

SAFETY DATA SHEET

Date Printed: Sep. 9, 2002

Version: 12

Revision date: June 9, 2020

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: KONNATE o-TDA

1.1.2 Other means of identification: 3(or 4) toluene-1,2-diamine

1.2 Recommended use of the chemical and restrictions on use

1.2.1 Recommended use: Polyol, Antioxidant, Anticorrosive agent, dyes. etc.

1.2.2. Restrictions on use: Since the oxidation occurs in the air, it must be minimized contact with air.

1.3 Details of the supplier of the safety data sheet

1.3.1 Manufacturer

Company name: TDI Plant, Hanwha Solutions Co, Ltd.

Address: 46-47, Yeosusandan 2-ro, Yeosu-si, Jeollanam-do, Korea

Prepared by: Production Team

Contact Telephone: +82-61-688-4888

1.3.2 Supplier & Distributor

Company name: Hanwha Solutions Co, Ltd.

Address: Hanwha Building, 86 Cheonggyecheon-ro, Jung-gu, Seoul, Korea

Prepared by: Sales Team

Contact Telephone: +82-2-729-2700

1.4 Emergency phone number

Emergency phone : +1 201-308-6615 (Ext.801) (Any problems that occurs in U.S.A)

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:

Acute toxicity (oral): Category 4

Acute toxicity (dermal) Category 4

Acute toxicity (inhalation: dust): Category 3

Eye Damage/irritation: Category 2A

Skin sensitization: Category 1

Carcinogenicity: Category 2

Germ cell mutagenicity: Category 2

Reproductive toxicity: Category 2

Specific target organ toxicity (Repeated exposure): Category 2

Environmental Hazards:

Hazardous to the aquatic environment (Acute hazard): Category 1

Hazardous to the aquatic environment (Chronic hazard): Category 1

2.2 Label elements, including precautionary statements

o Pictogram and symbol:



o **Signal word:** Danger

o **Hazard statements:**

- H302 Harmful if swallowed.
- H312 Harmful in contact with skin.
- H317 May cause an allergic skin reaction.
- H320 Causes eye irritation
- H331 Toxic if inhaled.
- H341 Suspected of causing genetic defects.
- H351 Suspected of causing cancer.
- H361 Suspected of damaging fertility or the unborn child.
- 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.

o **Precautionary statements:**

- **Prevention:**

- P201 Obtain special instructions before use.
- P202 Do not handle until all safety precautions have been read and understood.
- P260 Do not breathe dust/fume/gas/mist/vapors/spray.
- P261 Avoid breathing dust/fume/gas/mist/vapors/spray.
- P264 Wash your hands thoroughly after handling.
- P271 Use only outdoors or in a well-ventilated area.
- 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.
- P281 Use personal protective equipment as required.

- **Treatment:**

- P301+P312 If swallowed: Call a poison center or doctor/physician if you feel unwell.
- P302+P352 If on skin: 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.
- P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P308+P313 If exposed or concerned: Get medical advice/ attention.
- P311 Call a poison center or doctor/physician.
- P312 Call a poison center or doctor/physician you feel unwell.
- P314 Get medical advice/attention if you feel unwell.
- P321 Specific treatment (see Section 8 on this label).
- P322 Specific measures (see Section 6 on this label).
- P330 Rinse mouth.
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
- P337+P313 If eye irritation persists: Get medical advice/attention.
- P363 Wash contaminated clothing before reuse.
- P391 Collect spillage.

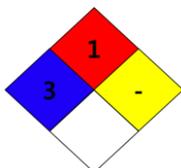
- **Storage:**

- P403+P233 Store in a well-ventilated place. Keep container tightly closed.
- 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:** 1

- o **Reactivity:** -
- o **Specific hazard:** -

3. Composition/information on ingredients

Component	Common name and synonyms	CAS No.	Conc. / %
3(or 4)-Methylbenzene-1,2-diamine	Ortho Toluene Diamine	26966-75-6	100
	Toluene-2,3-diamine	2687-25-4	55±5
	Toluene-3,4-diamine	496-72-0	45±5

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.
- If eye irritation persists: Get medical advice/attention.

Skin contact

- If skin irritation or rash occurs: Get medical advice/attention.
- Wash contaminated clothing before reuse.
- For hot product, immediately immerse in or flush the affected area with large amounts of cold water to dissipate heat.
- 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.
- For minor skin contact, avoid spreading material on unaffected skin.

Inhalation

- Call a poison center or doctor/physician.
- If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.

Ingestion

- If exposed or concerned: Get medical advice/ attention.
- Rinse mouth
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or others proper respiratory medical device.

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

- None known.

4.3 Indication of immediate medical attention and notes for physician

- Exposures require specialized first aid with contact and medical follow-up.
- 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

- **Suitable extinguishing media:** Dry chemical powder, carbon dioxide, water, normal foam-extinguishing agent
- **Unsuitable extinguishing media:** Not available

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.
- 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.

