

ELEMENTS OF INDUSTRIAL TOXICOLOGY

to an anesthetic with special affinity for the central nervous system. The first sign is usually exhilaration, followed by sleepiness, dizziness, vomiting, trembling, hallucinations, delirium, and unconsciousness.

The main first-aid requirements in acute poisoning are removal of the person to fresh air, inhalation of oxygen, and maintenance of bodily warmth.

Skin contact with benzene should be avoided, partly because like other powerful solvents it produces dryness and cracking of the skin, but primarily because it will almost certainly involve excessive inhalation of the vapor.

See Industrial Data Sheet 308 and *Hygienic Guide*.

Benzene hexachloride—see Hexachlorocyclohexane.

Benzyl chloride is a colorless liquid used in a variety of chemical syntheses. Its vapor is a potent irritant to the eyes, nose, and throat and may cause lung edema. The liquid may cause severe corneal injury.

Beryllium. Among the occupational diseases produced by beryllium, the first condition reported (in 1943) was an acute chemical pneumonitis, which occurred among workers exposed to beryllium compounds and was attributed largely to the fluorides.

A delayed reaction to beryllium, characterized as chronic and appearing as late as two or three years after the exposure which caused it, was reported some time later. Even more recently, it has been reported that the delay between last exposure to beryllium and the appearance of symptoms may be as long as ten years. This condition showed a granulomatous lesion of the lungs as the most striking effect, accompanied by general metabolic disturbances and anemia so that the individual had continuous weight loss and great weakness in addition to a chronic cough. A large number of cases of dermatitis attributed to beryllium and beryllium compounds have also been reported.

Although as recently as 1940 beryllium was thought to be reasonably harmless, it has since been declared that it is unquestionably a toxic agent and in such small quantities as to be among the most toxic chemically of all elements yet investigated. Acute effects have been brought about in

animals with beryllium in quantities in the order of millimicrograms. Field survey evidence shows that still smaller quantities may produce the chronic disease in human beings. "Safe" levels of beryllium exposure may ultimately be set well below one μg per cu m of air.

It has also been established that a worker may carry home enough beryllium compound on his clothes to result in illness in some member of his family.

Several investigators have demonstrated that the presence of fluorine contributes to toxic action of beryllium.

Recommendations issued by the Atomic Energy Commission for the control of beryllium hazards in atomic energy installations state as follows:

- 1 The implant atmospheric concentration of beryllium at beryllium operations should not exceed two μg per cu m as an average concentration throughout an eight-hour day.
- 2 Even though the daily average is within the limits of recommendation No. 1, no personnel should be exposed to a concentration greater than 25 μg per cu m for any period of time, however short.
- 3 In the neighborhood of an AEC plant handling beryllium compounds, the average monthly concentration at the breathing zone level should not exceed 0.01 μg per cu m.
- 4 An individual showing any sign of chronic berylliosis should be excluded from further exposure to beryllium compounds.
- 5 There is no reason to exclude women from employment in plants handling beryllium.
- 6 Preemployment and termination examinations, including chest radiographs, should be required of employees in beryllium plants.
- 7 Periodic chest radiographs should be made every six months on personnel exposed to beryllium.
- 8 Each individual exposed to beryllium should be weighed every two weeks, and if loss of weight is noted the reason for it should be determined.

See *Hygienic Guide*.

Boric acid has been used for many years as a mild disinfectant and a soothing and