SAFETY DATA SHEET

According to OSHA Hazcom Standard 29 CFR 1910.1200

Nessler´s solution

Date of issue: 2024-04-12 Revision date: 2024-04-15 Version: 1.1

1. IDENTIFICATION

A. Product name

- Nessler´s solution

B. Recommended use and restriction on use

- General use : for experimental, research and industrial use
- Restriction on use : Never drink, Not used except for experimental, research and industrial applications.

C. Manufacturer / Supplier / Distributor information

○ Manufacturer information

- Company name : DUKSAN PURE CHEMICALS
- Address : 53,SINWONRO 133BEONGIL, DANWONGU, ANSANSHI, GYUNGGIDO, KOREA
- Emergency telephone number : 82-31-495-4055

○ Supplier/Distributer information

- Company name : DUKSAN PURE CHEMICALS
- Address : 53,SINWONRO 133BEONGIL, DANWONGU, ANSANSHI, GYUNGGIDO, KOREA
- Emergency telephone number : 82-31-495-4055

2. HAZARD IDENTIFICATION

A. GHS Classification

- Corrosive to metals : Category1
- Acute toxicity (oral) : Category2
- Acute toxicity (dermal) : Category1
- Acute toxicity (inhalation: vapor) : Category2
- Skin corrosion/irritation : Category1
- Specific target organ toxicity(Repeated exposure) : Category2
- Acute aquatic toxicity : Category1
- Chronic aquatic toxicity : Category1

B. GHS label elements

○ Hazard symbols



○ Signal words

- Danger

○ Hazard statements

- H290 May be corrosive to metals

- H300 Fatal if swallowed
- H310 Fatal in contact with skin
- H314 Causes severe skin burns and eye damage
- H330 Fatal if inhaled
- H373 May cause damage to organs through prolonged or repeated exposure
- H400 Very toxic to aquatic life
- H410 Very toxic to aquatic life with long lasting effects

○ Precautionary statements

1) Prevention

- P234 Keep only in original packaging.
- P260 Do not breathe dust/fume/gas/mist/vapours/spray.
- P262 Do not get in eyes, on skin, or on clothing.
- P264 Wash hands thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P273 Avoid release to the environment.
- P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
- P284 In case of inadequate ventilation wear respiratory protection.

2) Response

- P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P302+P352 IF ON SKIN: Wash with plenty of soap and water.
- 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 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 or doctor/physician.
- P314 Get medical advice/attention if you feel unwell.
- P320 Specific treatment is urgent
- P321 Specific treatment
- P330 Rinse mouth.
- P361+P364 Take off immediately all contaminated clothing and wash it before reuse.
- P363 Wash contaminated clothing before reuse.
- P390 Absorb spillage to prevent material damage.
- P391 Collect spillage.

3) Storage

- P403+P233 Store in a well-ventilated place. Keep container tightly closed.
- P405 Store locked up.
- P406 Store in corrosion resistant container with a resistant inner liner.

4) Disposal

- P501 Dispose of contents/container in accordance with local/regional/national/international regulation

C. Other hazards which do not result in classification

- Not available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Trade names and Synonyms	CAS No.	Content(%)

Water	Aqua; Dihydrogen oxide	7732-18-5	79~81
Sodium hydroxide	Caustic soda ; Sodium hydroxide ; Sodium hydrate ; Ascarite	1310-73-2	10~15
Mercury diiodide	Mercuric iodide	7774-29-0	4~5
Potassium iodide	Potassium monoiodide ; Dipotassium diiodide ; Tripotassium triiodide ;	7681-11-0	3~4

4. FIRST AID MEASURES

A. Eye contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15 minutes and call a doctor/physician.
- Get medical attention immediately.

B. Skin contact

- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Wash contaminated clothing thoroughly before re-using.
- Get medical attention immediately.
- Wash thoroughly after handling.

