## 0. Revision history

| Rev. No. | Rev. Date (YY.MM.DD) | Revison reason & contents | remark |
|---|---|---|---|
| 0 | 1996. 7. 1 | New establishment | |
| 1 | 2001. 7. 1 | Total revision | |
| 2 | 2003. 9. 8 | Total revision(Reconstruction according to the Korea Industry Safety and Health Law' MSDS format) | |
| 3 | 2008.01.01 | Modification of Exposure limits<br>(MOL notification No. 2007-25)<br>TWA 5→3(mg/m3), STEL 5(mg/m3) | |
| 4 | 2008.03.01 | Reflect GHS' requirements<br>(MOL notification No. 06-36, '06.12.12) | |
| 5 | 2013.9.10 | Phone Number Change<br>(Emergency phone No) | |
| 6 | 2015.09.01 | 2-A), 2-B), 4-C), 4-D), 8-A), 11-A, B), 14-D), 15-B) Revision | |
| 7 | 2019.02.28 | 2-A), 2-B), 9, 11, 12, 14-E) Revision | |
| 8 | 2020.06.01 | Reflect Emergency Contact information<br>In North America | |
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| related document | |
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# 1. IDENTIFICATION

A. **Product name** : Sodium Cyanide(Solid)

B. **Recommended use and restriction on use** : Gold/silver extraction and plating, heat treatment of metals, etc.

C. **Manufacturer/supplier/distributor information**

o Manufacturer information : 108-70 Sapyeong-ro, Nam-gu, Ulsan, 44785 Korea
TONGSUH PETROCHEMICAL CORP., LTD.

o Emergency phone No. : ☎ +82-52-259-7691, +82-52-260-0178

o Division/Person in charge : safety team

o Emergency Contact in North America

: Chemtrec, ☎ +1-800-424-9300 / +1-703-527-3887

Samsung C&T American, Inc. Account Number: CCN19505

# 2. HAZARD IDENTIFICATION

A. **Hazard classification**

| Physical hazards | |
|---|---|
| Not applicable | |
| **Health hazards** | |
| o Acute toxicity(oral) : Category 2 | |
| o Acute toxicity(dermal) : Category 1 | |
| o Acute toxicity(inhalation) : Category 2 | |
| o Specific Target organ Toxicity(repeated exposure) : Category 1 (Thyroid, blood) | |
| **Environmental hazards** | |
| o Acute aquatic toxicity : Category 1 | o Chronic aquatic toxicity : Category 1 |

B. **GHS label elements, including precautionary statements**

1) Hazard symbols :

2) Signal word : Danger

3) Hazard statement :

H300 Fatal if swallowed

H310 Fatal in contact with skin

H330 Fatal if inhaled

H361 Suspected of damaging fertility or the unborn child

H372 Causes damage to thyroid, blood through prolonged or repeated exposure

H400 Very toxic to aquatic life

H410 Very toxic to aquatic life with long lasting effects

4) Precautionary statement

(1) Prevention

P260 Do not breathe dust/fume.
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.
P284 Wear respiratory protection.

(2) Response

P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P302+P350 IF ON SKIN: Gently wash with plenty of soap and water.
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
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 Remove/Take off immediately all contaminated clothing.
P363 Wash contaminated clothing before reuse.
P391 Collect spillage.

(3) Storage

P403+P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

(4) Disposal

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

C. Other hazards which do not result in classification :

o NFPA Codes: Health 4, Fire 0, Reactivity 0

## 3. COMPOSION/INFORMATION ON INGREDIENTS

A. Chemical name : Sodium Cyanide
B. Generic name & other name : NaCN, Natrium cyanide, sodium nitrile
C. CAS No. or other unique identifiers : CAS NO(143-33-9), EC EINECS NO(205-599-4), EC # (006-007-00-5)
D. Contents : ≥ 98%

## 4. FIRST-AID MEASURES :

A. Eye contact :

o Wash eyes immediately with large amounts of water or normal saline until all evidence of material is removed(at least 15 min)

o Get medical attention immediately.

B. Skin contact :

o Remove all contaminated clothing and shoes, flush the contact part with water and soap(at least 15 min)

o Get medical attention immediately.

o contaminated clothing and shoes thoroughly clean and dry before reuse.

C. Inhalation :

o If inhaled, move exposed person to fresh air.

o Get medical attention immediately.

D. Ingestion :

o Call a physician or emergency medical attention immediately.

o Rinse Mouth

o Take emergency measures until get medical attention.

