

ELEMENTS OF INDUSTRIAL TOXICOLOGY

Magnesium is one of the light metals used as a construction material. In the early days of its industrial use, there were numerous laboratory reports that fine particles of magnesium, and particularly of magnesium alloys, left in wounds would react with the tissue fluid to produce bubbles of hydrogen gas that would cause severe tissue injury. It was stated that when the hydrogen was produced, magnesium hydroxide was also produced and acted as a moderately strong alkali to damage the tissue.

This reaction is theoretically possible and has been produced in experimental animals by imbedding magnesium powder beneath the skin. It was also seen occasionally a number of years ago when metallic magnesium clips were tried as substitutes for sutures in experimental surgery.

Nevertheless, there are no published reports of such tissue injuries from the industrial use of magnesium. The reason is not known, it may be that such injuries fail to develop or that the hazard is recognized and special care is taken to eliminate particles of the metal and its alloys from industrial injuries.

The magnesium ion is a normal constituent of a number of tissues, and a certain amount of magnesium in the diet is essential to life. Excessive amounts are known to be toxic, and injuries and deaths due to medical use of magnesium salts have been reported. There have been no reports of industrial intoxication from inhalation of magnesium metal powder or magnesium oxide.

Inhalation of freshly produced magnesium oxide fumes has caused metal fume fever, similar to the better known "zinc chills" or "zinc shakes" caused by inhalation of freshly formed zinc oxide fumes.

Heavy exposure to magnesium oxide is irritating to the eyes and nose and throat, but the material is not a severe primary irritant.

Finely powdered magnesium is a fire hazard, and severe injuries and deaths have occurred from ignition of powdered magnesium in the clothing of workers who have done hand grinding on magnesium alloys. Also, fires and dust explosions have occurred in exhaust systems carrying powdered magnesium from grinding operations.

Exhaust systems should go as directly as

possible to a dust separator which will remove the magnesium powder and trap it under water without permitting it to get into the main exhaust system. The wet powder from these dust collectors and turning-chips that are wet with coolant should be removed from the plant as soon as they are taken from the collecting equipment.

Workers in magnesium-grinding operations should be provided with and required to wear flame-resistant clothing.

Massive pieces of magnesium in the form of castings or machined work are not a severe fire hazard because they are hard to ignite. When once ignited, however, the metal in the massive forms will burn vigorously.

See Industrial Data Sheet 426 and *Hygienic Guide*.

Malathion (O,O-dimethyl dithiophosphate of diethyl mercaptosuccinate) is one of the organic phosphate insecticides. Like the others of its class, its principal toxic action on warm-blooded animals is its inhibition of acetylcholinesterase. It seems to be one of the least toxic of this type of insecticide. Inhalation of 5 ppm (56 mg per cu m) by dogs and guinea pigs produced no effects except tears and a slight decrease in the plasma cholinesterase activity.

Manganese is found in a wide variety of minerals. The dioxide is its most common inorganic compound and is used as a chemical intermediate, enamel additive, and drier.

The probability of contracting manganese poisoning is low, but the effects are severe—total disablement may result from a few months' exposure to high concentrations. This effect, however, is more likely to occur after prolonged and repeated exposures above 30 mg per cu m.

The main hazard is usually from the inhalation of manganese dioxide, which may produce neurological lesions. The symptoms are many and are similar to Parkinson's syndrome. Symptoms include weakness, instability, difficulty in walking, immobility of facial expression, monotonous and intermittent speech, spasmodic laughter, and other grotesque signs. Exposures to finely divided dusts of manganese dioxide may produce pneumonitis.

See Industrial Data Sheet 306 and *Hygienic Guide*.