

Safety and health alert

54/99 Occupational asthma associated with exposure to isocyanates

Incident

A factory hand in a foam manufacturing factory developed a wheeze, cough and difficulty breathing after helping out in the polyurethane foam making area. The factory made large blocks of polyurethane foam or "buns". The process involved mixing resin and toluene diisocyanate (TDI) in an enclosed area. The mixture was poured into a mould and allowed to rise as a "bun". The factory hand's task was to help other employees push the mould down the process line. He was also involved in removing the foam buns from the moulds in order that they could be cured on racks in an open shed.

He was diagnosed with asthma which responded to medical treatment.

Factors

TDI belongs to a group of compounds known as isocyanates. These compounds are used as curing agents in the manufacture of polyurethane products such as foam, paints, coatings and plastics.

Polyurethane is used to manufacture some soft or rigid foams (used in furniture and insulation), spray painting (2 part polyurethane paints are commonly used in the automotive industry) or the manufacture of hard wearing plastics for items such as castors and rollers.

Commonly used isocyanates include toluene diisocyanate (TDI), 4,4 diphenylmethane diisocyanate (MDI) and hexamethylene diisocyanate (HDI).

Isocyanates can be 'monomeric' (ie consisting of a single molecule) or 'polymeric' (consisting of several molecules linked together). Monomeric forms are more volatile and therefore more likely to be breathed into the lungs as a vapour. However all forms of isocyanates are hazardous when breathed into the lungs whether in the form of vapour or in the form of droplets. A few molecules are sufficient to set off asthmatic reactions in sensitised persons.

Isocyanates including TDI are strong irritants of the eyes, mucous membranes and skin. Isocyanates are also potent sensitisers of the respiratory tract and can cause asthma-like symptoms in people or aggravate pre-existing asthma. Once sensitised, people may not be able to tolerate working in industries where isocyanates are used.

Because of this it is important to minimise exposure. TDI is particularly hazardous because it is more volatile than other common isocyanates. Great care needs to be taken when using TDI.

In summary:

1. The risks associated with the process had not been adequately assessed. Short term exposures experienced during the removal of buns from the moulds had not been considered.
2. Respiratory protection supplied by the employer was not appropriate for TDI vapours.



3. Employees had not received adequate instruction in the use of respiratory protection.

Recommendations

1. The risks from hazardous substances should be adequately assessed. This involves looking at potential exposures at all stages of the process. If uncertain about the risks expert advice may need to be obtained and atmospheric monitoring carried out.
2. Where practical, polymeric isocyanates should be used in preference to monomeric forms because of their lower volatility.
3. Where practical, the manufacturing process should be fully enclosed to prevent airborne vapours or droplets.
4. Where practical, the airborne concentration of isocyanate vapours or droplets should be maintained below the occupational exposure standard by using local exhaust ventilation.
5. Respiratory protection must be appropriate for the hazards encountered in the workplace. Advice should be obtained from the supplier.
6. Employees should be adequately trained in the proper use, storage and maintenance of respiratory protection.
7. Employees exposed to isocyanates should be provided with health surveillance of a type specified in Schedule 5.3 of the Occupational Safety and Health Regulations, 1996. Such health surveillance must be supervised by an Appointed Medical Practitioner and the results notified to the Occupational Health Physician, WorkSafe Western Australia.

Further Information

Further information can be obtained from the WorkSafe internet site www.worksafe.wa.gov.au, or by contacting customer service on 1300 307 877 or email: safety@docep.wa.gov.au.

Date: October 1999

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