

## 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/ UNDERTAKING

**Identification of the substance or preparation:**

**Country of origin:**

**CAS Number:**

**Toluene di-isocyanate**

**Iran (Islamic Republic of Iran)**

**CAS # of mixture 26471-62-5**

**(2,4 – toluene di-isocyanate , 80% (CAS NO: 584 - 84 – 9) ,Chemical formula: C<sub>6</sub>H<sub>3</sub>CH<sub>3</sub>(NCO)<sub>2</sub>,**

**2,6 – toluene di-isocyanate , 20% (CAS NO:91-08-7), Chemical formula: C<sub>6</sub>H<sub>3</sub>CH<sub>3</sub>(NCO)<sub>2</sub>)**

## 2. COMPOSITION/INFORMATION ON INGREDIENTS

**Hazardous substances:**

**Signal word: DANGER!**

**NFPA Ratings: Health 3 -Flammability 1-  
Reactivity 3**

**Mixtures of :**

**2,4 – toluene di-isocyanate , 80%**

**2,6 – toluene di-isocyanate , 20%**

**Hazardous label(s):**



**Signal word: DANGER!**

**Toxicological characteristics:**

**TDI is an extreme inhalation hazard, which can cause allergic sensitisation. React with water releasing carbon dioxide gas, which can build up pressure and rupture containers.**

**TDI has been shown to cause cancer in experimental animals.**

**No data available.**

**Substances present at a concentration below the minimum danger:**

**Other component:**

**-**

### 3. IDENTIFICATION OF HAZARDS

|                           |   |
|---------------------------|---|
| <b>Risk phrases:</b>      | <b>Signal word: DANGER!</b>   |
| <b>Skin contact:</b>      | May cause irritation or rash, discoloration and sensitization.  |
| <b>Eye contact:</b>       | Can cause severe irritation, reddening, tearing and swelling.   |
| <b>Inhalation :</b>       | Extremely toxic by inhalation, tightening of chest, respiratory tract irritation, coughing, headache and shortness of breath. May lead to allergic sensitivity in some individuals resulting in asthma –like symptoms at and below PEL exposure.  |
| <b>If swallowed:</b>      | Can irritate and burn mouth, stomach and digestive tract.   |
| <b>Other information:</b> | <p>-Repeated or prolonged over exposures may result in:<br/>Respiratory system disorders (allergic sensitization, injury to the lungs), skin disorders (allergic sensitization, allergic dermatitis) and cancer.</p> <p>-Routs of exposure :<br/>Eyes , skin , ingestion and inhalation</p> <p>-Special hazard precautions:<br/>TDI is an extreme inhalation hazard, which can cause allergic sensitization. Reacts with water, releasing carbon dioxide gas, which can build up pressure and rupture containers.<br/>TDI has been shown to cause cancer in experimental animals.</p> <p>-Symptoms of over exposure:<br/>Eye irritation, rash, shortness of breath, headache, coughing, nausea, vomiting.<br/>Medical conditions aggravated by overexposure: dermatitis, asthma, lung disease, allergies.</p> <p>For persons already allergic to isocyanates, even concentrations below the OSHA PEL can trigger allergic response. Therefore, these persons should not be allowed to work in a TDI atmosphere.</p> |

#### 4. FIRST AID MEASURES

As a general rule, in case of doubt or if symptoms persist, always call a doctor  
NEVER induce swallowing in an unconscious person.

In all cases obtain immediate medical attention after first aid:

**Skin contact :**

Remove contaminated clothing and shoes .wash skin with warm water and soap for at least 15 minutes. If sticky, use waterless cleaner first. Launder clothing before reuse.

**In case of exposure by inhalation:**

Remove to fresh air and provide oxygen/CPR if needed.

**In case of splashes or contact with eyes:**

Flush with plenty of water at least 15 minutes, occasionally lifting upper and lower eyelids.

**In case of swallowing:**

Do not induce vomiting

**Note of physician:**

**Other information :**

May cause respiratory sensitization or asthma-like symptoms. Respiratory symptoms, including pulmonary edema, may be delayed, so persons receiving significant exposure should be observed for 48 hours for signs of respiratory distress.

#### 5. FIRE FIGHTING MEASURES

**Flammable class:**

Flammability classification ,OSHA/NFPA  
Class IIIB combustible liquid.  
Auto ignition temperature: 620°C ( 1148°F)  
Flash point: 270°F / 132°C, Method: COC  
LEL: 0.9 vol % UEL: 9.5 vol %

**Suitable extinguishing media:**

Use alcohol resistance foam, water spray or water fog. Do not use water stream, as it may spread fire. Dry chemical or carbon dioxide extinguishers can be used on small fires.  
Note: Other types of foams will react with TDI and release corrosive, toxic fumes.  
Water is not recommended, but may be applied in large quantities as a fine spray when other extinguishing agents are not available.

