SAFETY DATA SHEET

Date Printed: May 6, 2020
Version: 1
Regulation: According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

1. Identification

1.1 Product identifier

1.1.1 Product name: HYPO(NaOCl)

1.1.2 Other means of identification: Not available

1.2 Recommended use of the chemical and restrictions on use

1.2.1 Recommended use: Cleaning and Washing agents, Non-agricultural pesticides and Disinfectants (coolant), Oxidizing agents(oxidized starch, wastewater treatment), pH-Regulating agents

1.2.2. Restrictions on use: Do not use for purposes other than those recommended.

1.3 Details of the supplier of the safety data sheet

1.3.1 Manufacturer

Company name: Hanwha Solutions Co, Ltd.
Address: Hanwha Solutions Co, Ltd., 117, Yeosusandan 3-ro, Yeosu-si, Jeollanam-do, Republic of Korea
Prepared by: CA Production Team
Contact Telephone: (Yeosu Plant) +82-61-688-1774

1.3.2 Supplier & Distributor

Company name: Hanwha Solutions Co, Ltd.
Address: Hanwha Solutions Co, Ltd., Hanwha Bldg., 86, Cheonggyecheon-ro, Jung-gu, Seoul, Republic of Korea
Prepared by: CA Sales Team
Contact Telephone: +82-10-9772-2753

1.4 Emergency phone number

Emergency phone : +82-10-9772-2753

2. Hazard(s) identification

2.1 Classification of the substance or mixture

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Physical / Chemical Hazards: Not classified

Health Hazards:

Skin corrosion/irritation : Category 1
Serious eye damage /eye irritation : Category 1

Environmental Hazards:

Hazardous to the aquatic environment (acute hazard) : Category 1
Hazardous to the aquatic environment (chronic) : Category 2

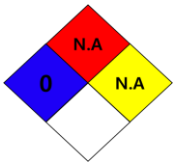
2.2 Label elements, including precautionary statements

o Pictogram and symbol:

o Signal word: Danger
o Hazard statements:
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H400 Very toxic to aquatic life.
H411 Toxic to aquatic life with long lasting effects.

o Precautionary statements:
- Prevention:
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P264 Wash skin thoroughly after handling.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

- Treatment:
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 (see sections 4 on this SDS).
P363 Wash contaminated clothing before reuse.
P391 Collect spillage.



- Storage:
P405 Store locked up.

- Disposal:
P501 Dispose the contents/container in accordance with local/regional/national/international regulations.

2.3 Other hazard information not included in hazard classification (National Fire Protection Association; NFPA)

o Health: 3
o Flammability: Not available
o Reactivity: Not available

3. Composition/information on ingredients

Component	Common name and synonyms	CAS No.	Conc. / %

Water	Dihydrogen monoxide	7732-18-5	84.0~85.0
Sodium hypochlorite	Not available	7681-52-9	10.0~15.0
Sodium hydroxide	Caustic soda; Soda lye; Sodium hydrate	1310-73-2	< 1.0

4. First aid measures

4.1 Description of first aid measures

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.

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.

Inhalation

- Immediately call a poison center or doctor/physician.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.

Ingestion

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

4.2 Most important symptoms and effects, both acute and delayed acute effects

- Not known

4.3 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

5.1 Extinguishing media

- Use alcohol foam, carbon dioxide, or water spray when fighting fires involving this material.
- Use dry sand or earth to smother fire.
- Do not use Mono Ammonium Phospate(MAP) fire extinguishers. May cause toxic gas release and explosion

5.2 Specific hazards arising from the chemical

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

- Containers may explode when heated.

5.3 Special protective equipment and precautions for fire-fighters

- Rescuers should put on appropriate protective gear.
- Evacuate area and fight fire from a safe distance.
- Substance may be transported in a molten form.
- Some may be transported hot.
- 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

6.1 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.

6.2 Environmental precautions

- Avoid release to the environment.
- Prevent entry into waterways, sewers, basements or confined areas.

