FACT SHEET

4,4-Methylene Diphenyl Diisocyanate (MDI), All Isomers
CAS#: 101-68-8

1,6-Hexamethylene Diisocyanate (HDI), All Isomers
CAS#: 822-06-0

This fact sheet provides a summary of the Development Support Document (DSD) created by the TCEQ Toxicology, Risk Assessment, and Research Division (TD) for the development of Regulatory Guidelines (ESLs and ReVs) for ambient exposure to these chemicals. For more detailed information, please see the DSD or contact the TD by phone (1-877-992-8370) or e-mail (tox@tceq.texas.gov).

What are 4,4-Methylene Diphenyl Diisocyanate (MDI) and 1,6-Hexamethylene Diisocyanate (HDI)?

MDI and HDI are diisocyanates. At room temperature, monomeric MDI is a solid and polymeric MDI (PMDI) is a viscous liquid. MDI vapor is only released when MDI is heated. MDI is used for polyurethane elastomers, spandex fibers, and rubber shoe soles. PMDI is used to make rigid and flexible foam, binder resin, and heat insulating material. HDI monomer is a clear, colorless to light-yellow liquid with a sharp, irritating odor. HDI is used as a polymerizing agent in the manufacture of higher molecular weight HDI polyisocyanates that are used as curing agents for polyurethane paints and coatings.

How are MDI and HDI released into ambient air?

MDI and HDI may be released into the air primarily from industrial activity. Under normal circumstances, exposure of the general public to MDI or HDI are likely only from releases to the atmosphere. Potential exposures to both vapor and aerosol MDI are associated with the production, handling, use, and disposal of MDI and MDI-containing products and material. HDI can be released into the environment during manufacturing or processing of HDI or during spray applications of polymer paints containing residual amounts of monomer HDI.

How can MDI and HDI affect my health?

Permitted levels of MDI and HDI should not cause adverse health or welfare effects. Exposure to MDI and HDI primarily cause adverse effects on the respiratory system in both animals and humans. Acute exposure to very high concentrations of MDI or HDI in humans can cause pulmonary edema, coughing, and shortness of breath. The most common health endpoints caused by inhalation of MDI or HDI are occupationally-induced asthma, hypersensitivity pneumonitis, decreases in lung function, and inflammation of the upper respiratory tract. Acute irritation, dermal sensitization, and occupational asthma have been reported in workers exposed to HDI. There are limited data to determine whether exposure to MDI can cause cancer. The USEPA indicated that the available evidence is inadequate to describe the carcinogenic potential of MDI or HDI.

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Is MDI or HDI odorous or harmful to plants?

MDI is odorless. HDI has a sharp/pungent odor at levels higher than the TCEQ air quality guideline levels for HDI. Airborne concentrations have not been shown to have adverse effects on plants.

Why does the TCEQ set Regulatory Guidelines for MDI and HDI?

The TCEQ has set various air quality guideline levels (ESLs, AMCVs and ReVs) to protect human health and welfare. Please see Definitions of ESLs, ReVs, and AMCVs located on the TCEQ DSD webpage for more information. The air quality guideline levels for MDI and HDI have been designed to protect the general public from short-term and long-term adverse health and welfare effects. The general public includes sensitive populations such as children, the elderly, pregnant women and people with preexisting health conditions. If you would like to know more about the specific ESLs, and ReVs developed, what the values are and what they are used for, please see the DSD.