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1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

- 1) Product identifier: TDM
- 2) Relevant identified uses of the substance or mixture and uses advised against: Reaction intermediate.
- 3) Manufacture/Supplier/Distributor information:
 - Manufacture information:
 - Company name: ISU CHEMICAL CO., LTD
 - Address: 8, Seokdang-gil, Onsan-eup, Ulju-gun, Ulsan, Korea
 - Emergency telephone number: Tel. +82 52 231 5585 Fax. +82 52 231 5699

2. HAZARD IDENTIFICATION

- 1) Hazard classification: Skin corrosion/irritation Cat.2
Skin sensitization Cat.1
Hazards to the aquatic environment, chronic toxicity Cat.4
- 2) Allocation label elements including precautionary statements
 - Hazard pictograms
 - 
 - Signal word
 - Warning
 - Hazard statements
 - H315: Causes skin irritation.
 - H317: May cause an allergic skin reaction.
 - H400: Very toxic to aquatic life
 - H410: Very toxic to aquatic life with long-lasting effects
 - Precautionary statements
 - Prevention
 - P261: Avoid breathing mist/vapours/spray.
 - P264: Wash the handling area thoroughly after handling
 - P272: Contaminated work clothing should not be allowed out of the workplace.
 - P273: Avoid release to the environment.
 - P280: Wear protective gloves/protective clothing/eye protection/face protection.
 - Response
 - P302+P352: IF ON SKIN: Wash with plenty of soap and water.
 - P321: Specific treatment (See item 4 on this label.)
 - P332+P313: If skin irritation occurs: Get medical advice/attention.
 - P333+P313: If skin irritation or rash occurs: Get medical advice/attention.
 - P362+P364: Take off contaminated clothing and wash it before reuse.

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- P391: Collect spillage.
 - Storage: No data available
 - Disposal
- P501: Dispose of contents and container.(as specified in applicable regulations)
- 3) Other hazards:
 - NFPA Grade: Health 2, Flammability 1, Reactivity 0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	Common name	CAS No.	Concentration(wt%)
Tert- Dodecanethiol(TDM)	Tert- Dodecyl mercaptan	25103- 58- 6	100

4. FIRST AID MEASURES

- 1) Following eye contact:
 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 - If eye irritation persists: Get medical advice/attention.
- 2) Following skin contact:
 - If skin irritation develops, get medical attention.
 - Take off contaminated clothing and wash before reuse.
 - Call 911 or emergency medical service.
 - Remove and isolate contaminated clothing and shoes.
 - In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
 - In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
 - Wash skin with soap and water.
- 3) Following inhalation:
 - Move victim to fresh air.
 - Seek immediate medical assistance.
 - Give artificial respiration if victim is not breathing.
 - Administer oxygen if breathing is difficult.
- 4) Following ingestion:
 - Seek immediate medical assistance.
- 5) Advice to physician:
 - Effects of contact or inhalation may be delayed.
 - Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

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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.
 - Direct water (Unsuitable extinguishing media)
- 2) Special hazards arising from the substance or mixture:
 - During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
 - On combustion, may emit toxic fumes of carbon monoxide (CO)
 - Inhalation or contact with material may irritate or burn skin and eyes.
 - May cause toxic effects if inhaled or absorbed through skin.
- 3) Special protective equipment for firefighters:
 - Rescuers should put on appropriate protective gear.
 - Evacuate area and fight fire from a safe distance.
 - 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) Health considerations and protective equipment:
 - Do not breathe dust/fume/gas/mist/vapours/spray.
 - Clean up spills immediately, observing precautions in Protective Equipment section.
 - Do not touch or walk through spilled material.
 - ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
 - All equipment used when handling the product must be grounded.
 - Stop leak if you can do it without risk.
 - A vapor suppressing foam may be used to reduce vapors.
 - Please note that materials and conditions to be avoided.
- 2) Environmental precautions:
 - Avoid release to the environment.
 - Runoff may cause pollution.

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

3) For cleaning up:

- Absorb the liquid and scrub the area with detergent and water.
- Use clean non- sparking tools to collect absorbed material.
- Stir calcium hypochlorite to reduce odor rapidly.
- Absorb with liquid- binding material (sand, diatomite, acid binders, universal binders, sawdust).
- Dispose of the material collected according to regulations.

