 <b>LG Chem</b> <b>/Yeosu plant</b>	Material Safety Data Sheet	Identity No.	GHS-CA-002
	<b>Sodium Hydroxide (50%)</b>	Pages	1/10


## 1. Identification of the product and the supplier

- 1) Chemical Name : Sodium Hydroxide (50%)
- 2) Advisable use and Restriction  
 Advisable use : Not available  
 Restriction of product using : Not available
- 3) Manufacturer/Supplier/Distributor information  
 Company : LG Chem, LTD. VCM plant  
 Address : 763, Wollae-dong, Yeosu-si, Jeollanam-do  
 Emergency response number : Tel) +82-61-680-6493, FAX) +82-61-680-6599  
 Respondent : C/A Team

## 2. Hazard identification

- 1) Hazard classification :
- Corrosive to metals : Category 1
  - Skin corrosion/irritation : Category 1
  - Serious eye damage /eye irritation : Category 1
  - Hazardous to the aquatic environment (acute hazard) : Category 3

### 2) Allocation label elements

<input type="radio"/> Pictogram and symbol	<input type="radio"/> Signal word	<input type="radio"/> Hazard statement
	Danger	H290: May be corrosive to metals. H314: Causes severe skin burns and eye damage. H318: Causes serious eye damage. H402: Harmful to aquatic life.

### Precautionary statements

#### [Prevention]

- P234 : Keep only in original container.
- P260 : Do not breathe dust/fume/gas/mist/vapours/spray.
- P264 : Wash thoroughly after handling.
- P280 : Wear protective gloves/protective clothing/eye protection/face protection.

#### [Response]

- 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.

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.

P310 : Immediately call a poison center or doctor/physician.

P321 : Specific treatment.

P363 : Wash contaminated clothing before reuse.

P390 : Absorb spillage to prevent material damage.

[Storage]

P405 : Store locked up.

P406 : Store in corrosive resistant/... container with a resistant inner liner.

[Disposal]

P501 : Dispose of contents/container to in accordance with local/regional/national/international regulations (to be specified).

3) Other hazard information not included in hazard classification

○ NFPA Rating system : Health: 3, Flammability: Not available, Reactivity: Not available

### 3. Composition/information on ingredients

Chemical Name	Common name Synonyms	CAS No.	Content (%)
Sodium Hydroxide	Caustic soda	1310-73-2	49.5~50.5
WATER	DIHYDROGEN OXIDE	7732-18-5	49.5~50.5

### 4. First-aid measures

1) Eye contact:

- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- Call emergency medical service.

2) Skin contact:

- If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- For hot product, immediately immerse in or flush the affected area with large amounts of cold water to dissipate heat.
- Call emergency medical service.
- Remove and isolate contaminated clothing and shoes.
- For minor skin contact, avoid spreading material on unaffected skin.

3) Inhalation:

- Immediately call a poison center or doctor/physician.



- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.

4) Ingestion:

- If swallowed: Rinse mouth. Do not induce vomiting.
- Call emergency medical service.

5) Indication of immediate medical attention and notes for physician:

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves

## 5. Fire-fighting measures

1) Suitable (and unsuitable) extinguishing media:

- Use alcohol foam, carbon dioxide, or water spray when fighting fires involving this material.
- Use dry sand or earth to smother fire.

2) Specific hazards arising from the chemical (ex: hazardous combustion products):

- May be corrosive to metals. Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning .
- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning
- Containers may explode when heated.
- Some of these materials may burn, but none ignite readily.
- Some may produce flammable hydrogen gas upon contact with metals.
- Non-combustible, substance itself does not burn but may decompose upon heating, then produce corrosive and/or toxic fumes.

3) Special protective equipment and precautions for fire-fighters:

- Rescuers should put on appropriate protective gear.
- Evacuate area and fight fire from a safe distance.
- Dike fire-control water for later disposal; do not scatter the material.
- Move containers from fire area if you can do it without risk.
- Fire involving Tanks; Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Fire involving Tanks; Cool containers with flooding quantities of water until well after fire is out.
- Fire involving Tanks; Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- Fire involving Tanks; Always stay away from tanks engulfed in fire.
- Fire involving Tanks; For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

## 6. Accidental release measures

1) Personal precautions, protective equipment and emergency procedures:

- Clean up spills immediately, observing precautions in Protective Equipment section.
- Eliminate all ignition sources.
- Stop leak if you can do it without risk.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Cover with plastic sheet to prevent spreading.