6.3 Methods and materials for containment and cleaning up

- Collect spillage.
- 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.
- Large Spill; Dike far ahead of liquid spill for later disposal.
- With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.
- Small Spill; Take up with sand or other non-combustible absorbent material and place into containers for later disposal.

7. Handling and storage

7.1 Precautions for safe handling

- Wash skin thoroughly after handling.
- Use only in a well-ventilated area.
- Follow all SDS/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.
- Be careful to high temperature.

7.2 Conditions for safe storage, including any incompatibilities

- Store locked up.
- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.
- Store in a cool.
- Store in a dry and a well-ventilated place. Keep container tightly closed.
- Avoid contact with water during storage.
- Avoid contact with acids.

8. Exposure controls/personal protection

8.1 Occupational Exposure limits

<Sodium hypochlorite>

- **o ACGIH regulation**: Not available
- **o OSHA regulation**: Not available
- **o NIOSH regulation**: Not available
- **o Biological exposure index**: Not available
- **o EU regulation**: Not available
- **o Other**: Not available

<Sodium hydroxide>

- **o ACGIH regulation**: Ceiling = 2 mg/m^3
- **o OSHA regulation**: TWA = 2 mg/m^3, Ceiling = 2 mg/m^3
- **o NIOSH regulation**: Ceiling = 2 mg/m^3
- **o Biological exposure index**: Not available
- **o EU regulation**: Not available
- **o Other**:
  - Taiwan: TWA = 2 mg/m^3, STEL = 4 mg/m^3
  - Philippines: TWA = 2 mg/m^3
  - Singapore: STEL = 2 mg/m^3

8.2 Exposure controls

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.

Individual protection measures, such as personal protective equipment

Respiratory protection

- Wear NIOSH approved full or half face piece (with goggles) respiratory protective equipment when necessary.

Eye protection

- Wear enclosed safety goggles or breathable safety glasses to protect from vapor 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 chemicals resistance protective gloves such as PVC by considering physical and chemical properties of chemicals.

Body protection
- Wear appropriate rubber boots and chemicals resistance protective clothing by considering physical and chemical properties of chemicals.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	
Description:	Liquid
Color:	Not available
Odor:	Not available
Odor threshold:	Not available
pH:	Not available
Melting point/freezing point:	Not available
Initial boiling point and boiling range:	Not available
Flash point:	Not available
Evaporation rate:	Not available
Flammability (solid, gas):	Not applicable
Upper/lower flammability or explosive limits:	Not available
Vapor pressure:	Not available
Vapor density:	Not available
Relative density	Not available
Solubility:	Not available
Solubility in organic solvents:	Not available
Partition coefficient: n-octanol/water:	Not available
Auto ignition temperature:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available

"NOTE: The physical data presented above are typical values and should not be construed as a specification"

10. Stability and reactivity

10.1 Reactivity/Chemical stability/Possibility of hazardous reactions

- Decomposes slowly at normal temperatures releasing low concentration of corrosive chlorine gas.
- Some of these materials may burn, but none ignite readily.
- 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.
- Exothermic reaction with acid.
- Contact with ammonia, amine and ammonium salts will result in chloramines.

10.2 Conditions to avoid:

- Heat, sparks or flames, ultraviolet light

10.3 Incompatible materials:

- Acids, metals and metal salts, amines, ammonia and ammonia salts, urea, ethylene, glycols, formic acid, methanol, reducing and oxidizing agents, organic and combustibles, peroxides, EDTA

10.4 Hazardous decomposition products:

- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning
- Corrosive and/or toxic fume
- Irritating and/or toxic gases
- Chlorine gases, hydrochloric acid, hypochlorous acid, sodium oxide

