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


- 1) Product identifier: N-PAR 11
- 2) Relevant identified uses of the substance or mixture and uses advised against:
 - Alkyl manufacturing raw materials
- 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. 052-231-5587 Fax. 052-231-5566

2. HAZARD IDENTIFICATION

- 1) Hazard classification: Aspiration hazard: Cat.1
- 2) Allocation label elements including precautionary statements:
 - Hazard pictograms
 - Signal word: Danger
 - Hazard statements:
 - H304: May be fatal if swallowed and enters airways.
 - Precautionary statements:
 - Response:
 - P331: Do not induce vomiting.
 - P301+310: IF SWALLOWED: Immediately call a POISON CENTER/doctor.
 - Storage:
 - P405: Store locked up.
 - Disposal:
 - P501: Dispose of contents/container to (in accordance with local/regional/national/International regulations.)
- 3) Other hazards:
 - EUH066: Repeated exposure may cause skin dryness or cracking

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	Common name	CAS No.	Concentration (wt%)
Undecane	HENDECANE	1120-21-4	≥ 99

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4. FIRST AID MEASURES

- 1) Following eye contact:
 - Get urgent medical attention.
 - Immediately wash skin and eyes under running water for at least 20 minutes upon contact with the substance.
- 2) Following skin contact:
 - Get urgent medical attention.
 - Remove contaminated clothing and shoes and isolate contaminated areas.
 - In case of burns, immediately cool the affected area with cold water as long as possible, and do not remove any clothing that sticks to the skin.
 - Wash your skin with soap and water If you get it on your skin (or hair), remove or remove all contaminated clothing.
 - Wash/shower your skin with water.
 - If skin irritation occurs, seek medical advice.
- 3) Following inhalation:
 - Don't make me vomit.
 - Move to fresh air.
 - Get urgent medical attention.
 - If you are not breathing, apply artificial respiration.
 - If breathing is difficult, supply oxygen.
 - Keep it warm and stable.
- 4) Following ingestion:
 - If swallowed, consult a medical institution (doctor) immediately.
 - Don't make me vomit.
- 5) Advice to physician: Ensure that medical personnel are aware of the substance and take protective measures.

5. FIRE FIGHTING MEASURES

- 1) Suitable (and unsuitable) extinguishing media:
 - Use alcohol foam, carbon dioxide, or water spray to digest this substance
 - Use dry sand or soil when extinguishment by smothering
- 2) Special hazards arising from the substance or mixture:
 - flammable liquids and vapors
 - May cause fire and explosion by intense polymerization
 - Steam is transferred to the ignition source and may ignite
 - Irritating and highly toxic gases may be caused by pyrolysis or combustion during burning
 - May form explosive mixture at or above a flammable point
 - Containers may explode when heated

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- Highly flammable: easily ignited by heat, spark, and flame
- Leakage is at risk of fire/explosion
- Risk of steam explosion indoors, outdoors, and sewers
- Vapor may form an explosive mixture with air
- Vapor can cause dizziness or suffocation without awareness
- Stimulating skin and eyes or causing burns during inhalation and contact

3) Special protective equipment for firefighters:

- Rescuers should wear proper protective gear.
- Keep safe distance from the area and digest.
- Most of them are lighter than water, so be careful.
- Most vapors are heavier than air, so they can spread along the ground and accumulate in low-lying or enclosed spaces
- Be careful, it can be carried hot.
- Remove the container from the fire area if it is not dangerous.
- In case of tank fire, fire out at maximum distance or use unmanned fire extinguishing equipment.
- Cool the container with a large amount of water even after extinguishing the fire in the tank.
- In case of tank fire, if there is a high tone in the pressure release system or if the tank is discolored, leave immediately.
- In case of tank fire, step away from the tank covered in flames.

6. ACCIDENTAL RELEASE MEASURES

1) Health considerations and protective equipment:


- Remove all sources of ignition as very fine particles can cause fire or explosion.
- Wipe the spilled product immediately and follow the precautions in the protective gear clause.
- Do not touch or walk around the exposure.
- Remove all ignition sources.
- Make sure all equipment is grounded when handling material.
- Stop the leak if it's not dangerous.
- Steam suppression foam may be used to reduce steam generation
- Pay attention to the substances and conditions to be avoided.

2) Environmental precautions:

- Leakage may cause contamination.
- Prevent inflow into waterways, sewers, basement, and confined spaces.
- Do not discharge into the environment.

3) For cleaning up:

- Use a clean explosion proof tool to collect the absorbed material.