- Please note that there are materials and conditions to avoid.

2) Environmental precautions and protective procedures:

- Prevent entry into waterways, sewers, basements or confined areas.

3) The methods of purification and removal:

- Absorb spillage to prevent material damage.
- Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Absorb the liquid and scrub the area with detergent and water.

## 7. Handling and storage

1) Precautions for safe handling:

- Wash thoroughly after handling.
- Use only in a well-ventilated area.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Use carefully in handling/storage.
- Loosen closure cautiously before opening.
- Avoid prolonged or repeated contact with skin.
- Avoid breathing vapors from heated material.
- Do not enter storage area unless adequately ventilated.
- Please note that there are materials and conditions to avoid.
- Please work with reference to engineering controls and personal protective equipment.

2) Conditions for safe storage:

- Keep only in original container.
- Store locked up.
- Store in corrosive resistant/... container with a resistant inner liner.
- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.

## 8. Exposure controls/personal protection

	<b>Sodium Hydroxide</b>
Korean Occupation of Safety and Health Regulation	TWA = 2 mg/m <sup>3</sup>
ACGIH	Ceiling = 2 mg/m <sup>3</sup>
OSHA	TWA = 2 mg/m <sup>3</sup>
NIOSH	Ceiling = 2 mg/m <sup>3</sup>
Biological exposure index	Not available

EU Regulation	Not available
Other	- Canada: Ceiling = 2 mg/m <sup>3</sup> - China: Ceiling = 2 mg/m <sup>3</sup> - France: TWA = 2 mg/m <sup>3</sup> - Japan: Ceiling = 2 mg/m <sup>3</sup> - Australia: Ceiling = 2 mg/m <sup>3</sup>

**2) Appropriate engineering controls**

- Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
- Facilities for storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**3) Personal protective equipment:**
 Respiratory protection:

- Wear NIOSH or European Standard EN 149 approved full or half face piece(with goggles) respiratory protective equipment when necessary.
- In case exposed to gaseous/liquid material, the respiratory protective equipments as follow are recommended. escape full facepiece gas mask (of use for acid gas, in case of acid gas for organic compounds) or escape half facepiece gas mask (of use for acid gas, in case of acid gas for organic compounds) or direct full facepiece gas mask (of use for acid gas, in case of acid gas for organic compounds) half facepiece gas mask (of use for acid gas, in case of acid gas for organic compounds) or powered air-purifying gas mask.

 Eye protection:

- Wear enclosed safety goggles to protect from gaseous state organic material causing eye irritation or other disorder.
- An eye wash unit and safety shower station should be available nearby work place.

 Hand protection:

- Wear appropriate protective gloves by considering physical and chemical properties of chemicals.

 Body protection:

- Wear appropriate protective clothing by considering physical and chemical properties of chemicals.

**9. Physical and chemical properties**

	NaOH	Water
1) Appearance	Deliquescent liquid / Colorless	Liquid
2) Odor	Odorless	Odorless
3) Threshold of odor	Not applicable	Not available
4) pH	(0.05% sol. 12; 0.5% sol. 13; 5% sol. 14 (2))	Not available
5) Melting point/freezing point	13 °C (at 50% NaOH)	0 °C

6) Initial boiling point and boiling range	1390 °C	100 °C
7) Flash point	Not applicable	Not applicable
8) Evaporation rate	Not available	Not applicable
9) Flammability (solid, gas)	Inflammable (1)	Not applicable
10) Upper/lower flammability or explosive limits.	Not applicable	Not applicable
11) Vapour pressure	1 mmHg (739°C)	0.001 mmHg (10 °C)
12) Solubility(ies)	109 g/100ml (20°C (1), soluble at alcohol, glycerol (2))	Not available
13) vapour density	Not available	>1 (air=1)
14) Specific gravity /Density	1.509	1 g/cm <sup>3</sup> (4 °C)
15) n-octanol/water partition coefficient	-3.88 (estimated)	Not available
16) Auto ignition temperature	Not applicable	Not available
17) Degradation temperature	Not available	Not available
18) Viscosity	4 cP (350°C)	0.01 P(g/cm·s) (20 °C)
19) Molecular weight	40.01	18.01

## 10. Stability and reactivity

### 1) Chemical stability and Possibility of hazardous reactions:

- May be corrosive to metals.
- Containers may explode when heated.
- Some of these materials may burn, but none ignite readily.
- Some may produce flammable hydrogen gas upon contact with metals.
- Non-combustible, substance itself does not burn but may decompose upon heating, then produce corrosive and/or toxic fumes.
- Fire will produce irritating, corrosive and/or toxic gases.

