Interactions of Hazardous Materials BOS 3640

Student's Name

Institutional Affiliation

Classification and physical properties of TDI and MDI

Diisocyanates [toluene diisocyanate (TDI) are organic compounds. It is a synthetic mixture of isomers and is very volatile. It has a colorless to yellow appearance or dark yellow. It has a sweet, fruity, pungent odor. TDI melts at 20 degrees Celcius and evolves carbon dioxide when moist. TDI is combustible and decomposes to produce highly toxic fume. Methylene diphenyl diisocyanate (MDI)] is an organic compound that is a federal hazardous air pollutant. It has a boiling point of 196 degrees Celcius and a melting point of 37.2 degrees Celcius. MDI is soluble in benzene, acetone, and kerosene, and it is combustible. TDI and MDI are highly reactive substances, and when exposed to the air, they react quickly to form other compounds. The substances do not catch fire easily but burn when exposed to an external fire. They should be stored separately from combustible materials to keep them safe in the event of a fire.

Emergency Actions in the Event of Fire

1. Evacuate the area

All individuals, except those handling the emergency, should be relocated upwind of the fire to reduce the risk of inhaling poisonous fumes or smoke.

2. Inform management and emergency services

The lead incident commander must inform the emergency services even though the fire may not involve the diisocyanate storage site. Their presence at the site is vital should the fire get into contact with MDI and TDI.

3. Use personal protective equipment

TDI and MDI are poisonous when inhaled, and thus firefighters need protective gear which provides them with fresh air and prevents them from inhaling diisocyanates (ERG Data Files |

PHMSA. (n.d.). They should also have clothing that protects them from getting into contact with the liquids.

4. Use fire-fighting foam or water

If the fire is small, the team should use dry chemicals or carbon dioxide appliances to extinguish it. In case they decide to use water, it should be applied in large quantities and from a reasonable distance. Employees with relevant training can handle small fires training in handling emergencies. In case the fire involves MDI and TDI, it is advisable to let trained and equipped emergency teams to handle the incident. Suitable appliances for extinguishing large fires include water-based protein or any fire-fighting foams. The foams not extinguish the fire but also suppresses any release of diisocyanate vapor. It is, however, advisable to use water immediately if the foam is not readily available. The commander should also ensure that run-off water is contained and disposed of in an environmentally-friendly manner. Any metallic drums of diisocyanate should be cooled with water to avoid ruptures while plastic drums are cooled to prevent melting.

5. Test the area for diisocyanate residues

After extinguishing the fire, it is appropriate that surfaces and air are tested for traces of diisocyanate that could be present.

Corrective Measures to Prevent Fire Incidences

To avoid accidents in the future, manufacturers who deal with TDI and MDI should take several precautions which are as follows:

- The company should follow unloading checklists at the unloading location
- The company should comply with the department of transportation requirements during unloading, and the unloading personnel also require proper training (Hughes et al., 2014).

- Unloading personnel and employees in the production areas should wear protective clothing.
- The company should conduct a periodic test on apparatus used handling TDI and MDI to ensure they are in good condition all the time.

References

ERG Data Files | PHMSA. (n.d.). Retrieved from http://www.phmsa.dot.gov/hazmat/library/erg

Hughes, M. A., Carson, M., Collins, M. A., Jolly, A. T., Molenaar, D. M., Steffens, W., & Swaen, G. M. H. (2014). Does diisocyanate exposure result in neurotoxicity?. *Clinical Toxicology*, *52*(4), 242-257.