7. HANDLING AND STORAGE

1) Precautions for safe handling:

- Wash the handling area thoroughly after handling.
- Contaminated work clothing should not be allowed out of the workplace.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Avoid prolonged or repeated contact with skin.
- All equipment used when handling the product must be grounded.
- Please note that materials and conditions to be avoided.
- Handling refer to engineering control/personal protection section.

2) Conditions for safe storage (including any incompatibilities):

- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.
- Please note that materials and conditions to be avoided.
- Keep container tightly sealed.
- Store in a dry place. Store in a closed container.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

1) Chemical exposure limits, Biological exposure standard:

Components	Occupational exposure limits (Domestic)	ACGIH	Biological limit values
Tert- Dodecanethiol (TDM)	No data available	No data available	No data available


2) Appropriate engineering controls:

- Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

3) Personal protection equipment

○ Respiratory protection:

- Respiratory protections are needed when concentration is unknown or other life or


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- health is in urgent danger.
- Wear breathing protection, which needs a confirmation from the Korea Occupational Safety and Health Agency.
 - For gas / liquid substances the following respiratory protection is recommended:
Isolated full face gas mask (for organic compounds (if acid gas, acid gas)) or Isolation type half- gas mask (for organic compound (for acid gas, acid gas)) or Direct type full face gas mask (for organic compounds (for acid gas, for acid gas)) Or The half- gas mask (for organic compounds (for acid gas, for acid gas)) or Electric Gas Mask
 - In case of lack of oxygen (<19.5%), wear breathing mask or self- contained breathing apparatus.
 - Eye protection:
 - Provide emergency showers and eyewash.
 - Wear suitable protective goggles and face shields.
 - Hand protection:
 - Wear insulated gloves.
 - Wear suitable protective gloves.
 - Body protection:
 - Wear suitable protective clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

- 1) Appearance(Physical state, color, etc): Colorless liquid
- 2) Odor: Repulsive odor
- 3) Odor threshold: No data available
- 4) pH: Not applicable
- 5) Melting point/freezing point: < - 20 °C
- 6) Initial boiling point and boiling range: 231- 239 °C
- 7) Flash point: 95 °C
- 8) Evaporation rate: No data available
- 9) Flammability(solid, gas): Not applicable
- 10) Upper/lower flammability or explosive limits: No data available
- 11) Vapour pressure: 20 Pa at 25 °C
- 12) Solubility(ies): 3.93 µg/L at 20 °C
- 13) Vapour density: No data available
- 14) Relative density: 0.8634 @ 15/4 °C
- 15) n- octanol/water partition coefficient: 6.07
- 16) Auto ignition temperature: 212 °C
- 17) Decomposition temperature: No data available
- 18) Viscosity: 3.77 mm²/s at 20 °C
- 19) Molecular weight(mass): 197- 205

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10. STABILITY AND REACTIVITY

- 1) Stability and hazardous reactivity:
 - Some may burn but none ignite readily.
 - Fire may produce irritating, corrosive and/or toxic gases.
 - Inhalation or contact with material may irritate or burn skin and eyes.
 - May cause toxic effects if inhaled or absorbed through skin.
- 2) Conditions to avoid:
 - Ignition source (heat, spark, flame, etc.)
- 3) Incompatible materials:
 - No data available
- 4) Hazardous decomposition products:
 - During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
 - Decomposition may produce H₂S, CO.

11. TOXICOLOGICAL INFORMATION

- 1) Exposure route information
 - No data available
- 2) Health hazard information
 - Acute toxicity:
 - Oral: LD₅₀ >= 2,000 mg/kg (Rat, OECD TG 423, 2017)
 - Dermal: LD₅₀ >= 12,600 mg/kg (Rat, OECD TG 402, 1961)
 - Inhalation(Vapor): No data available
 - Inhalation(mist): No data available
 - Skin corrosion/Irritation:
 - Irritating (Rabbit, OECD TG 404, GLP)
 - Serious eye damage/irritation:
 - Not Classified (Rabbit, OECD TG 437, GLP)
 - Respiratory sensitization:
 - No data available
 - Skin sensitization:
 - Sensitizing (Mouse, OECD TG 429, GLP)
 - Carcinogenicity:
 - No data available
 - Germ cell mutagenicity:
 - In vivo –Negative (Micronucleus assay, OECD TG 474, GLP)
 - In vitro –Negative (Ames test, OECD TG 471, 1992)
 - *Mouse lymphoma cells*: Negative (Mammalian Cell Gene Mutation Test, OECD TG 476, Metabolic activation: with and without)

