

CWA Occupational Safety & Health Fact Sheet #4

Polyurethanes & Isocyanates & the Workplace

Polyurethanes are a creation of America's post World War II science and technology- a period when hundreds and thousands of so called "wonder chemicals" were invented. Polyurethanes or plasticizers are produced in three forms:

- As flexible or soft foams used primarily for cushioning;
- As rigid foams used primarily for building insulation, support elements, and decoration, and;
- As elasto-plastics used for automobile body panels, coatings, adhesives, sealants, and as a substitute for rubber. Because of ease of application and versatility, manufacturers and employers consider polyurethanes to be invaluable.

Polyurethanes are formed by combining a variety of chemicals. The most important ingredient is the family of isocyanates. The family of isocyanates includes: Toluene Diisocyanate (TDI), Methylene Bisphenyl Diisocyanate (MDI), also known as Diphenyl Methane Diisocyanate, Hexamethylene Diisocyanate (HDI), Naphthalene Diisocyanate (NDI), and Diisocyanate Dicyclohexyl Urethane.

Several thousand CWA telecommunications and automotive manufacturing members work with and are exposed to isocyanate products. In the telecommunications industry, this work involves the use of polyurethane products used as (foam) plugs to weatherproof and seal telephone cable splices and, in the automotive manufacturing industry, polyurethane products are used in the manufacturing of plastics and related materials.

Health Effects

Although all of the isocyanate products are hazardous, Toluene Diisocyanate (TDI) is considered the most toxic. Therefore, this section of the fact sheet will focus primarily upon the health effects associated with exposure to TDI. However, CWA leaders and members should assume that exposure to other isocyanate products may cause the same or similar health problems.

TDI irritates all living tissues that it comes in contact with. TDI vapors, which may be emitted when mixing the two chemical mixtures (or A and B ingredients), may be inhaled or breathed. Inhalation of such vapors can produce severe irritation and burning to the mucous membranes of the eyes and respiratory tract. Inhalation may also cause nausea, vomiting, abdominal pain, and breathing problems. In addition, skin contact can cause a rash commonly referred to as contact dermatitis. Of particular concern, the National Institute for Occupational Safety and Health (NIOSH) has identified TDI as an (animal) carcinogen.

TDI exposure causes serious upper respiratory health problems- involving the nose, throat, esophagus, and lungs. Also, TDI can cause acute irritation, chronic irritation, and sensitization of the lungs and throat. Acute irritation is like a burn inside the nose, throat, or lungs. The throat and lungs become so damaged by TDI that the body loses its ability to defend against infections. Such acute irritation may cause the lungs to become filled with fluid. In turn, this condition could cause infection to become worse and, as a result of significant accumulation of these fluids, cause the drowning of the affected worker.

Chronic irritation involves gradual bodily changes such as the reduction of lung capacity. This may result in increasing one's susceptibility to upper respiratory infections such as chronic bronchitis. In addition, since lung capacity may be reduced and the heart has to work harder, there may be an increased risk of cardiovascular or heart problems.

When a worker becomes sensitized (develops an allergy) to TDI, exposure may cause a severe allergic reaction (e.g., occupational asthma). In turn, this medical condition may cause death. Between two (2) to fifteen (15) per 100 people can become sensitized to TDI. Given a large dose, an individual/worker can become sensitized upon the first exposure. However, sensitization normally develops after repeated exposures. Once a worker becomes sensitized, any level of TDI exposure can set off an allergic reaction.

Before or soon as possible after working with TDI, affected workers should have a complete work and medical history, lung function test, chest x-ray, and blood tests performed. This is especially important for those workers who have a history of upper respiratory/lung allergies, previously weakened lungs, and lung or throat problems at the time of exposure.

Controlling the Hazard

Exposure to TDI can best be controlled by removing the substance from the workplace. Where possible, less toxic, acceptable substitutes should be identified and used. When isocyanate products are used, exposure can be effectively controlled with the use of engineering controls such as enclosed systems or methods, as well as local exhaust ventilation.

In addition, the employer has the responsibility for ensuring that CWA members are not exposed to harmful levels of TDI. If a worker has an idea that she/he may be exposed to harmful levels of TDI, she/he should contact the appropriate union representative as soon as possible. If the affected worker(s) can smell the TDI substance (a fruity smell), she/he/they should leave the work area immediately and contact the supervisor and union representative. In turn, until the hazard is corrected, the worker should request alternative work.

Where TDI is used and the employer is unable to prevent CWA members from being exposed to harmful levels (even after implementing engineering and administrative controls), the employer must provide the workers with the appropriate personal protective equipment. In addition to the provision of gloves, goggles, and clothing protection, the

employer must provide all exposed workers with an appropriate respirator. Workers should use all personal protective equipment as provided.

CWA members should practice good personal hygiene. This includes no smoking or eating in TDI work areas. In addition, members should not wear contaminated work clothing home. Rather, the employer should collect such clothing and arrange for it to be cleaned.

If skin contact with TDI occurs, the affected body parts should be washed with water for at least 15 minutes and all contaminated clothing should be removed. Then the affected area should be treated with rubbing alcohol and washed with soap and water. In turn, the affected worker(s) should notify her/his/their doctor about this incident.

If TDI gets in the eyes, they should be flushed with water for at least 15 minutes. After this treatment, the affected worker(s) should contact her/his/their physician.

If TDI is inhaled, the worker should be taken to fresh air and a doctor should be called immediately. Oxygen can be administered by trained personnel. If breathing has stopped, artificial respiration should be given.

OSHA Standard

The OSHA Standard sets the maximum or ceiling level of permissible TDI exposure at 0.02 parts per million (PPM) of air. If such exposure is exceeded, the employer must implement all necessary engineering and administrative controls to reduce exposure to safe levels. If the OSHA Standard is still exceeded, personal protective equipment must be provided. In addition, as noted, NIOSH has identified TDI as an (animal) carcinogen. Thus, the federal agency recommends that exposure to TDI be limited to the lowest feasible concentration.

What Can You Do?

The key to making the workplace safe for all CWA members is strong, active local safety and health committees. The committee can identify dangerous conditions at the workplace and discuss them with management. If the employer refuses to resolve the safety and/or health hazard(s), the committee can request an OSHA inspection. The committee should always coordinate its activities with the local officers, the CWA Representatives, and negotiated safety and health committees.

In addition, CWA members may obtain information and assistance by contacting the:
CWA Occupational Safety and Health Department
501 Third Street, N.W.
Washington, D.C. 20001-2797
Webpage: www.cwasafetyandhealth.org
Phone: (202) 434-1160.

Developed in 1979 and revised in 1991, 1994, 1998, 2000, 2002, 2004, 2009, 2013, and 2017.