11. Toxicological information

Information on toxicological effects	
(a) Acute toxicity	
Oral	Not classified (ATE_{mix} = 5,140.19 mg/kg bw)
	- Sodium hypochlorite · Rat (male), LD_{50} = 1,100 mg/kg bw (12.5% solution) (OECD TG 401) - Sodium hydroxide · Rat, LD_{50} = 140~340 mg/kg bw
Dermal	Not classified (ATE_{mix} = 81,793.4 mg/kg bw)
	- Sodium hypochlorite · Rabbit (male/female), LD_{50} > 20,000 mg/kg bw (OECD TG 402) - Sodium hydroxide · Rabbit, LD_{50} = 1,350 mg/kg bw
Inhalation	Not classified
	- Sodium hypochlorite · Rat (male), LC_{50} > 10.5 mg/L air (1hr). No mortality, No significant findings. LC_{50} > 5.25 mg/L air (4hr) (OECD TG 403)
(b) Skin Corrosion/ Irritation	Category 1
	- Sodium hypochlorite · In a skin corrosion/irritation study with rabbits and guinea pigs, 5.25 % Hypochlorite bleach, was slightly irritant in rabbits (abino) and guinea. All symptoms were reversible. (pH > 11.5) (OECD TG 404) - Sodium hydroxide · In a skin corrosion/irritation study with rabbits, irritating. (OECD TG 404)
(c) Serious Eye Damage/ Irritation	Category 1
	- Sodium hypochlorite · In a eye irritation/corrosion study with rabbits, Sodium hypochlorite solutions with concentrations of more than 0.052 % are severely irritant or corrosive to the eye of rabbits. (OECD TG 405) - Sodium hydroxide · In a eye irritation/corrosion study with rabbits, irritating. Severe conjunctival

	irritation was also observed between 4 and 96 hours at this concentration. (OECD TG 405)
(d) Respiratory sensitization	Not available
(e) Skin Sensitization	Not classified
	- Sodium hypochlorite ・In a skin sensitization study with guinea pigs, No skin alterations in the treated or control groups were observed. Thus, the test material is not considered to be skin sensitizing. (OECD TG 406) - Sodium hydroxide ・In a skin Sensitization study with humans, Not sensitizing.
(f) Carcinogenicity	Not classified
	- Sodium hypochlorite ・IARC, NTP, OSHA, ACGIH, EU CLP 1272/2008: Not listed - Sodium hydroxide ・IARC, NTP, OSHA, ACGIH, EU CLP 1272/2008: Not listed
(g) Mutagenicity	Not classified
	- Sodium hypochlorite ・*In vitro*: Mammalian Chromosome Aberration Test: with metabolic activation: Positive (OECD TG 473) ・*In vivo*: Mammalian Erythrocyte Micronucleus Test: Negative (OECD TG 474) ・*In vivo*: Mammalian Bone Marrow Chromosomal Aberration Test: Negative (OECD TG 475) - Sodium hydroxide ・*In vitro*: Bacterial Reverse Mutation Assay: with/without metabolic activation: Negative ・*In vitro*: Mammalian Chromosome Aberration Test: with metabolic activation: Positive, without metabolic activation: Negative (Incubation of CHO-K1 cells with NaOH in the presence of rat liver S9 increased the clastogenic activity of S9, or induced new clastogens by breakdown of the S9. Therefore, testing at non-physiological pH might give false-positive responses.) ・*In vivo*: Mammalian Erythrocyte Micronucleus Test: Negative
(h) Reproductive toxicity	Not classified
	- Sodium hypochlorite ・Rats were administered 0, 0.08, 0.8, 8 mg/kg bw/day of test substance in a study performed according to OECD 414. There were no treatment-related changes in viability, foetal weights and external appearance of all foetuses in all dose groups. Skeletal and soft-tissue defects were in the normal range for all dose groups. maternal toxicity was not evaluated. NOAELteratogenicity ≥ 5.7 mg/kg bw/day, LOAELtetragenicity > 5.7 mg/kg bw/day. (OECD TG 414) ・Rats(male/female) were administered 1, 2, 5 mg/kg bw/day of test substance in a study performed according to OECD 415. No differences were observed between control rats and those rats exposed to up to 5 mg/kg bw/day of the test material when fertility, viability, litter size, day of eye opening or day of