**Special exposure hazards arising from the substance or preparation itself, combustion**

Thermal decomposition may include toxic oxides of carbon.

**products, resulting gases:**

**Special protective equipment for fire fighting :**

**Other information:**

Use self-contained breathing apparatus with full face piece. Butyl rubber gloves, full-body suit and boots must be worn.

-Evacuate people near by and downwind. Barricade fire area and deny unnecessary entry.

-Stay upwind and keep out of low areas where gases (fumes) can accumulate. Allow re-entry only by persons equipped and trained for fire fighting.

-Use water spray to cool fire-exposed containers and fire-affected zone until fire is out. Move containers from fire area if this is possible without hazard.

Fight fire from protected location or safe distance.

Consider use of unmanned hose holder or monitor.

-Immediately withdraw all personnel from area in case of rising sound from venting safety device or discoloration of container.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions:**

If TDI is released, evacuate people near by and downwind .Barricade area and deny unnecessary entry. Vapors may ignite if exposed to an ignition source.

-Keep upwind of release .Ventilate area of leak or spill.

Allow re-entry only by persons equipped and trained for decontamination. Use self-contained breathing apparatus with full facepiece.Butyl rubber gloves, full-body suit and boots must be worn.

Shut-off ignition sources and stop the leak.

Contain spill with earth dikes.Prevrent TDI from entering floor drains.

**Environmental precautions:**

Do not allow material to enter sewers or waterways.

**Methods for cleaning up and disposal:**

Absorb with material such as: sawdust, vermiculite, dirt, sand, clay, or cob girt.

Avoid materials such as cement powder.

Collect materials in suit able and properly labeled open containers. Do not place in sealed container. Contact with water results in chemical reaction, which may result in

**Other information:**

rupture of the container. Place in properly labeled polylined fibred packs, plastic drums or metal containers. Clean up floor areas. -Attempt to neutralize by adding materials such as: 5% ammonia or 5% sodium bicarbonate solution, with 2% detergent .If ammonia is used; provide good ventilation to prevent vapor exposure. Remove to a well ventilated area. Dispose of waste materials according to information in section 13. Spills and releases may have to be reported to federal and/or local authorities. Dispose of waste materials according to information in section 13.

## 7. HANDLING AND STORAGE

The regulations relating to storage premises apply to workshop where the product is handled :

**Handling:**

Use only with adequate ventilation. Do not eat, drink, or smoke in working area. Never use welding / cutting torch near storage containers, even if empty, because even residual product can ignite explosively.

**Storage:**

Store in well-ventilated area designed for TDI storage .Store between 60°F and 104°F (16°C and 40°C). Material will deteriorate if stored over 104°F (40°C) (3-6months). Use containers of steel or stainless steel. Do not use aluminum or galvanized containers.

**Other information and precautions:**

Do not use polyethylene containers-water can be absorbed through plastic. Emergency showers and eyewash fountains should be easily accessible. Containers of this material may be hazardous when emptied, since emptied containers retain product residues (vapour, liquid and solid).

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

|   |  |
|---|--|
| <b>Exposure limit values:</b>           | <b>2,4 – toluene di-isocyanate :</b><br>OSHA PEL : 0.02 PPM<br>ACGIH TLV : 0.005 ppm (0.036 mg/m3)<br>ACGIH STEL : 0.02ppm (0.14 mg/m3)<br>Odor threshold :0.2 ppm approx  |
|   | <b>2,6 – toluene di-isocyanate :</b><br>OSHA PEL : 0.02 PPM<br>ACGIH TLV : 0.005 ppm (0.036 mg/m3)<br>ACGIH STEL : 0.02ppm (0.14 mg/m3)<br>Odor threshold : 2.1 ppm approx.  |
| <b>Exposure controls:</b>               | Atmospheric concentrations of TDI must be maintained below the exposure guidelines, so monitoring by instrument or individual exposure badge is required.  |
| <b>Personal protective equipment:</b>   | Butyl rubber gloves  |
| <b>Eye protection:</b>                  | ANSI approved chemical workers goggles.  |
| <b>Respiratory protection:</b>          | Not required under normal conditions in a well-ventilated workplace.<br>-When respiratory protection is required for certain operations, such as sampling or cleaning and repair of equipment.<br>- Selection of specific items such as face shield, butyl rubber over shoes or boots, apron, or full-body suit will depend on operation.<br>Clean rubber gear thoroughly after contamination.<br>Contaminated clothing and shoes should be discarded.<br>Wear an approved respirator such as MSHA/NIOSH. For emergency or nonroutine operations wear an SCBA. |
| <b>Hand protection:</b>                 | Use appropriate protective gloves  |
| <b>Skin and body protection:</b>        | Wear appropriate protective gloves, boots and aprons to prevent prolonged or repeated skin contact.  |
| <b>Health measures:</b>                 | -  |
| <b>Environmental exposure controls:</b> | Provide general and local exhaust ventilation to control airborne levels below the exposure guidelines.  |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