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.
- 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.
- Prevent dust cloud.

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.
- Reduce dust and prevent scattering by moistening with water.
- 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.
- Powder Spill; Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.
- 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

- Do not handle until all safety precautions have been read and understood.
- Avoid breathing dust/fume/gas/mist/vapors/spray.
- Wash your hands thoroughly after handling.
- Do not eat, drink or smoke when using this product.
- 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.
- Use carefully in handling/storage.
- Loosen closure cautiously before opening.
- Avoid prolonged or repeated contact with skin.
- Be careful to high temperature.
- Avoid inhalation of particulate matter such as gas.

7.2 Conditions for safe storage, including any incompatibilities

- Store in a cool, well-ventilated place. Keep container tightly closed.
- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.
- Keep away from food and drinking water.

8. Exposure controls/personal protection

8.1 Occupational Exposure limits

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

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

Eye protection

- Wear the protective glasses or breathable safety goggles to protect from vaporous state organic material causing eye irritation or other disorder.

Hand protection

- Wear appropriate protective gloves by considering physical and chemical properties of chemicals.

Body protection

- Wear appropriate resistant 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:	Solid
Color:	Brown
Odor:	Pungent
Odor threshold:	Not available
pH:	Not applicable
Melting point/freezing point:	61~92°C
Initial boiling point and boiling range:	250~270°C
Flash point:	172.5°C
Evaporation rate:	Not available
Flammability (solid, gas):	Not available
Upper/lower flammability or explosive limits:	Not available
Vapor pressure:	2mmHg (100°C)
Vapor density:	Not available
Relative density	1.045 g/mL (20°C)
Solubility:	2.69 g/L (20°C)
Solubility in organic solvents:	Not available
Partition coefficient: n-octanol/water:	logKow=0.66(20°C)
Auto ignition temperature:	Not available
Decomposition temperature:	Not available
Viscosity:	5cPs (100°C)

“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

- Stable(at room temperature and pressure)
- Not polymerisation

10.2 Conditions to avoid:

- Store in places out of water supplies and sewers.
- Please suppressing the generation of dust.

10.3 Incompatible materials:

- Strong acid, Strong oxidizing agent.

10.4 Hazardous decomposition products:

- Thermal decomposition products: nitrogen oxide

11. Toxicological information

Information on toxicological effects	
(a) Acute toxicity	
Oral	Category 4
	Rat, LD ₅₀ =660mg/kg bw (OECD TG 401)
Dermal	Category 4
	Rabbit, LD ₅₀ =1,120 mg/kg bw (EPA OPP 81-2)
Inhalation	Category 3
	Rat, LC ₅₀ (4h) = 0.9 mg/L (read-across, CAS No. 25376-45-8)
(b) Skin Corrosion/	Not classified

Irritation	In a primary dermal irritation study with rabbits, No to slight erythema of 72 hours and slight edema for 24 hours. Primary irritation index obtained equaled 1.25.
(c) Serious Eye Damage/ Irritation	Category 2A
	In an eye irritation study with albino rabbits, substances induced moderate eye damage/irritation, but cleared in all group by the 72 hour. (cornea score: 2.39, iris score: 1.27, conjunctivae score: 2.89, chemosis score: 1.94) (read-across, CAS No. 823-40-5, 95-80-7)
(d) Respiratory sensitization	Not available
(e) Skin Sensitization	Category 1
	In an skin sensitization with mouse, the test substance was shown to be a slight sensitiser. (read across, CAS No. 25376-45-8) (OECD TG 429)
(f) Carcinogenicity	Category 2
	- In a carcinogenicity study F344 rats were administered with feeding concentrations of 0, 125/50 and 250/100 ppm 2,4 -TDA over a period of up to 103 weeks. The time-weighted average dose was 79 ppm for the low-dose males and females for 103 weeks, 176 ppm for the high-dose males for 79 weeks, and 171 ppm for the high-dose females for 84 weeks. The calculated average intake of 2,4-TDA was approx. 5.9 mg/kg bw/day (low dose) and approx. 13 mg/kg bw/day (high dose). In this study survival time and mean body weights were dose related decreased in males and females. In both sexes an average dose of approx. 5.9 mg/kg bw/day 2,4-TDA showed hepatotoxic effects, induced the development of chronic renal disease, and an increased incidence of tumors. An overall NOAEL for rats was not demonstrated. (read-across, CAS No. 95-80-7) (OECD TG 451)
	- IARC: 2B (Possibly carcinogenic to humans) (read-across, CAS No. 95-80-7) - EU CLP 1272/2008: 1B (Suspected of causing cancer)
(g) Mutagenicity	Category 2
	<i>In vitro</i> : Bacterial Reverse Mutation Assay: Positive (OECD TG 471) <i>In vitro</i> : Mammalian Chromosome Aberration Test: weakly Positive (OECD TG 473) <i>In vivo</i> : Mammalian Erythrocyte Micronucleus Test: Positive (OECD TG 474, GLP)
(h) Reproductive toxicity	Category 2
	Developmental screening tests to target the rats, significantly reduced the number of pups born in a high-concentration. Also between 0-4 days after birth, five pups are died. The more highly concentrated reduced the viability index. In a medium concentration, the weak pups are born. So materials is associated with reproductive toxicity. (Reproductive performance and Fertility toxicity(P): NOAEL=50 mg/kg bw/day, LOAEL = 250 mg/kg bw/day) (Developmental Toxicity(F1): NOAEL = 50 mg/kg bw/day, LOAEL = 250 mg/kg bw/day)
(i) Specific target organ toxicity (single exposure)	Not available
(j) Specific target organ toxicity (repeat exposure)	Category 2
	In a subacute oral toxicity study with rats, increased clinical signs of liver and decreased a body weight.(NOAEL=50mg/kg bw/day)
(k) Aspiration Hazard	Not available

