

Toluene diisocyanate (TDI) Product Stewardship Summary

CAS number
26471-62-5

Chemical formula
Mixture of 20 % of 2,6-TDI and 80 % of 2,4-TDI; please contact supplier for more details

What is TDI?

Toluene diisocyanate (TDI) may be a liquid or solid, depending on the ambient temperature. It is made by the phosgenation of toluene diamine.

How is TDI used?

It is reacted with polyols to form polyurethanes, which are used in foam manufacture and in coatings, adhesives, sealants and elastomers. It is used in the manufacture of flexible polyurethane foams, which are used in mattresses, furniture and car seats, and in coatings, adhesives, sealants and elastomers.

Health, Safety and Environmental considerations

TDI is classified in the EU as “very toxic by inhalation”, “irritating to eyes, the respiratory system and skin”, “may cause sensitization by inhalation and skin contact” and “limited evidence of carcinogenic effect”. 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 irritation and irreversible corneal injury.

While several workplace epidemiology studies have been carried out, 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) and the European Union (EU) has assigned R40 (limited evidence of carcinogenic effect)

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 organisms and may cause long-term adverse effects in the aquatic environment. 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 as flammable.

Storing and transporting toluene diisocyanate

TDI is transported by road, rail and sea, mainly in bulk. In limited circumstances TDI can be transported in drum or isotank.

Transport of TDI is carried out by selected hauliers, with skilled and trained drivers. TDI transport risks are assessed using Shell Chemicals route risk assessments to identify hazards and establish controls to minimize those risks. Customers are audited before first supply and thereafter on a regular basis

The temperature of TDI during transport, handling and storage should not exceed 30°C. Storage vessels or containers should not be stored without shelter as TDI reacts with (rain) water to form CO₂. This would lead to an increase of pressure in the container with the consequent danger that it could burst.

During the loading/unloading procedure 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, Shell’s 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

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 Material 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.