|  |   |
|--|---|
| <b>General information:</b>            | <b>TDI</b>  |
| <b>Appearance (at 20°C):</b>           | Water-white to pale yellow liquid.                                    |
| <b>Colour:</b>                         | Water-white to pale yellow liquid                                     |
| <b>Odour:</b>                          | Sharp, pungent odour.   |
| <b>PH (at 20°C):</b>                   | Not applicable.   |
| <b>Boiling point/range (°C):</b>       | 251 °C (484°F )   |
| <b>Freezing /melting point (°C):</b>   | 14°C (57°F)   |
| <b>Decomposition temperature (°C):</b> | 287 °C (530 °F)   |
| <b>Flammability:</b>                   | Class IIIB<br>Combustible liquid.                                     |
| <b>Auto-ignition temperature:</b>      | 620°C ( 1148°F)   |
| <b>Explosive properties:</b>           | LEL: 0.9 vol % UEL: 9.5 vol %   |
| <b>Oxidising properties:</b>           | -   |
| <b>Vapour pressure (at 25°C):</b>      | 0.004 KPa   |
| <b>Vapour density (at 20°C):</b>       | 6 (air = 1)   |
| <b>Specific gravity (at 20°C):</b>     | 1.22  |
| <b>Solubility (at 20°C):</b>           | <b>Water solubility:</b> Insoluble, but reacts with evolution of Co2. |
| <b>Evaporation rate:</b>               | <b>solubility in fats:</b>  |
| <b>Other information:</b>              | No information available.<br>C8H18O MW=174.16                         |

## 10. STABILITY AND REACTIVITY

|                             |   |
|-----------------------------|---|
| <b>Stability:</b>           | Stable under normal condition.  |
| <b>Conditions to avoid:</b> | Avoid from excessive heat, sparks, open flame and all sources of ignition. Burning TDI produces oxides of carbon and nitrogen, some of which are poisonous, as well as toxic hydrogen cyanide. TDI at elevated temperatures or in fires produces toxic TDI fumes. Vapors may be explosive and poisonous. Avoid temperatures above 104°F (40°C) Avoid temperatures below 60 °F (16°C) Product decompose at elevated temperatures .generation of gas during decomposition can cause pressure in closed systems. Pressure build up can be rapid. Avoid moisture. TDI reacts slowly with water, releasing carbon dioxide, which can cause pressure build up and rupture of closed containers. Elevated temperatures accelerate this reaction. |
| <b>Material to avoid:</b>   | Avoid unintended contact with alcohols and  |

**Hazardous decomposition products:**

amines. The reaction generates heat and polymer. Avoid contact with water, acids, ammonia, bases, moist air, and strong oxidizers. Reaction with water, acids, ammonia, bases, moist air and strong oxidizers. Reaction with water will generate solid urea polymers and carbon dioxide gas. Generation of gas can cause pressure build-up in closed systems. Avoid contact with metals such as aluminum, zinc, brass, copper and galvanized metals. TDI can react with itself at temperatures above 320°F (160° C). Product can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems. pressure build up can be rapid. Avoid moisture. TDI reacts with water, releasing carbon dioxide which can cause pressure build-up and rupture of closed containers. Elevated temperatures accelerate this reaction. Generation of gas during decomposition can cause pressure in closed systems. pressure build up can be rapid. Hazardous polymerization will occur. Decomposition due to self-reaction to carbodiimide polymers and carbon dioxide gas can occur at temperatures over 320°F /160°C. Hazardous polymerization can occur.

**11. TOXICOLOGICAL INFORMATION**

**Acute toxicity: 2,4 TDI**

- LD<sub>50</sub>, skin absorption, rabbit (mg.kg<sup>-1</sup>):  
> 9400

- LC<sub>50</sub>, inhalation, rat (mg.kg<sup>-1</sup>):  
14 ppm/4 hours

**Sub chronic – chronic toxicity:**

- LD<sub>50</sub>, ingestion, rat (mg.kg<sup>-1</sup>): 5800  
Mutagenic in several genotoxicity assays.