12. Ecological information	
12.1 Toxicity	
Acute toxicity	Category 1
	Fish: <i>Brachydanio rerio</i> , LC ₅₀ (96h)=20 mg/L (read-across: 496-72-0) static (OECD TG 203) Invertebrate: <i>Daphnia magna</i> , EC ₅₀ (48h)=2.47 mg/L static (OECD TG 202, GLP) Algae: <i>Desmodesmus subspicatus</i> , ErC ₅₀ (72h)=0.716 mg/L (OECD TG 201, GLP)
Chronic toxicity	Category 1
	Fish: <i>Danio rerio</i> , NOEC(10d) = 10mg/L(Hatching success), 3.16mg/L(Behaviour), LOEC(10d) = 31.6 mg/L(Hatching success), 10mg/L(Behaviour) (read-across: 25376-45-8) (OECD TG 212, GLP) Invertebrate: <i>Daphnia magna</i> , NOEC(21d)=0.02 mg/L static LOEC(21d)=0.07 mg/L static (OECD TG 211, GLP) Algae: <i>Desmodesmus subspicatus</i> , NOEC(72h)=0.01 mg/L (OECD TG 201, GLP)
12.2 Persistence and degradability	Persistence: Low persistency (log Kow is less than 4 estimated.) (Log Kow=0.66) Degradability: Not available
12.3 Bio-accumulative potential	Bioaccumulation: Not available Biodegradation: As well-biodegraded, it is expected to have low accumulation potential in living organisms (76% biodegradation was observed after 28 days) (OECD TG 302C)
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.: 2811

14.2 UN Proper shipping name: **TOXIC SOLID, ORGANIC, N.O.S.,MOLTEN (CONTAINS TOLUENEDIAMINE)**

14.3 Transport Hazard class

ADR: 6.1

IMDG: 6.1

ICAO/IATA: 6.1

RID: 6.1

14.4 Packing group: III

14.5 Environmental hazards: Applicable

14.6 Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code): Regulated

14.7 Special precautions for user

in case of fire: F-A

in case of leakage: S-A

15. Regulatory information

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

Regulatory Information

TSCA (Toxic Substances Control Act): Not regulated

Proposition 65: Not Regulated

OSHA Regulation: Not regulated

CERCLA Regulation: 4.5399kg 10lb

SARA 311/312 Hazard classes: Not regulated

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: Toxic Chemical (97-1-299), Phase-in substance subject to registration (441)
- European Inventory of Existing Commercial chemical Substances(EINECS): Present (248-145-0)
- China management information: Inventory of Existing Chemical Substances (IECSC): Not regulated
- Japan management information: Existing and New Chemical Substances (ENCS): (3)-126
- Canada management information: Domestic Substances List (DSL): Not regulated
- Australia management information: Australia Inventory of Chemical Substances (AICS): Not regulated
- New Zealand management information: New Zealand Inventory of Chemicals (NZIoC): Not regulated
- Philippines management information: Philippines Inventory of Chemicals and Chemical Substances (PICCS): Not regulated

16. OTHER INFORMATION

16.1 Indication of changes:

Preparation date: Sep. 9, 2002

Version: 12

Revision date: June 9, 2020

16.2 Key literature reference and sources for data:

- National chemicals information systems; <http://ncis.nier.go.kr>
- Pubchem; <http://pubchem.ncbi.nlm.nih.gov/>
- AKRON; <http://ull.chemistry.uakron.edu/erd/>
- IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>
- ECHA; <http://echa.europa.eu/web/guest>
- UN Recommendations on the transport of dangerous goods 17th
- NIOSH(The National Institute for Occupational Safety and Health)
- ACGIH(American Conference of Governmental Industrial Hygienists)
- TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp>
- National Emergency Management Agency-Korea dangerous material inventory management system; <http://hazmat.mpss.kfi.or.kr/index.do>
- Waste Control Act enforcement regulation attached [1]
- EPISUITE Program ver.4.1

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.