	vaginal patency were evaluated. No alterations in sperm count, sperm direct progressive movement, percent motility or sperm morphology were observed among adult male rats. LOAEL > 5.0 mg/kg bw/day, NOAEL ≥ 5.0 mg/kg bw/day (OECD TG 415)
(i) Specific target organ toxicity (single exposure)	Not classified
	- Sodium hypochlorite ・In a acute oral toxicity study with rat, Clinical signs included hypoactivity, muscular weakness, haemorrhagic rhinitis and emaciation. Surviving animals had recovered after 1, 3 and 7 days in the 4.64, 6.81 and 10.00 g/kg bw groups, respectively. LD_{50} = 8,910 mg/kg bw (OECD TG 401)
(j) Specific target organ toxicity (repeat exposure)	Not classified
	- Sodium hypochlorite ・In a 30-day repeated dose toxicity study by inhalation, The described observations indicated that repeated exposure of Fischer 344 rats to chlorine resulted in pulmonary effects at all level used, and hepatic and renal effects at 9 and 3 ppm chlorine. However, these results are difficult to interpret as they pertain to human exposures largely because of differences between rats and humans. LOAEL ≤ 3 mg/m³ air. (read across: Chlorine gas) (OECD TG 412)
(k) Aspiration Hazard	Not available

12. Ecological information

12.1 Toxicity	
Acute toxicity	Category 1 (ATE_{mix} = 0.286 mg/L)
	- Sodium hypochlorite ・Fish: 96h-LC_{50} (*Pink salmon*) = 0.023~0.052 mg TRO/L (nominal) flow-through, saltwater ・Invertebrate: 48h-EC_{50} (*Ceriodaphnia dubia*) = 35 μg/L (OECD TG 202, GLP) ・Algae: 72h-ErC_{50} (*Pseudokirchneriella subcapitata*) = 0.036 mg/L (OECD TG 201, GLP) - Sodium hydroxide ・Fish: 96h-LC_{50} (*Gambusia affinis*) = 125 mg/L ・Invertebrate: 48h-EC_{50} (*Ceriodaphnia sp.*) = 40.4 mg/L ・Algae: Not available
Chronic toxicity	Category 2
	- Sodium hypochlorite ・Fish: 28d-NOEC (*Menidia peninsulae*) = 0.04 mg CPO/L ・Invertebrate: 21d-NOEC (*E. capsaeformis*) = 10 μg/L ・Algae: Not available
12.2 Persistence and degradability	Not available
12.3 Bio-accumulative potential	Not available

12.4 Mobility in soil	Not available
12.5 Hazardous to the ozone layer	Not classified
12.6 Other adverse effects	Not available

13. Disposal considerations

13.1 Disposal method

- Waste must be disposed of in accordance with federal, state and local environmental control regulations.

13.2 Disposal precaution

- Consider the required attentions in accordance with waste treatment management regulation.

14. Transport information

14.1 UN No.: 1791

14.2 UN Proper shipping name: HYPOCHLORITE SOLUTION

14.3 Transport Hazard class

- ADR: 8
- IMDG: 8
- ICAO/IATA: 8
- RID: 8

14.4 Packing group: Ⅲ

14.5 Environmental hazards: Not available

14.6 Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code): Not applicable

14.7 Special precautions for user

- **in case of fire:** F-A
- **in case of leakage:** S-B

15. Regulatory information

15.1 Safety, health and environmental regulation/legislation specific for the substance or mixture USA Regulatory Information

<Sodium hypochlorite>

TSCA (Toxic Substances Control Act): Section 8(b) inventory (Present)
Proposition 65: Not regulated
OSHA Regulation: Not regulated
CERCLA Regulation: 100 lb final RQ, 45.4 kg final RQ
SARA 302 Regulation: Not regulated
SARA 304 Regulation: Not regulated
SARA 313 Regulation: Not regulated

Foreign Regulatory Information

Substance of Rotterdam Protocol: Not regulated

Substance of Stockholm Protocol: Not regulated
Substance of Montreal Protocol: Not regulated

