Toluene di-isocyanate (TDI) [CARADATE 80]
Product Stewardship Summary
(CAS number 26471-62-5)

Chemical Formula for TDI
Mixture of 20% 2,6-TDI and 80% 2,4-TDI

What is Toluene di-isocyanate?
Toluene di-isocyanate (TDI) may be a liquid or solid, depending on the ambient temperature and has a sharp pungent smell. It is made by the phosgenation of toluene diamine.

How is Toluene di-isocyanate Used?
It is reacted with polyols to form polyurethanes, which are used in foam manufacture (for mattresses, furniture and car seats) and in coatings, adhesives, sealants and elastomers. The use of TDI is restricted to professional users.

Health, Safety and Environmental Considerations
TDI is classified as fatal by inhalation. If inhaled, it may cause allergic reaction in the respiratory tract, asthma symptoms or breathing difficulties. In hyper-reactive or hypersensitive people, very low concentrations may lead to broncho-constriction (demonstrating asthmatic signs and symptoms). The onset of respiratory symptoms may be delayed for several hours after exposure. Chronic exposure by inhalation may result in permanent decrease in lung function. Eye contact may cause serious irritation and irreversible corneal injury. TDI is also a skin irritant and may cause allergic skin reaction.

TDI is classified as “suspected to cause cancer”. Several workplace epidemiology studies have been carried out and exposure to TDI has not been shown to be associated with cancer in humans. There is, however, limited evidence of carcinogenic effects from animal experiments. The US National Toxicology Program [NTP] has classified TDI as “reasonably anticipated to be a human carcinogen”, the International Agency for Research in Cancer [IARC] has classified it as “possibly carcinogenic to humans” (Group 2B).

Occupational Exposure Limits (OEL) have been set in the range of 0.005 to 0.02 ppm. The odour threshold level of 0.2 ppm is approximately 10 times greater than the OEL; therefore, Shell Chemicals recommends workers in polyurethane facilities wear exposure monitoring devices to identify accidental exposure.

TDI is harmful to aquatic life with long lasting effects. Due to its reactivity with water and its hydrophobic nature, the availability in the environment and environmental transfer are limited. Due to the lack of persistence, the impact of localised accidental release is expected to be low and transient.
TDI is not classified for physical hazards.

**Storing and Transporting Toluene di-isocyanate**

TDI is transported by tank truck, rail car and vessel, mainly in bulk. In limited circumstances, TDI can be transported in drum or isotank.

Transport of TDI is carried out by selected hauliers using assessed routes, with skilled and trained drivers. Customers are audited before first supply and thereafter on a regular basis following the ISOPA guidelines.

Under normal conditions, the temperature of TDI during transport, handling and storage should be between 68°F/20°C and 86°F/30°C. Storage vessels or containers should not be stored without shelter as TDI reacts with (rain) water to form carbon dioxide. This would lead to an increase of pressure in the container with the consequent danger that it could burst.

During the loading/unloading processes, those involved should wear personal protective equipment, including adequate protection for the respiratory tract.

**Risk Characterization Summary**

Risks associated with exposure to this product have been evaluated for the following "chain-of-commerce" activities: manufacture, storage, product transfer, transportation, and customers/markets. Due to health, safety and environmental considerations, it is only manufactured, stored and transported to customers in closed systems. Likewise, customers are limited to those who only use the product in closed systems as an intermediate for the manufacture of other chemicals. Proper equipment design and handling procedures maintain low risk from exposure to TDI where the product is handled as a chemical intermediate.

To address the specific hazards of working with Di-isocyanates, ISOPA has developed the "Walk the Talk" programme focussing on the behavioural safety of everyone involved in the industry through an ongoing process of information exchange and dialogue. The ISOPA ‘Walk the Talk’ modules on safe use of Di-isocyanates have been specifically generated by the members of ISOPA with the aim of improving safety, health and environmental standards across the European polyurethanes industry.

* ISOPA: the European Diisocyanates & Polyol Producers Association

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This product stewardship summary is intended to give general information about the chemical or categories of chemicals addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the chemical’s applicable Safety Data Sheet, which should be consulted before use of the chemical. This product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.

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