
(Warne et al., 1999)

Chronic toxicity to crustaceans

NOEC (no observed effect concentration):

It is not required to conduct this study since the substance dissociates in water and the only possible effect would result from the pH effect. However, pH will remain within environmentally expected ranges.

Acute toxicity to algae and other aquatic plants

EC50 (effect concentration, 50%):

No data available.

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Toxicity data on soil micro- and macro-organisms and other environmentally relevant organisms, such as birds, bees and plants

If emitted to soil, sorption to soil particles will be negligible. Depending on the buffer capacity of the soil, OH⁻ will be neutralised in the soil pore water or the pH may increase. There is no direct exposure of soil to NaOH based on the available uses. In addition, no indirect exposure via air is expected as it rapidly neutralizes in air.

12.2. Persistence and degradability

Readily biodegradable

Not applicable (inorganic substance).

Other relevant information

Abiotic degradation:
NaOH is a strong alkaline substance that dissociates completely in water to Na⁺ and OH⁻. High water solubility and low vapour pressure indicate that NaOH will be found predominantly in aqueous environment. This implies that it will not adsorb on particulate matter or surfaces. Atmospheric emissions as aerosols are rapidly neutralized by carbon dioxide and the salts will be washed out by rain.

12.3. Bioaccumulative potential

Bioconcentration factor (BCF): experimental data:

Considering its high water solubility, NaOH is not expected to bioconcentrate in organisms. In addition, sodium is a naturally-occurring element that is prevalent in the environment and to which organisms are exposed regularly, for which they have some capacity to regulate the concentration in the organism.

Partition coefficient: n-octanol/water (log Pow):

Not applicable (inorganic substance).

12.4. Mobility in soil

High water solubility and mobility.

12.5. Results of PBT (persistent, bioaccumulative and toxic) and vPvB (very persistent and very bioaccumulative) assessment

Persistence Assessment (P):

NaOH will rapidly dissolve and dissociate in water. Therefore, NaOH does not fulfil the P criterion.

Bioaccumulation Assessment (B):

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Bioaccumulation is not relevant for NaOH. Therefore, NaOH does not meet the B criterion of the PBT criteria.

Toxicity Assessment (T):

The lowest LC50 for freshwater and marine organisms were found to be 40 and 33 mg/l, respectively. This is clearly above the cut-off value of 0.1 mg/l. Therefore, NaOH does not meet the T criterion in the PBT assessment.

NaOH does not fulfil the criteria for persistency, bioaccumulation and toxicity. Therefore, NaOH is not considered a PBT or vPvB substance.

12.6. Other adverse effects

No data available.

SECTION 13 DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Absorb any residue using sand, earth or clay. Any contaminated absorbent products must be treated by an authorised waste manager, along with any used packaging and residue.

The product can be neutralised using highly diluted hydrochloric acid, which should be added very slowly by specialised personnel wearing the proper protection. **Never neutralise the solid product.**

The product will be disposed of in accordance with the regulation currently in force and specifically with:

- Directive 2008/98/EC, of 19 November 2008 on waste and the corresponding national regulations which transpose this Directive.
- Directive 94/62/EC, of 20 December 1994 on packaging and packaging waste and its modification and the corresponding national regulations which transpose this Directive.
- Commission Decision 2001/118/EC of 16 January 2001 amending Decision 2000/32/EC as regards the list of wastes and any other regulation currently in force in the European Community, National and Local with regard to the correct disposal of this material and its empty containers.

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SECTION 14: TRANSPORT INFORMATION

14.1 ADR (road)/RID (rail)

14.1.1 UN number:	UN 1823	
14.1.2 UN proper shipping name:	Sodium hydroxide, solid	
14.1.3 Transport hazard class:	8,	Label: 8
14.1.4 Packing group:	II	
14.1.5. Environmental hazards:	No.	

14.2 IMDG (sea)

14.2.1 UN number:	UN 1823	
14.2.2 UN proper shipping name:	Sodium hydroxide, solid	
14.2.3 Transport hazard class:	8,	Label: 8
14.2.4 Packing group:	II	
14.2.5. Environmental hazards:	No.	

14.3 ICAO / IATA (air)

14.3.1 UN number:	UN 1823	
14.3.2 UN proper shipping name:	Sodium hydroxide, solid	
14.3.3 Transport hazard class:	8,	Label: 8

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14.3.4 Packing group:	II
14.3.5. Environmental hazards:	No.

14.4. Special precautions for user

It is necessary to attend to the same information described in the previous epigraphs: ADR, RID, IMDG, ICAO, etc.

14.5. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work.

15.2. Chemical safety assessment

The supplier has carried out a chemical safety assessment for the substance.

SECTION 16: OTHER INFORMATION

Information sources used in the elaboration of this Safety Data Sheet:

- HANDBOOK OF REACTIVE CHEMICALS HAZARDS. BRETHERIC 4th Ed. 1990
- DANGEROUS PROPERTIES INDUSTRIAL MATERIALS (TENTH EDITION) SAX
- HAZARDOUS CHEMICALS DATA BOOK (2nd EDITION) G.WEIS.
- IARC (International Agency for Research on Cancer).
- NIOSH (National Institute for Occupational Safety and Health).
- NTP (National Toxicology Program).
- ACGIH (American Conference of Governmental Industrial Hygienist).
- OSHA (Occupational Health and Safety Assessment)
- INSHT (Instituto Nacional de Seguridad e Higiene en el Trabajo).
- SYNDICAT DES HALOGÉNES ET DÉRIVÉS