- Move exposed person to fresh air and keep person warm.
- If the person is conscious, give soapy water or syrup or give an emetic of mustard to induce vomiting.
- If victim is unconscious, do not induce vomiting.
- If the person is breathing, give antidote
- Take emergency measures using antidote if patient is breathing.
- If not breathing, perform artificial respiration using appropriate respiratory medical equipment.

E. Most important symptoms/effects, acute and delayed

o Prolonged skin contact, inhalation and ingestion may cause burning, nausea, decreased appetite, headache and dizziness.

o Skin or eye contact, inhalation and ingestion may cause burning, nausea, vomiting, irregular heartbeat, headache, dizziness, convulsions, coma and death.

F. First-aid treatment and Note to physician

o Give oxygen if needed.

o Must refer to the label of antidote box.

- Antidote : Sodium nitrite 3% solution, sodium thiosulfate 25% solution
- Treatment :

1st Sodium nitrite 3% solution 10cc, intravenous injection(2.5cc/min)
2nd Sodium thiosulfate 25% solution 50cc, intravenous injection(2.5cc/min)

## 5. FIRE-FIGHTING MEASURES

A. Suitable(Unsuitable) extinguishing media

o Suitable extinguishing media : Use common fire extinguishers, water spray.

o Unsuitable extinguishing media : Do not use carbon dioxide.
Avoid contact with Acid and acid salt.

B. Specific hazards arising form the chemical

o If contact with water(dissolved in water), may produce hydrogen cyanide by hydrolysis.

C. Specific protective actions for fire-fighters

- o Move containers from fire area if you can do it without risk.
- o Fight fire from maximum distance or safety space.
- o Dike spill for later disposal.
- o Do not scatter spilled material with high pressure water streams.
- o If there is hydrogen cyanide, fire-fighting from upwind. Wear personal supplied-air respirator and protective equipment(rubber coats, rubber boots, safety helmets etc).

## 6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment and emergency procedure

- o Do not touched spilled materials.
- o Move containers from fire area if you can do it without risk.
- o Provide ventilation in confined spaces before enter.

B. Environmental precautions

- o Air spill
  - Water spray may be used to reduce vapors.
  - Collect spillage to disposal as potential hazardous waste.
- o Land spill
  - Secure the assigned acceptance area such as pool or pit for storage.
  - Cover spilled material with plastic sheet or waterproof cloth to minimize spreading and contact with water.
- o Water spill
  - Give oxidizing agents(NaOCl, H2O2).
  - Give alkaline materials(lime, lime powder, Sodium hydrogencarbonate or soda ash) additionally.

C. Methods and materials for containment and cleaning up

- o small spills
  - Absorb spill with sand or incombustible materials and transfer to container for disposal.
- o Small particles spills(solid)
  - Move containers away from spill to a safe area.
- o large spills
  - Dike spill for later disposal.
  - Keep unnecessary people away, isolate hazard area.
  - Spills and releases may have to be reported to fedral and/or local authoritics.

## 7. HANDLING AND STORAGE

A. Handling

- o Indemnify against physical injury.
- o Store away from incompatible materials.

  It called the substance what influence on components or properties of product directly.

B. Storage Precautionary Statements

- o Store in a cool dry area.
- o Store and handle in accordance with laws and regulations in force.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits, biological exposure limits etc

o Exposure limit(ISHL in Korea) - TWA : 3mg/m3, STEL : 5mg/m3
o OSHA - Not applicable
o ACGIH - Ceiling 5mg(CN)/m3 (skin)

B. Appropriate engineering controls

o The use of local exhaust ventilation is recommended.
o Confirm to be suitable to exposure standard.

C. Personal Protective Equipment :

(1) Respiratory Protection :
o Take official approval(safety mark) of Korea occupational safety&health agency.
o Respiratory protection NIOSH/OSHA standard
- Cyan(CN) 25mg/m3 : Air-supplying respirator, Airline respirators(Full-face respirator)
- Escape . Air Purifying Respirators(Full-face respirator, air-purifying cartridge or filtration media that removes specific air contaminants)
. Airline respirators(for escape)
- For unknown concentration or immediately dangerous to life or health
. Air-supplying respirator(combination airline mask)
. Airline respirators(Full-face respirator)

(2) Eye protection
- Use chemical safety goggles to protect from dusting or splashing of solutions.
- Ensure that eyewash stations and safety showers are close to warehouse or the workstation location.

(3) Hand protection
o Wear appropriate protective anti-chemical gloves.

(4) Body protection
o Wear appropriate protective anti-chemical clothing.

