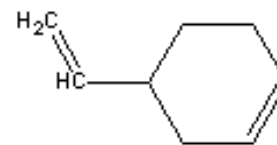


DRAFT - Factsheet on 4-VINYLCYCLOHEXENE

What is 4-Vinylcyclohexene?

In synthetic rubber manufacturing, 4-Vinylcyclohexene (4-VCH) can be found as a byproduct from the chemical processing of 1,3-butadiene (dimerization). 4-VCH is a colorless liquid in normal conditions with a strong odor. Worker exposure in synthetic rubber plants is from 4-VCH vapor in the air. The figure to the right shows the chemical structure of 4-VCH.



Is 4-VCH dangerous?

Workers exposed to 4-VCH have documented irritation of the skin, respiratory tract, and eyes. Exposure may cause headaches and other flu-like symptoms. Over an extended period of time, this chemical may cause damage to internal organs and the nervous system. 4-VCH is also a *suspect cancer-causing chemical*.

How are workers exposed to 4-VCH?

Typically, 4-VCH may be in the air that workers breathe. Also, the chemical can be absorbed through the skin. If 4-VCH is in a workplace, employers should perform air monitoring to determine if workers are exposed to too much 4-VCH.

Cancer & 4-VCH Exposure

4-VCH has been documented to cause cancer in animals (mice). Therefore, 4-VCH is classified as a potential human carcinogen. Although there is no research that definitively links 4-VCH exposure to human cancer cases, workers should exercise caution to limit exposure when this chemical exists in their workplace.

The term used for this type of potential cancer causing chemical is a class 2B (or group 2B) carcinogen. This classification comes from the International Agency for Research on Cancer (IARC). IARC is an agency of the United Nations' Work Health Organization. IARC has the responsibility to classify the cancer causing potential of materials used in the workplace. A class 2B compound possibly causes cancer in humans -- some evidence shows that it causes cancer in animals, but there is no evidence to prove that it causes cancer in people.

What is a CARCINOGEN?	
Carcinogen	A material is considered to be a carcinogen when it does or may cause cancer.
Cancer	Cancer is a disease that causes an abnormal growth of cells. The cancer cells attack the body and may spread to other parts of the body.

OTHER IARC 2B CARCINOGENS		
Lead (Inorganic)	Carbon Black	Methylene Chloride
Chloroform	DDT	Toluene-2,3-diisocyanate (TDI)
Styrene	Carbon Tetrachloride	Fiberglass
Gasoline	Hydrazine	Saccharin

Exposure Limits

The Occupational Safety and Health Administration (OSHA) is the governmental agency that is charged with protecting worker health and safety. OSHA sets permissible exposure limits (PELs) for chemical exposures. PELs are the maximum legal limit for worker exposure of the related chemicals. There is no OSHA permissible exposure limit (PEL) for 4-VCH.

The American Conference of Governmental Industrial Hygienists (ACGIH) is an independent group that sets recommended exposure limits called threshold limit values (TLVs). The ACGIH TLV for 4-VCH is 0.1 parts per million (ppm).

However, there is some controversy about the exposure limits for 4-VCH. Some occupational health professionals believe that the exposure limits were based on inaccurate scientific data and are too low. The United Steelworkers (USW) is currently reviewing these concerns.

Percent (%) by volume	vs. parts per million (ppm)
100%	= 1,000,000 ppm
50%	= 500,000 ppm
10%	= 100,000 ppm
1%	= 10,000 ppm
0.5%	= 5,000 ppm
0.05%	= 500 ppm
0.005%	= 50 ppm
0.0005%	= 5 ppm
0.0001%	= 1 ppm

What should be done about this chemical in our workplace?

Employers have a legal obligation to provide workers with a safe workplace. 4-VCH exposure, like other chemical exposures, should be controlled so that workers are not injured or made ill. The best way to control any health and safety hazard is to eliminate the hazard or use something less hazardous. If that can't be done, engineering controls (like exhaust ventilation and enclosing equipment) can control the hazard. Also, workers should be well informed about this chemical and the danger it poses to them. Finally, **if** there is no better way to control the hazard, then personal protective equipment (PPE) like eye protection, gloves, and in some cases chemical protective suits and/or respirators may be used to protect workers from the hazard.

Where can I get more information?

Your local union health & safety representatives and stewards are a good first step to have your questions answered. The USW's Health, Safety and Environment Department is also available as a technical resource if your local union needs help with this or other health and safety issues.