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- Reproductive toxicity:
 - No significant effects on mother and fetus were observed in rats in developmental toxicity tests by inhalation exposure (Rat, OECD TG 414, 1983). NOAEC \geq 55ppm(6.07mg/l)
- Specific target organ toxicity (single exposure):
 - No data available
- Specific target organ toxicity (repeated exposure):
 - Decreased food intake and decreased exercise activity were observed in repeated 90-day inhalation exposure using rats, but cannot be classified because they are not significant effects. (Rat, OECD TG 413, 2017)
- Aspiration hazard:
 - No data available

12. ECOLOGICAL INFORMATION

- 1) Aquatic toxicity:
 - Fish: LC50 > 100 mg/L (Danio rerio, OECD TG 203, 96h)
 - Crustacean: No observation (Daphnia magna, OECD TG 202, 48h)
 - Aquatic algae: EC50 > 100 mg/L (Pseudokirchnerella subcapitata, OECD TG 201, 72hr)
- 2) Persistence and degradation: log Kow > 6.2, BOD= 81.9% (14d)
- 3) Bioaccumulative potential: BCF = 592 L/kg
- 4) Mobility in soil: log Koc = 3.6 (calculation)


13. DISPOSAL CONSIDERATIONS

- 1) Disposal methods:
 - Dispose of contents/container to the waste control act.
- 2) Precautions (including disposal of contaminated container of package):
 - Regulations precautions indicated in Waste Management Act should be considered.

14. TRANSPORT INFORMATION

- 1) UN No.: No information on classification of hazardous materials transportation
- 2) Proper shipping name: Not applicable
- 3) Class or division: Not applicable
- 4) Packing group: Not applicable
- 5) Marine pollutant: Not applicable
- 6) Special safety response for transportation or transportation measure: Not applicable

15. REGULATORY INFORMATION


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- 1) Occupational Safety and Health Act in Korea: Not applicable
- 2) Chemicals Control Act in Korea: Applicable
- 3) Safety Control of Dangerous Substances Act in Korea: Class 4 Third Petroleum liquids
- 4) Wastes Control Act in Korea: Designated waste
- 5) Other regulations in KOREA and Abroad regulations:
 - Other regulation (Domestic):
 - Persistent Organic Pollutants (POPs) Control Act: Not applicable
 - National regulations:
 - U.S.A. management information(OSHA regulation): Not applicable
 - U.S.A. management information(CERCLA regulation): Not applicable
 - U.S.A. management information(EPCRA 302 regulation): Not applicable
 - U.S.A. management information(EPCRA 304 regulation): Not applicable
 - U.S.A. management information(EPCRA 313 regulation): Not applicable
 - U.S.A. management information(Rotterdam Convention on Substances): Not applicable
 - U.S.A. management information(Stockholm Convention on Substances): Not applicable
 - U.S.A. management information(Mont- real Protocol on Substances): Not applicable
 - EU Classification (Classification): Not applicable
 - EU Classification (Risk Phrases): Not applicable
 - EU Classification (Safety Phrases): Not applicable

16. OTHER INFORMATION

- 1) Reference:
 - Korea Occupational Safety & Health Agency MSDS
 - IMDG Code
 - OECD SIDS
 - ChemWATCH
 - IUCLID
 - HSDB
 - IARC
 - ECOTOX
 - NITE
 - Recommendations on the transport of dangerous goods
 - NCIS
 - Emergency response guide book
 - ECOSAR
 - QSAR
 - EU RAR
 - The Chemical Database

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<ul style="list-style-type: none"> • ICSC • RTECS • NIOSH Pocket guide • ESIS • ECHA CHEM • HPVIS <p>2) Date of initial completion: 2011. 01. 21</p> <p>3) Number of revised/Date of last revision: 7 / 2022. 07. 12</p> <p>4) Other: No data available</p>