### 2) Conditions to avoid (e.g., static discharge, shock or vibration):

- Heat, sparks or flames

### 3) Incompatible materials:

- Combustibles, reducing agents,
- Metals

### 4) Hazardous decomposition products:

- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning.



- Corrosive and/or toxic fume

## 11. Toxicological information

### Information of Health Hazardous:

- Acute toxicity:
  - oral: Not available
  - dermal: Not classified
  - **Sodium Hydroxide** : LD<sub>50</sub> = 1,350 mg/kg bw (rabbit)
  - Inhalation: Not available
  
- Skin Corrosion/ Irritation: Category 1
  - **Sodium Hydroxide** : Corrosive reactions were observed on skin of rabbits. (OECD TG 435)
  
- Serious Eye Damage/Irritation: Category 1
  - **Sodium Hydroxide** : In eyes irritation test with rabbits, severe conjunctival irritations were observed. (OECD TG 405)
  
- Respiratory sensitizer: Not available
  
- Skin Sensitization: Not classified
  - **Sodium Hydroxide** : In skin sensitisation test with human, skin sensitization were not observed.
  
- Carcinogenicity: Not classified
  - **Sodium Hydroxide** : KOREA-ISHL, IARC, NTP, OSHA, ACGIH, EU Regulation 1272/2008: not listed
  
- Mutagenicity: Not classified
  - **Sodium Hydroxide** : Negative reactions were observed in both in vitro (Mammalian cell gene mutation assay, Bacterial reverse mutation assay) and in vivo (micronucleus assay).
  
- Reproductive toxicity: Not classified
  - **Sodium Hydroxide** : In reproduction/developmental toxicity test with mice, toxic effects were not observed.
  
- Specific target organ toxicity (single exposure): Not classified
  - **Sodium Hydroxide** : In acute oral toxicity with rats, gastric injuries were observed.
  
- Specific target organ toxicity (repeat exposure): Not classified
  - **Sodium Hydroxide** : In repeated oral toxicity with rats, clinical signs were not observed.
  
- Aspiration Hazard: Not available

## 12. Ecological information

- 1) Ecological toxicity:
- Acute toxicity: Not classified
  - Chronic toxicity: Not classified

- Fish:
    - **Sodium Hydroxide** : 96hr-LC<sub>50</sub>(*Gambusia affinis*) < 180 mg/L
  - Crustacea:
    - **Sodium Hydroxide** : 48hr-EC<sub>50</sub>(*Ceriodaphnia dubia*) = 40.4 mg/L
  - Algae: Not available
- 2) Persistence and degradability:
- Persistence:
    - **Sodium Hydroxide** : Low persistency (log Kow is less than 4 estimated. (log Kow = -3.88) (estimated)
  - Degradability: Not available
- 3) Bioaccumulative potential:
- Bioaccumulation:
    - **Sodium Hydroxide** : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (estimated)
  - Biodegradation: Not available
- 4) Mobility in soil:
- **Sodium Hydroxide** : Low potency of mobility to soil. (Koc = 0.1114287) (estimated)

### 13. Disposal considerations

- 1) Disposal method:
- Dispose by neutralization, hydrolysis, oxidation, reduction.
  - Incinerate or melt down in high temperature.
  - Solidify.
- 2) Disposal precaution:
- Consider the required attentions in accordance with waste treatment management regulation.