(5) Specific Hygine Measures
o Shower thoroughly after handling(working on workplace etc)
o Wash working clothes and other protective equipment.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

- Appearance : white crystalline solid
- Odor : almond odor
- pH : basic(in solution)
- Solubility(in Water) : 58% @20℃
- Initial Boiling Point / Boiling Ranges : 1,500℃ ± 10℃ (evaporation heat: 729Cal/g)
- Melting point / Freezing point : 560℃ (heat of fusion : 43Cal/g)
- Vapor pressure : 100 Pa (798℃)
- Solubility : 58.2 g/100g H2O (20℃)
- Relative density(water=1) : 1.6 (25℃)
  Relative density(liquid) : 1.19 @850℃
- Partition coefficient of n-octanol/water : 0.66
- Vapor density : Not applicable
- Molecular weight : 49.008(=49.01)
- Molecular formula : NaCN
- Deliquescent : Deliquescent material
- Heat of formation : -438Cal/g @25℃
- Specific heat : 0.335Cal/g℃ @26~73℃

## 10. STABILITY AND REACTIVITY

A. Chemical Stability
- o Stable in normal temperature and pressure.

B. Possibility of Hazardous Reaction
- o Hydrogen cyanide may formed by the kind of reaction.
- o Incompatible materials : Acid, Oxidizing agents, Combustible materials, Hydrogen peroxide, Halogens, Metals
- o Polymerization reaction : Not applicable

C. Conditions to avoid
- o Do not exposure to heat, sparks, flames and other ignition sources.
- o Exposure to heat may cause bursting or explosion.

D. Materials to avoid
- o Acid, Oxidizing agents, Combustible materials, Hydrogen peroxide, Halogens, Metals

E. Hazardous Decomposition Products
- o Thermal decomposition may produce hydrogen cyanide.

## 11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure :
- o (Respiratory tracks) : Fatal if inhaled
- o (Oral) : Fatal if swallowed
- o (Eye•Skin) : Fatal in contact with skin

B. Delayed and immediate effects and also chronic effects from short and long term exposure :
- o Acute Toxicity :
  - Oral : 6.44mg/kg oral-rat LD50, 5.09 mg/kg Rat LD50
  - Skin : 10.4mg/kg skin—rabbit LD50, 7.35 mg/kg Rabbit LD50
  - Inhalation : 0.05< LC50 <= 0.5 mg/L/4hr
- o Skin Corrosion/Irritation :
  - Cyanide is slightly irritating to the skin and eye.
- o Serious Eye damage/Eye irritation :
  - It is difficult to observe eye irritation / corrosive effects because of the high likelihood of death before eye irritation / corrosion.
- o Respiratory sensitization : Not available
- o Skin sensitization : Not available
- o Carcinogenicity : Not Classifiable as a Carcinogen
- o Germ Cell Mutagenicity : The Salmonella typhimurium Bacterial Reverse Mutation Test (strains TA97, TA98, TA100 and TA1535) - Negative (ECHA)

  In vitro - Chinese hamster(Hamster): Negative (Chromosome aberration test using mammalian cultured cells)

  In vivo - Chinese hamster(Hamster): Negative(Bone marrow chromosome aberration test)

  In vivo - Swiss(Mouse): Negative(spermatogonia chromosome aberration test)
- o Reproductive toxicity :
  - The evidence of malformation of the foetuses in Golden Syrian hamster teratogenicity tests is described but the effects on parent animals is not reported.
  - Reproductive and Developmental Toxicity Screening: LOEL is 30 ppm for epididymal weights and delayed estrus delay, but it is difficult to see due to the effect of substance treatment (Fischer 344 (Rat))
  - Teratogenicity: The NOAEL for the incidence of fetal anomalies and developmental

changes was 10 mg/kg/day, but the highest test dose and similar effects between the treated and control groups (Rat, Acetone cyanohydrin)

o Specific target organ toxicity(single exposure) : Not available

o Specific target organ toxicity(repeated exposure) : Thyroid, blood

- Changes in body weight and organ (testosterone) weight were observed at 300 ppm (12.5 mg/CN/kg/day), but not related to the administration of the substance and the significant function of the central, peripheral nervous system or other organ systems No change (F344/N(Rat), oral(drinking water), 90 days)
- The NOEC was found to be 9.2 ppm for eye, nose, and respiratory distress syndrome. Sprague-Dawley(Rat) was found to be associated with low activity, 59.2 ppm of oxygen and hypoxia related symptoms such as progression, Inhalation, 28 days)(Category 1). The average hemoglobin and lymphocyte counts of workers who worked in electroplating sites for 5-15 years were significantly higher than those of the control group (P <0.001). Frequent headache, weakness, changes in taste and smell, throat stimulation, vomiting and dyspnea Symptoms have occurred. (TSH) values were significantly higher in workers in silver recovery facilities (in human cases)(Category 1)

o Aspiration hazard : Not available

o Other toxicity information :

