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# *Toxicology of Drugs and Chemicals*

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vapor pressure of vinyl bromide, there should be no problem from ingestion incidental to industrial use. Single prolonged exposures may cause slight anesthesia. Repeated inhalation experience indicates that vinyl bromide is not highly toxic but overexposure may cause liver and kidney damage. A level of 50 ppm may be used for control purposes until a threshold limit value is recommended.

Undiluted vinyl bromide is slightly-to-moderately irritating to the eye. Direct contact with the liquid is capable of producing slight-to-moderate conjunctivitis which subsides in a day. Since rapid evaporation of the liquid can cause a frostbite-type injury, eye exposure may result in a burn depending on the extent of exposure.

Undiluted vinyl bromide is nonirritating to the intact or abraded skin if exposure is not excessive. Because of the rapid evaporation, frostbite-type injury can occur if exposure is excessive.

*Treatment:* In case of inhalation exposure, remove individual to fresh air. If breathing has stopped, start artificial respiration immediately. If eyes are contaminated with vinyl bromide, they should be flushed immediately with copious amounts of flowing water for at least 15 minutes.

### VINYL CHLORIDE (Chloroethylene; Chlorethene)

Pure vinyl chloride is a colorless gas at room temperature; its boiling point is 13.9°C. It has a sweetish odor. The vapor has little or no irritating effect. Six human subjects exposed to 4000 ppm for 5 minutes reported no effects; 12,000 ppm under the same conditions caused dizziness in two subjects, but no apparent difference in the reactions of the other four subjects. Two men exposed for approximately 3 minutes to 25,000 ppm experienced dizziness and disorientation as to space and the size of surrounding objects, and complained of a burning sensation in the soles of the feet.

Atmospheric exposure to 10% vinyl chloride produced deep narcosis in mice and rats, but no deaths. 30% concentrations killed these animals. Exposure of guinea pigs to 20% produced deep narcosis; but three of five guinea pigs survived exposures to 40% concentration. The principal pathological changes in animals dying from exposure were congestion with pulmonary edema and hemorrhagic degeneration of the liver and kidneys.

Thirty-one cases of hand disease were reported among 3000 workers involved in the manufacturing and polymerization of vinyl chloride. They complained of soreness and tenderness of the hands. The great majority were characterized by three factors: symptoms likened to those of Raynaud's phenomenon and acroosteolysis of the terminal phalanges. A few had no symptoms but had roentgenographic evidence of acroosteolysis. In some of the patients, there were external changes on the dorsal surfaces of the hands and forearms, a scleroderma-like appearance resembling changes that occur in scleroderma. Some had clubbing of the fingers. The disorder is believed to have resulted from a combination of physical injury, chemical irritation, and personal idiosyncrasy [R. H. Wilson et al. (1967)].

### VINYLPYRROLIDONE

Vinylpyrrolidone is a clear liquid miscible with water and having a boiling point of 95°C (400 mm Hg). The acute oral toxicity values are as follows: $LD_0$, 1.0 ml/kg; $LD_{50}$, 1.5 ml/kg; $LD_{100}$, 2.0 ml/kg. Skin tests indicate that this material is not a sensitizer nor a primary skin irritant.

*Treatment:* In case of contact with eyes, flush immediately with plenty of water.

### VITAMIN A (Oleovitamin A)

Vitamin A deficiency leads to degenerative changes of the cornea, iris and lens, to retarded growth in children, and changes in the skin.

Hypervitaminosis A is characterized by irritability, pruritus, headache, cracking of lips, diplopia, and low-grade fever. Symptoms that usually appear later include desquamation of the skin (carotenemia), hepatomegaly, enlargement of the liver, and swelling and tenderness of the long bones. Severe gastrointestinal symptoms experienced by arctic explorers who ate polar bear liver. One pound of this liver contains 1,000,000 IU of vitamin A. Acute

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Thirty-one cases of hand disorder have been reported among 3000 workers involved in vinyl chloride manufacturing and polymerization. These men complained of soreness and tenderness of the fingertips. The great majority were characterized by two common factors: symptoms likened to those ascribed to Raynaud's phenomenon and acroosteolysis of the distal phalanges. A few had no symptoms, but had the roentgenographic evidence of acroosteolysis. In several of the patients, there were external skin lesions on the dorsal surfaces of the hands and forearms, with a rope-like appearance resembling changes sometimes seen in scleroderma. Some had clubbing of the fingers. The disorder is believed to have resulted from the combination of physical injury, chemical insult, and personal idiosyncrasy [R. H. Wilson *et al.*, *JAMA* 201, 577 (1967)].

**VINYLPYRROLIDONE**

Vinylpyrrolidone is a clear liquid completely miscible with water and having a boiling point of 193°C (400 mm Hg). The acute oral toxicity for rats is as follows: $LD_0$, 1.0 ml/kg; $LD_{50}$, 1.5 ml/kg; $LD_{100}$, 2.5 ml/kg. Skin tests indicate that this material is neither a sensitizer nor a primary skin irritant.

*Treatment:* In case of contact with skin or eyes, flush immediately with plenty of water.

**VITAMIN A (Oleovitamin A)**

Vitamin A deficiency leads to night blindness, changes of the cornea, iris and lens, keratosis, reduced growth in children, and changes in tooth structure.

Hypervitaminosis A is characterized by anorexia, irritability, pruritus, headache, cracking and bleeding of lips, diplopia, and low-grade fever. Signs and symptoms that usually appear later include yellow coloration of the skin (carotenemia), loss of hair, enlargement of the liver, and swelling and pain over the ends of the long bones. Severe gastroenteric upsets were experienced by arctic explorers shortly after ingesting polar bear liver. One pound of this liver contains about 1,000,000 IU of vitamin A. Acute poisoning may occur