C. Inhalation contact

- Take specific treatment if needed.
- When exposed to large amounts of steam and mist, move to fresh air.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.
- If breathing is stopped or irregular, give artificial respiration and supply oxygen.

D. Ingestion contact

- Please be advised by doctor whether induction of vomit is demanded or not.
- Rinse your mouth with water immediately.
- Get medical attention immediately.
- Go to the hospital immediately if symptoms(flare, irritate) occur.

E. Delayed and immediate effects and also chronic effects from short and long term exposure

- Not available

F. Notes to physician

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.

5. FIREFIGHTING MEASURES

A. Suitable (Unsuitable) extinguishing media

- Avoid use of water jet for extinguishing
- Dry chemical, carbon dioxide, regular foam extinguishing agent, spray

B. Specific hazards arising from the chemical

- Causes severe skin burns and eye damage
- Fatal if inhaled
- Fatal if swallowed
- Fatal in contact with skin
- May be corrosive to metals

C. Special protective actions for firefighters

- Avoid inhalation of materials or combustion by-products.
- Cool containers with water until well after fire is out.
- Do not approach the tank surrounded by fire until it is extinguished.
- In case of conflagration, use automatic fire sprinkler. Major fire may require withdrawal, allowing the object itself to burn.

- Keep unauthorized personnel out.

6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment and emergency procedures

- Do not touch spilled material. Stop leak if you can do it without risk.
- Handle the damaged containers or spilled material after wearing appropriate protective equipment
- Move container to safe area from the leak area.
- Must work against the wind, let the upwind people to evacuate.
- Remove all sources of ignition.

B. Environmental precautions

- If large amounts have been spilled, inform the relevant authorities.
- Prevent runoff and contact with waterways, drains or sewers.

C. Methods and materials for containment and cleaning up

- Appropriate container for disposal of spilled material collected.
- Dike for later disposal.
- Disposal of waste shall be in compliance with the Wastes Control Act
- Large spill : Stay upwind and keep out of low areas. Dike for later disposal.
- Notify the central and local government if the emission reach the standard threshold.

7. HANDLING AND STORAGE

A. Precautions for safe handling

- Avoid contact with incompatible materials.
- Avoid direct physical contact.
- Comply with all applicable laws and regulations for handling
- Dealing only with a well-ventilated place.
- Do not handle until all safety precautions have been read and understood.

B. Conditions for safe storage, including any incompatibilities

- Avoid direct sunlight.
- Check regularly for leaks.
- Do not apply any physical shock to container.
- Do not apply direct heat.
- Do not use damaged containers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

○ ACGIH TLV

- [Sodium hydroxide] : Ceiling 2 mg/m3
- [Mercury diiodide] : TWA 0.025 mg/m3, as Hg-Inorganic forms including metallic mercury
- [Mercury diiodide] : TWA, 0.01 ppm (0.1 mg/m3)-Iodine and iodides as inhalable Fraction and Vapor STEL, 0.1 ppm (1 mg/m3) - Iodine Vapor
- [Potassium iodide] : TWA, 0.01 ppm (0.1 mg/m3)-Iodine and iodides as inhalable Fraction and Vapor STEL, 0.1 ppm (1 mg/m3) - Iodine Vapor

○ OSHA PEL

- [Sodium hydroxide] : 2 mg/m3

B. Engineering controls

- Business owner is recommended to maintain below recommended exposure limits for the working place with general exhaust of gas/vapour/mist/fume.

C. Individual protection measures, such as personal protective equipment

○ Respiratory protection

- Any air-purifying respirator with a full facepiece and an organic vapor canister.

- Any chemical cartridge respirator with a full facepiece and organic vaporcartridge(s).
- Any chemical cartridge respirator with organic vapor cartridge(s).
- Consider warning properties before use.
- For Unknown Concentration or Immediately Dangerous to Life or Health : Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.
- Respiratory protection is ranked in order from minimum to maximum.
- Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.