- In case of can be increased the hazard by exposure : Abnormalities of the heart or Cardiovascular, heart, respiratory tract, skin diseases and allergies

C. Other toxicity information : Not available Not applicable

## 12. ECOLOGICAL INFORMATION

A. Ecotoxicity

o Acute aquatic toxicity :

- Fish : LC50 0.102mg/L 96hr, Yellow perch(freshwater)
  LC50 0.0988 mg/L/96hr, Gasterosteus aculeatus
  NOAEL 0.0057 mg/L, 144 days, Brook trout
- Crustacea : EC50 0.426mg/L 96hr, Kamimuria tibialis
  EC50 0.09 mg/L/48hr, Daphnia magna
  NOEC 0.016~0.021 mg/L, 83 days, Gammarus pseudolimnaeus
- Algae : EC50 0.057 mg/L/72hr, Nitzschia linearis
- Other : 0.26mg/L 0.42mon, frog

o Chronic aquatic toxicity :

- Classified into Category 1, since acute toxicity was Category 1, and behavior in water and bioaccumulative potential are unknown.

B. Persistence and degradability : Not avaliable

C. Bioaccumulative potential : Not avaliable

D. Mobility in soil : Not avaliable

E. Other adverse effects : Not avaliable

## 13. DISPOSAL CONSIDERATIONS

A. Disposal methods

o Dispose of contents/container in accordance with local regulation.

B. Special precautions for disposal

o The user of this product must disposal by oneself or entrust to waste disposer or person who other's waste recycle and dispose, person who establish and operate waste

disposal facilities.
- o Dispose of waste in accordance with local regulation.
- o U.S hazardous waste regulations : U.S. EPA 40 CFR 262.
- o Hazardous Waste No. : P106

## 14. TRANSPORT INDORMATION

A. UN Number : UN1689
B. UN Proper Shipping name : SODIUM CYANIDE, SOLID
C. Transport hazard class(es) : Class 6.1
D. Packing group : I
E. Sea pollutants : Applicable
F. Special precautions for user related to transport or transportation measures :
- o Type of extraordinary step in fire : F-A
- o Type of extraordinary step in spill : S-A
- o U.S. DOT 49 CFR 172. 101 Class 6.1
- o TOXIC WARNING label required.

## 15. REGULATORY INFORMATION

A. KOREA regulation :
- o Korea Existing Chemicals List(KECL) : Listed
- o Korea Occupational Exposure Standards : Regulated
- o Korea Toxic Chemicals Control Act : Toxic Chemical
- o Korea Toxic Release Inventory(TRI) Chemicals : Regulated
- o Dangerous goods Safety Management Law : Not regulated

B. Other local or international regulation

*o U.S. Regulation*
- CERCLA 103(40CFR302.4) : 10 LBS RQ
- SARA 302(40CFR355.30) : 100 LBS TPQ
- SARA 304(40CFR355.40) : 10 LBS RQ
- SARA 311/312(40CFR370.21)
  . ACUTE : YES . CHRONIC : NO
  . FIRE : NO . REACTIVE : NO
  . SUDDEN RELEASE : NO
- SARA 313(40CFR372.65) : Cyanide, complex compound with soluble salt.

o EU Classification
* Classification
  - Not applicable
* Risk Phrases
  - Not applicable
* Safety Phrase
  - Not applicable

o TSCA(Toxic Substances Control Act) : Listed

## 16. OTHER INFORMATION

*A. References*
- o Korea Occupational Safety & Health Agency, MDL Information Systems, Inc.
- o National Institute of Technology and Evaluation(NITE, Japan), GHS Classification Database

o References : Chemical Safety Data Sheet SD-30, MCA

B. Issue date : 1996. **. **

C. Revision number and Last date revised : refer to establishment & revision history

D. General Information

o This SDS is prepared based on improved data/information now available. Also, this SDS is informed storage and handling method in general condition, therefore must use to make appropriate safety measure in specific storage and handling condition.

o TONGSUH PETROCHEMICAL CORP., LTD. is handling with attention in accordance with SDS and cannot guarantee that these are the only hazards, which exist.

o This SDS intend to inform about stability of product based on a use of product and known ingredients. Accordingly, must use to confirm about the law and regulation or suitability, stability in accordance with research and tests.

o Can be punished or instituted a suit by regulation be related to copyright if resell this SDS for any commercial purpose, or translate into the 3rd language except Korean without advance permission of TONGSUH PETROCHEMICAL CORP., LTD.