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- Absorb spillage with inert material (e.g., dry sand or soil), and place it in a chemical waste container.
- Build levees for digestion and collect water.
- Absorb liquid and rinse contaminated area with detergent and water.
- In case of a large leak, make a ditch by keeping it away from the liquid leak.
- Use unmanned fire extinguishing equipment for large-scale fire in case of tank fire, and if it is impossible, let it burn.


7. HANDLING AND STORAGE

1) Precautions for safe handling:

- Use explosion proof electric, ventilation, lighting, and equipment.
- Use only spark-free tools.
- Take anti-static measures.
- Wash the handling area thoroughly after handling.
- Do not apply pressure, cut, weld, solder, joint, puncture, polishing, or expose to heat, flames, flames, sparks, static electricity, or other sources of ignition.
- Please follow all MSDS/label precautions as product residues may remain after the container is emptied.
- Use it carefully for handling/storage.
- Carefully open the cap before opening.
- Prevent prolonged or sustained skin contact.
- Do not breathe steam from heated material.
- Do not enter the storage area unless there is adequate ventilation.
- Make sure all equipment is grounded when handling materials.
- Pay attention to the substances and conditions to be avoided.
- Refer to engineering management and personal protective equipment.
- Pay attention to the heat.
- Measure and ventilate oxygen concentration in the air during work, as there is a possibility of oxygen deficiency when working in a low-lying enclosed space.

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

- Stay away from heat, sparks, flames and high heat – No smoking
- Seal the container tightly.
- Store in well ventilated area and keep at low temperature.
- Store in a locked storage area.
- Completely drain and properly block empty drums and return them to the drum regulator immediately or place them appropriately.
- Pay attention to the substances and conditions to be avoided.

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8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

1) Chemical exposure limits, Biological exposure standard:

Components	Occupational exposure limits (Domestic)	ACGIH	Biological limit values
Undecane	No data available	Not applicable	No data available

2) Appropriate engineering controls:

- Use process isolation, local exhaust, or other engineering management that adjusts the air level below the exposure standard.
- Install a washout and a safety shower for facilities that store or use this substance.

3) Personal protection equipment:

○ Respiratory protection:

- Wear respiratory protective equipment certified by Korea Occupational Safety & Health Agency according to the physical and chemical properties of the gas / liquid exposed.
- For gas / liquid substances the following respiratory protection is recommended:
 - Isolated full face gas mask (for organic compounds (if acid gas, acid gas))
 - Isolation type half-gas mask (for organic compound (for acid gas, acid gas))
 - Direct type full face gas mask (for organic compounds (for acid gas, for acid gas))
 - The half- gas mask (for organic compounds (for acid gas, for acid gas))
 - Electric Gas Mask
- In case of lack of oxygen (<19.5%), wear breathing mask or self-contained breathing apparatus.

○ Eye protection:


- Wear safety glasses or breathable eyeglasses to protect your eyes from steam-conditioned organic matter that causes eye irritation or other health problems.
- Install an emergency washing facility (shower type) and a cleansing facility in a location easily accessible to workers.

○ Hand protection: Wear appropriate protective gloves by considering physical and chemical properties of chemicals.

○ Body protection: Wear appropriate protective gloves by considering physical and chemical properties of chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

- 1) Appearance(Physical state, color, etc): Liquid at 20°C and 1013 hPa
- 2) Odour: faint
- 3) Oder threshold: No data available
- 4) pH: No data available

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- 5) Melting point/freezing point: -26 °C @ 101.325 kPa
- 6) Initial boiling point and boiling range: 185.8 – 200.5 °C @ 101.325 kPa
- 7) Flash point: 65 °C @ 101.325 kPa
- 8) Evaporation rate: No data available
- 9) Flammability(solid, gas): Liquid
 - 10) Upper/lower flammability or explosive limits: 6.5 / 0.6%
- 11) Vapour pressure: 60 Pa @ 25 °C
- 12) Solubility(ies): 20.3 µg/L @ 25 °C
- 13) Vapour density: 5.4
- 14) Relative density: 0.7442 g/cm³ @ 15/4 °C
- 15) n-octanol/water partition coefficient: 6.42 @ 25 °C and pH 7
- 16) Auto ignition temperature: 202 °C @ 101.325 kPa
- 17) Decomposition temperature: No data available
- 18) Viscosity: 1.16 mm²/s at 40°C
- 19) Molecular weight(mass): 156.32