○ Eye protection

- Provide an emergency eye wash station and quick drench shower in the immediate work area.
- Wear primary eye protection such as splash resistant safety goggles with a secondary protection face shield.

○ Hand protection

- Wear appropriate chemical resistant glove.

○ Skin protection

- Wear appropriate chemical resistant protective clothing.

○ Others

- Not available

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance	
- Appearance	Liquid
- Color	light yellow
B. Odor	Not available
C. Odor threshold	Not available
D. pH	strong alkali
E. Melting point/Freezing point	Not available
F. Initial Boiling Point/Boiling Ranges	Not available
G. Flash point	Not available
H. Evaporation rate	Not available
I. Flammability(solid, gas)	Not available
J. Upper/Lower Flammability or explosive limits	Not available
K. Vapour pressure	Not available
L. Solubility	Not available
M. Vapour density	Not available
N. Specific gravity(Relative density)	1.1 ~ 1.3
O. Partition coefficient of n-octanol/water	Not available
P. Autoignition temperature	Not available
Q. Decomposition temperature	Not available
R. Viscosity	Not available
S. Molecular weight	Not available

10. STABILITY AND REACTIVITY

A. Chemical Stability

- Stable under normal conditions of use and storage.

B. Possibility of hazardous reactions

- May be corrosive to metals.

C. Conditions to avoid

- Avoid : Accumulation of electrostatic charges, Heating, Flames and hot surfaces
- Avoid contact with incompatible materials and condition.
- Avoid contact with metals.

D. Incompatible materials

- Avoid contact with strong oxidizing agent and strong reducing agent.

E. Hazardous decomposition products

- May emit flammable vapour if involved in fire.

11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure

○ Respiratory tracts

- Not available

○ Oral

- Fatal if swallowed

○ Eye·Skin

- Causes severe skin burns and eye damage

B. Delayed and immediate effects and also chronic effects from short and long term exposure

○ Acute toxicity

* Oral
  - Product (ATEmix) : 300mg/kg < ATEmix <= 2000mg/kg
  - [Water] : LD50 > 90000 ㎎/㎏ Rat (LD50 > 90 ml/kg) (HSDB)
  - [Mercury diiodide] : LD50 18 ㎎/㎏ Rat (ChemIDPlus)
  - [Potassium iodide] : LD50 2500 mg/kg bw Rat Not classified (ECHA)
* Dermal
  - Product (ATEmix) : 1000mg/kg < ATEmix <= 2000mg/kg
  - [Sodium hydroxide] : LD50 1350 ㎎/㎏ Rabbit (HSDB)
  - [Mercury diiodide] : LD50 75 ㎎/㎏ rabbit (ChemIDPlus)
  - [Potassium iodide] : LD50 > 2000 mg/kg bw Rat No death, Not classified (ECHA)
* Inhalation
  - Product (ATEmix) : >50.0mg/L, Vapour, 4hr
  - Not available

○ Skin corrosion/irritation

- Causes severe skin burns and eye damage

○ Serious eye damage/irritation

- Not available

○ Respiratory sensitization

- Not available

○ Skin sensitization

- Not available

○ Carcinogenicity

* IARC
  - [Mercury diiodide] : Group 3 (Mercury and inorganic mercury compounds)
* OSHA
  - Not available
* ACGIH
  - [Mercury diiodide] : A4 (Mercury inorganic forms)
  - [Potassium iodide] : A4 (Iodides)

* NTP

- Not available

* EU CLP

- Not available

○ Germ cell mutagenicity

- Not available

○ Reproductive toxicity

- Not available

○ STOT-single exposure

- Not available

○ STOT-repeated exposure

- May cause damage to organs through prolonged or repeated exposure

○ Aspiration hazard

- Not available

12. ECOLOGICAL INFORMATION

A. Ecotoxicity

○ Fish

- [Potassium iodide] : LC50 2190 mg/L 96 hr Oncorhynchus mykiss (ECHA)

