

PVC

Health and Safety

Answers to ten
questions most
often asked about
polyvinyl chloride

Q&A

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Since early 1974 vinyl chloride, the gaseous industrial chemical from which polyvinyl chloride (PVC) plastic is made, has been the subject of widespread misinformation and misunderstanding regarding questions of occupational, community and consumer health and safety.

Although a variety of erroneous and misleading impressions concerning vinyl chloride and PVC have been created in the public mind, the known facts, supported by extensive medical and technical research, are that:

- ▶ The development of angiosarcoma of the liver, a rare form of cancer, from long-term, high-level exposure to vinyl chloride has been confined exclusively to the occupational setting.
- ▶ There is no credible evidence linking vinyl chloride emissions with an excess number of angiosarcoma cases or an excess of birth defects among people living in communities surrounding vinyl chloride plants.
- ▶ There is no reasonable likelihood today of vinyl chloride getting into a consumer's diet from PVC food packaging materials and no hazard to the public from the use of finished PVC products.

Following are ten questions most commonly asked about vinyl chloride and health. Answers are based on known scientific evidence and industry experience.

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What is PVC and for what is it used?

Polyvinyl chloride, or PVC, is the second most widely used plastic resin in the United States. It is produced from vinyl chloride monomer (VCM), a gaseous industrial chemical, by a process called polymerization. The resin is, in turn, fabricated into a wide variety of consumer and industrial products, including pipe and conduit, floor tile, curtains, shoes, electrical insulation, telephone equipment, medical-surgical devices, phonograph records, food packaging, upholstery, umbrellas and raincoats, luggage and sporting goods. Approximately 2.2 million American jobs are directly or indirectly dependent on the PVC industry.

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How serious an occupational hazard is vinyl chloride?

Over the past 16 years there have been a total of 23 deaths from angiosarcoma in six U.S. plants and approximately 48 in other countries. In the U.S., all of the deaths were among workers heavily exposed to vinyl chloride monomer. The workers' jobs involved cleaning residue of PVC resin from the reactor in which it was produced. Their work thus resulted in high exposure to VCM over a period of many years. While some additional deaths can be expected to occur in the future as a result of these heavy past exposures, with the strict control measures instituted during the last few years there is every reason to believe that vinyl chloride-related disease has already been eliminated as an occupational problem.

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Does the current vinyl chloride standard adequately protect industry workers?

Yes. The results of numerous epidemiological studies show that the current exposure standard set by the federal Occupational Safety and Health Administration (OSHA) of one part per million averaged over an eight-hour period provides more than an ample margin of safety for industry employees. Vinyl chloride has been in use in industry for almost 40 years, and a sufficient number of workers have been exposed long enough to make epidemiological studies reliable indicators of the effects of VCM at various levels of exposure. In general, these studies show no excess of cancer nor any cases of angiosarcoma among workers exposed to low or intermediate levels (below 250 ppm) of vinyl chloride even if the exposure was extended over a long period of time.

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Is vinyl chloride a major air pollutant?

No. Measurements taken by the federal Environmental Protection Agency (EPA) in 1974 showed no scientific evidence that emissions from vinyl chloride facilities posed an imminent hazard to people living near the plants. EPA estimated that the average yearly concentration of vinyl chloride within five miles of uncontrolled PVC plants was only 17 parts per billion (17 ppb). However, the EPA in 1976, as a precautionary step, promulgated regulations

which would reduce even this insignificant level of community exposure to vinyl chloride by approximately 95 percent. Studies conducted for The Society of the Plastics Industry, Inc. (SPI) showed that the new regulations would theoretically reduce exposure levels within five miles of vinyl chloride plants to approximately two tenths of a part per billion (0.2 ppb) as a yearly average. All existing medical and technological data indicate that the standard promulgated in 1976 provides more than an ample margin of safety for people living in the vicinity of PVC plants.

Q Is there any special risk of getting angiosarcoma for people living in communities surrounding vinyl chloride plants?

A No. A government survey of all angiosarcoma deaths in the United States between 1964 and 1974 found no excess of deaths from this disease among people living within five miles of vinyl chloride monomer gas and PVC resin plants. The report concluded: "This survey has produced no evidence that living around vinyl chloride plants is a risk factor in the occurrence of liver angiosarcoma." Additional studies by industry, universities and research organizations confirmed this low risk. A professor at Harvard University, for example, has calculated that the risk of living within five miles of a PVC plant for one year is equivalent to the risk of contracting cancer from eating one half of a tablespoon of peanut butter or to the hazard of smoking one fifteenth of a cigarette.

Q Does vinyl chloride increase the risk of stillbirths and miscarriages among the wives of heavily exposed industry workers?

A No. While one 1976 research project at a single plant in Pennsylvania purported to show that such a risk may exist, serious scientific questions have been raised concerning the manner in which the study was conducted and the sweeping conclusions reached. Eminent scientists from the Harvard University Graduate School of Public Health and the University of

Texas Health Science Center, after reviewing the study on behalf of SPI, were highly critical of the analytical methods used. One termed the conclusions as "misleading" while the other called the data "worthless," the analysis "naive" and the test "inadequate and misleading." From a practical standpoint, since the original research was conducted, vinyl chloride exposure levels throughout the industry have been reduced a hundredfold or more. So even if a problem did exist, it has already been eliminated.

Q Does vinyl chloride cause birth defects in communities with PVC facilities?

A No. Because of a report from Ohio of excess birth defects in three widely separated communities with PVC facilities, the Center for Disease Control (CDC) of the U.S. Department of Health, Education and Welfare conducted three separate studies in 1975 and 1976 to examine the validity of the Ohio report. CDC concluded, on the basis of these investigations and a thorough analysis of the existing research data, that "no relationship between infants with malformations and parents' exposure to vinyl chloride could be established." In addition, a review conducted for SPI of the Ohio study by a noted Harvard scientist concluded that "the finding results from a combination of chance, reporting differentials and epidemiological gerrymandering." A recent Canadian study conducted in a manner similar to the Ohio report suffers from many of the same deficiencies. In short, there is no credible evidence that vinyl chloride causes birth defects in communities adjacent to PVC plants.

Q Is it safe to consume foods or beverages packaged in PVC?

A Yes. As a result of strenuous industry efforts over the past few years, the residual vinyl chloride content has been reduced dramatically in packaging products made from food-grade PVC resins. Therefore, there is no reasonable likelihood of vinyl chloride migration into foods from present packaging materials and no scientific evidence that vinyl chloride monomer can be found at any level in food products now packaged in PVC.

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Is it true that PVC, if burned, can release toxic fumes?

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Yes. All organic materials such as wood, paper, wool or cotton and PVC will burn in the presence of high heat or fire and will release toxic fumes. Being a compound of hydrogen, carbon and chlorine, PVC will release hydrogen chloride and carbon monoxide in a fire, both of which can be harmful if the exposure is high. However, PVC cannot burn on its own. Some outside source of heat is necessary. Fire is a problem of all organic materials. What is needed is a comprehensive approach to the problem, including increased use of fire detection and warning systems, installation of automatic sprinklers in commercial buildings, appropriate building codes and better education of the American public concerning action to take in case of fire.

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Should the manufacture and use of PVC be prohibited because of the health hazards?

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No. Vinyl chloride concentrations in the work place, in community air and in finished PVC products are today being rigidly controlled, and there is, therefore, no reason to ban the manufacture or use of any polyvinyl chloride product. From a public health standpoint such bans are completely unnecessary and would serve no meaningful purpose.

If you would like more detailed information on any of the material in this folder, or have additional questions you would like to have answered, please contact:

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