10. STABILITY AND REACTIVITY

- 1) Stability and hazardous reactivity:
 - flammable liquids and vapors
 - May cause fire and explosion due to intense polymerization
 - May form an explosive mixture at or above the Flash point
 - Container may explode when heated
 - Highly flammable: easily ignited by heat, spark, and flame
 - Leakage is at risk of fire/explosion.
 - Risk of steam explosion in indoor, outdoor, and sewer.
 - Vapor can form an explosive mixture of air and explosive.
 - May cause irritating, corrosive and toxic gases in case of fire
 - Stimulating skin and eyes or causing burns during inhalation and contact
 - Vapor can cause dizziness or suffocation without awareness
- 2) Conditions to avoid: Stay away from heat, spark, fire, and high fever – No smoking
- 3) Incompatible materials: No data available
- 4) Hazardous decomposition products: Irritating and highly toxic gases may be caused by Pyrolysis or combustion during burning

11. TOXICOLOGICAL INFORMATION

- 1) Exposure route information:
 - Short-term exposure may cause irritation

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- prolonged exposure may cause dizziness.
- Short-term exposure may cause dyspnea
- bluish skin color
- pulmonary congestion.
- No information available.
- No information on serious side effects from short-term exposure.

2) Health hazard information

- Acute toxicity:
 - Oral: LD50 = 5,000 – 15,000 mg/kg in rats (OECD TG 401)
 - Dermal LD50 = 3,160 – 5,000 mg/kg in rabbits (OECD TG 402)
 - Inhalation LC50 = 4.951 – 9.3 mg/L air (rat) (OECD TG 403)
- Skin corrosion/Irritation: No data available
- Serious eye damage/irritation: No data available
- Respiratory sensitization: No data available
- Skin sensitization: No data available
- Carcinogenicity: No data available
- Germ cell mutagenicity: No data available
- Reproductive toxicity: No data available
- Specific target organ toxicity (single exposure): No data available
- Specific target organ toxicity (repeated exposure): No data available
- Aspiration hazard: 40°C kinematic viscosity with hydrocarbons 1.597 mm²/s (GESTIS (Access on Aug). 2010)), 20.5 mm²/s or less. In addition, if a person inhales paraffin of carbon water 6 to 16, it is likely to cause pneumonia, edema of the lungs and bleeding (2003)
- Other Harmful Effects: No data available

12. ECOLOGICAL INFORMATION

- 1) Aquatic toxicity:
 - Fish: LL50 10–803,000 mg/L, 96hr
 - Crustacean: EC50 2–200 µg/L, 48hr
 - Aquatic algae: EL50 1–100.137 g/L, 72hr
- 2) Persistence and degradation:
 - Residuality: 6.50 log Kow
 - decomposability: No data available
- 3) Bioaccumulative potential:
 - condensability: 337.8 L/kg.
 - biodegradability: 53 (%) 28 day
- 4) Mobility in soil: No data available
- 5) Other adverse effects: No data available

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13. DISPOSAL CONSIDERATIONS


- 1) Disposal methods:
 - Dispose of the contents and containers in accordance with the provisions of the Waste Management Act.
 - Must not be disposed of together with household garbage.
 - Do not allow product to reach sewage system.
- 2) Precautions (including disposal of contaminated container of package):
 - Discard the contents container (in accordance with the relevant laws and regulations).

14. TRANSPORT INFORMATION

- 1) UN No.: 2330
- 2) Proper shipping name: UNDECANE
- 3) Class or division: Class 3
- 4) Packing group: : III
- 5) Marine pollutant: Not applicable
- 6) Special safety response for transportation or transportation measure:
 - Emergency measures in case of fire : F-E
 - Emergency measures in the effluent : S-E

15. REGULATORY INFORMATION

- 1) Occupational Safety and Health Act in Korea: Materials subject to Process Safety Report (PSM) submission
- 2) Chemicals Control Act in Korea: Not applicable
- 3) Safety Control of Dangerous Substances Act in Korea: Class 4 Second Petroleum liquids [non-water soluble liquid_(1000ℓ)]
- 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

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- U.S.A. management information(Stockholm Convention on Substances): Not applicable
- U.S.A. management information(Montreal 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 2018
- ECHA CHEM
- ECOSAR
- EHC 187 (1996)
- GESTIS
- HSDB
- IMDG code
- THOMSON
- the Japanese MITI test , HSDB

2) Date of initial completion: 2021. 02. 22

3) Number of revised/Date of last revision: 0 / 2021. 02. 22

4) Other: No data available