○ Crustaceans

- [Sodium hydroxide] : EC50 40.4 ㎎/ℓ 48 hr Ceriodaphnia sp (ECHA)
- [Potassium iodide] : EC50 100 mg/L 48 hr Daphnia magna (ECHA)

○ Algae

- [Potassium iodide] : EC50 4474.192 ㎎/ℓ 96 hr (Estimate)

B. Persistence and degradability

○ Persistence

- [Water] : log Kow = -1.38 (HSDB)
- [Sodium hydroxide] : log Kow -3.88 (SRC)

○ Degradability

- Not available

C. Bioaccumulative potential

○ Bioaccumulative potential

- [Sodium hydroxide] : BCF -3.88 (SRC)

○ Biodegradation

- [Potassium iodide] : inorganic (ECHA)

D. Mobility in soil

- [Potassium iodide] : Koc 13.2 (20 °C) (ECHA)

E. Other adverse effects

- [Sodium hydroxide] : Not classified as chronic aquatic hazard (ECHA)

13. DISPOSAL CONSIDERATIONS

A. Disposal methods

- It shall be treated by incineration
- Oil water separation technology shall be applied as pre-waste treatment if it is applicable
- Stabilization and minimization treatment by incineration or similar method can be applied, if more than two kinds of designated wastes are in mixture state and it is impractical to separate them

B. Special precautions for disposal

- Anyone with business license number who generates industrial wastes shall treat the waste by him/herself or by entrusting to the legal entities who treat the wastes, recycle the wastes of others or install and operate the waste

treatment facilities according to the Wastes Control Act

- Dispose of waste in accordance with all applicable laws and regulations.

14. TRANSPORT INFORMATION

A. UN No. (IMDG CODE/IATA DGR)

- 2922

B. Proper shipping name

- CORROSIVE LIQUID, TOXIC, N.O.S.

C. Hazard Class

- 8

D. IMDG CODE/IATA DGR Packing group

- II

E. Marine pollutant

- Applicable

F. Special precautions for user related to transport or transportation measures

- Local transport follows in accordance with Dangerous goods Safety Management Law.

- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.

- EmS FIRE SCHEDULE : F-A (General fire schedule)

- EmS SPILLAGE SCHEDULE : S-B (Corrosive substances)

15. REGULATORY INFORMATION

A. National and/or international regulatory information

○ POPs Management Law

- [Water] : Not applicable
- [Sodium hydroxide] : Not applicable
- [Mercury diiodide] : Applicable
- [Potassium iodide] : Not applicable

○ Information of EU Classification

* Classification
  - [Sodium hydroxide] : H314

○ U.S. Federal regulations

* OSHA PROCESS SAFETY (29CFR1910.119)
  - Not applicable
* CERCLA Section 103 (40CFR302.4)
  - [Sodium hydroxide] : 453.599 kg 1000 lb
* EPCRA Section 302 (40CFR355.30)
  - Not applicable
* EPCRA Section 304 (40CFR355.40)
  - Not applicable
* EPCRA Section 313 (40CFR372.65)
  - Not applicable

○ Rotterdam Convention listed ingredients

- Not applicable

○ Stockholm Convention listed ingredients

- Not applicable

○ Montreal Protocol listed ingredients

- Not applicable

16. OTHER INFORMATION

A. Reference

- The information contained herein is believed to be accurate. It is provided independently of any sale of the product for purpose of hazard communication. It is not intended to constitute performance information concerning the product. No express warranty, or implied warranty of merchantability or fitness for a particular purpose is made with respect to the product or the information contained herein.

- This Safety Data Sheet was compiled with data and information from the following sources: KOSHA, NITE, ESIS, NLM, SIDS, IPCS

B. Issue date

- 2024-04-12

C. Revision number and Last date revised

- 1 times, 2024-04-15

D. Other

- This SDS is prepared according to the Globally Harmonized System (GHS).