Foreign Inventory Status
- Korea management information: Existing Chemical Substance (KE-31506)
- European Inventory of Existing Commercial Chemical Substances(EINECS): Present (231-668-3)
- China management information: Inventory of Existing Chemical Substances (IECSC): Present (05289)
- Japan management information: Existing and New Chemical Substances (ENCS): Present ((1)-237)
- Canada management information: Domestic Substances List (DSL): Present
- Australia management information: Australia Inventory of Chemical Substances (AICS): Present
- New Zealand management information: New Zealand Inventory of Chemicals (NZIoC): HSNO Approval: HSR003698
- Philippines management information: Philippines Inventory of Chemicals and Chemical Substances (PICCS): Present

<Sodium hydroxide>

TSCA (Toxic Substances Control Act): Section 8(b) inventory (Present)
Proposition 65: Not regulated
OSHA Regulation: Not regulated
CERCLA Regulation: 1000 lb final RQ, 454 kg final RQ
SARA 302 Regulation: Not regulated
SARA 304 Regulation: Not regulated
SARA 313 Regulation: Not regulated

Foreign Regulatory Information
Substance of Rotterdam Protocol: Not regulated
Substance of Stockholm Protocol: Not regulated
Substance of Montreal Protocol: Not regulated

Foreign Inventory Status
- Korea management information: Existing Chemical Substance (KE-31487)
- European Inventory of Existing Commercial Chemical Substances(EINECS): Present (215-185-5)
- China management information: Inventory of Existing Chemical Substances (IECSC): Present (27689)
- Japan management information: Existing and New Chemical Substances (ENCS): Present ((1)-410)
- Canada management information: Domestic Substances List (DSL): Present
- Australia management information: Australia Inventory of Chemical Substances (AICS): Present
- New Zealand management information: New Zealand Inventory of Chemicals (NZIoC): HSNO Approval: HSR001547
- Philippines management information: Philippines Inventory of Chemicals and Chemical Substances (PICCS): Present

16. OTHER INFORMATION

16.1 Indication of changes:
Preparation date: May 6, 2020
Version: 1
Revision date: July 15, 2020

16.2 Key literature reference and sources for data:
- TSCA; http://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/searchbylist/search.do
- IECSC; http://cciss.cirs-group.com/
- EU Regulation 1272/2008
- TOMES-LOLI®; http://www.rightanswerknowledge.com/loginRA.asp
- UN Recommendations on the transport of dangerous goods 17th
- IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; http://monographs.iarc.fr

- ECHA CHEM; http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances
- OECD SIDS ; http://webnet.oecd.org/Hpv/U I/Search.aspx
- HSDB; http://toxnet.nlm.nih.gov/cgi-bin/sis/search2
- EPA; http://www.epa.gov/iris
- EPISUITE Program ver.4.1
- NIOSH(The National Institute for Occupational Safety and Health)
- ACGIH(American Conference of Governmental Industrial Hygienists)
- National chemicals information systems; http://ncis.nier.go.kr
- National Emergency Management Agency-Korea dangerous material inventory management system; http://hazmat.mpss.kfi.or.kr/material.do
- Waste Control Act enforcement regulation attached [1]

16.3 Abbreviations

ACGIH: American Conference of Governmental Industrial hygienists
NIOSH: The National Institute for Occupational Safety and Health
OSHA: Occupational Safety & Health Administration
IARC: International Agency for Research on Cancer
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
IMDG: International Maritime Dangerous Goods
ICAO/IATA: International Civil Aviation Organization/ International Air Transport Association
RID: Regulations Concerning the International Transport of Dangerous Goods by Rail

16.4 Other

- Product should be handled, stored, and used in accordance with the generally accepted industrial hygiene practices and in conformity with all the applicable legal regulations.
- The information provided herein is based on the knowledge possessed at this present time from the view point of safety requirements.
- It should, therefore, not be construed as guaranteeing specific properties.