### 14. Transport information

- 1) UN Number: 1824
- 2) UN Proper shipping name: SODIUM HYDROXIDE SOLUTION
- 3) Transport Hazard class: 8
- 4) Packing group: II
- 5) Marine pollutant: Not Applicable
- 6) Special precautions:
- in case of fire: F-A
  - in case of leakage: S-B



## 15. Regulatory information

### Korea:

- Occupational Safety and Health Regulation:
  - **Sodium Hydroxide** : Administration subject listed, Work environment monitoring listed (6 month)  
Occupational exposure limits listed
- Toxic Chemical Control Act:
  - **Sodium Hydroxide** : Toxic Chemicals(97-1-136), Existing Chemical Substance(KE-13257)
- Dangerous Material Safety Management Regulation:
  - **Sodium Hydroxide** : Non-dangerous
- Wastes Control Act:
  - **Sodium Hydroxide** : Public Controlled Waste (waste toxic chemicals)

### EU classification:

- **Sodium Hydroxide** :
  - Classification: C; R35
  - Risk phrases: R35
  - Safety phrases: S1/2 S26 S37/39 S45
  - EU Regulation 1272/2008: Skin Corr. 1A
- **Water** :
  - Classification: Not classified
  - Risk phrases: Not applicable
  - Safety phrases: Not applicable

### U.S.A management information:

- OSHA (29CFR1910.119) : Not regulated
- CERCLA 103 (40CFR302.4):
  - **Sodium Hydroxide** : 453.599 kg or 1000 lb
- EPCRA 302 (40CFR355.3): Not regulated
- EPCRA 304 (40CFR355.4): Not regulated
- EPCRA 313 (40CFR372.65): Not regulated
- **Sodium Hydroxide** : Section 8(b) Inventory (TSCA): Present
- **Water** : Section 8(b) Inventory (TSCA): Present

### Japan management information:

- **Sodium Hydroxide** : Existing and New Chemical Substances (ENCS): (1)-410
- **Water** : Industrial Safety and Health Law Substances (ISHL): 2-(4)-1220

### China management information:

- **Sodium Hydroxide** : Inventory of Existing Chemical Substances (IECSC): Present
- **Water** : Inventory of Existing Chemical Substances (IECSC): Present

### Canada management information:

- **Sodium Hydroxide** : Domestic Substances List (DSL): Present
- **Water** : Domestic Substances List (DSL): Present

### Australia management information:

- **Sodium Hydroxide** : Inventory of Chemical Substances (AICS): Present
- **Water** : Inventory of Chemical Substances (AICS): Present

- New Zealand management information:
  - **Sodium Hydroxide** : Inventory of Chemicals (NZIoC): present
  - **Water** : Inventory of Chemicals (NZIoC): May be used as a single component chemical under an appropriate group standard
- Philippines management information:
  - **Sodium Hydroxide** : Inventory of Chemicals and Chemical Substances (PICCS): present
  - **Water** : Inventory of Chemicals and Chemical Substances (PICCS): present
- Substance of Rotterdame Protocol: Not regulated
- Substance of Stockholme Protocol: Not regulated
- Substance of Montreal Protocol: Not regulated

## 16. OTHER INFORMATION

### 1) Information source and references:

- REACH information on registered substances;  
<http://apps.echa.europa.eu/registered/registered-sub.aspx#search>
- U.S. National library of Medicine (NLM) Hazardous Substances Data Bank (HSDB) ;  
<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.htm>
- The Chemical Database -The Department of Chemistry at the University of Akron;  
<http://ull.chemistry.uakron.edu/erd/>
- TOMES;LOLI ; <http://csi.micromedex.com/fraMain.asp?Mnu=0>
- EU Regulation 1272/2008
- ERG2008
- EPISUITE : <http://www.epa.gov/opt/exposure/pubs/episuitedl.htm>
- Korea Occupational Health & Safety Agency: <http://www.kosha.net>
- National chemicals information systems : <http://ncis.nier.go.kr>
- National Emergency Management Agency-Korea dangerous material inventory management system;  
<http://www.nema.go.kr/hazmat/main/main.jsp>
- Waste Control Act enforcement regulation attached [1]
- UN Recommendations on the transport of dangerous goods 17<sup>th</sup>

2) Issue date : 1996. 06. 30

3) Revision number and date : 2013. 07. 18 (9<sup>th</sup>)

### 4) Other material safety data sheet information:

- The contents of this MSDS documented and the information based on current knowledge and information. Some of the information contained in the information provided by the Korea Occupational Safety & Health Agency
- This MSDS were made of the informational purposes for the safe handling when education or use of the production department workers. Therefore we make no guarantee for result obtained, and assume no responsibility for damages incurred by use of this product. But the material used for the purpose of the data requested is available for further information.