**Sensibilization:  
Carcinogenicity:**

No information found  
Reasonably suspected to be a human carcinogen based on sufficient evidence of carcinogenicity in experimental animals.  
Group 2B-possible human carcinogen.

**Reproductive effects:**

No information found

**Human experience:**

**NTP:**

Reasonably suspected to be human carcinogen based on sufficient evidence of carcinogenicity in experimental animals.

**IARC :**

Group 2B- possible human carcinogen  
NTP and IARC classifications are based on oral exposure of laboratory animals to high levels of TDI. Long- term inhalation exposure studies in rats and mice show no indication of carcinogenic potential. Industrial experience in humans with TDI has shown any link between TDI exposure and cancer development.

**Other information:**

-

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity:**

TDI may be harmful to aquatic organisms.

**Fresh water fish :**

LC 50/96 hours Fathead minnow 164.6 mg/l

**Fresh water invertebrates :**

EC 50/24 hours Daphnia 750 mg/l

**Salt water fish:**

LC 50/96 Red Sea Bream 0.4 mg/l

**Bioaccumulative potential:**

The low value for log octanol /water partition coefficient (log Kow=0.21) indicates TDI will not bioaccumulate.

**Mobility:**

In the aquatic or terrestrial environment, movement is expected to be limited by the reactivity of TDI with water, forming predominately insoluble polymers (polyurea crusts), which appear to be stable.

**Persistence and degradability:**

It is expected to biodegrade and is not expected to persist along periods in an aquatic environment.

**Other adverse effects:**

A moderate biochemical oxygen demand and may cause oxygen depletion in aqueous systems.

### 13. DISPOSAL CONSIDERATIONS

|                               |  |
|-------------------------------|--|
| <b>Disposal of product:</b>   | <b>Waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification. Observe all national and local environmental regulations. RCRA waste number for 2, 4 TDI (CAS# 584-84-9) is U223. For 2,6 TDI (CAS# 91-08-7) no separate RCRA waste number has been assigned. TDI may be burned in an approved chemical waste incinerator designed for liquid wastes.</b> |
| <b>Disposal of packaging:</b> | <b>Waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.</b>   |

### 14. TRANSPORT INFORMATION

|                            |  |
|----------------------------|--|
| <b>Land transport:</b>     | <b>Shipping name: For CAS # 26471-62-5 (mixed isomers of TDI)<br/>Hazard class: 6.1<br/>PSN Code : 6.1-02<br/>UN NO: 2078<br/>Label: Skull and crossbones toxic</b>      |
| <b>ADR/RID:</b>            | <b>Shipping name: mixed isomers of TDI<br/>Hazard class: 6.1<br/>UN NO: 2078<br/>Label: Skull and crossbones toxic</b>   |
| <b>Maritime transport:</b> | <b>Transport by passenger ship not allowed<br/>Shipping name: Toluene diisocyanate<br/>UN NO: 2078<br/>Hazard class: 6.1 PG II<br/>Label: Skull and crossbones toxic</b> |
| <b>Air transport:</b>      | <b>Transport by Air Not Allowed<br/>Shipping name: Toluene diisocyanate<br/>UN NO: 2078<br/>Hazard class: 6.1 PG II<br/>Label: Skull and crossbones toxic</b>            |

## 15. REGULATORY INFORMATION

**Hazardous label(s):**



**EC DANGER /HAZARD SYMBOL:**

**Safety phrases:**

**T + VERY TOXIC**

**S23 do not inhale gas/fumes/ vapor/ spray**

**S26 in case of contact with skin, wash immediately with plenty of water and seek medical advice**

**S28A after contact with skin, wash immediately with plenty of water**

**S38 in case of insufficient ventilation ,wear suitable respiratory equipment**

**S45 in case of accident or if you feel unwell, seek medical advice immediately (show label where possible)**

**Risk phrases:**

**R26 very toxic by inhalation**

**R36 irritating to eyes**

**R37 irritating to respiratory system**

**R38 irritating to skin**

**R40 possible risks of irreversible effects**

**R42 may cause sensitization by inhalation**

**R43 may cause sensitization by skin contact**

**R52 harmful to aquatic organisms**

**R53 may cause long-term adverse effects in the aquatic environment**

## 16. OTHER INFORMATION

The reaction of polyols and isocyanates generates heat. Contact of the reacting materials with skin or eyes can cause severe burns and may be difficult to remove from the affected area. In addition, such contact increases the risk of exposure to isocyanates vapours.

