



Virginia Department of Health

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FREQUENTLY ASKED QUESTIONS ABOUT TRICHLOROETHYLENE (TCE)

What is trichloroethylene?

Trichloroethylene is a colorless, nonflammable liquid with a characteristic chloroform-like odor. It is practically insoluble in water and evaporates quickly. The most important use of trichloroethylene is the degreasing of metal parts in the automotive and metals industries. Trichloroethylene is used in many consumer products. Examples include typewriter correction fluids, paint removers, paint strippers, adhesives, spot removers, cleaning fluids for rugs, and metal cleaners.

How might I be exposed to trichloroethylene?

Most exposures to trichloroethylene occur in the workplace through breathing vapors or direct contact with the liquid. Exposure of the general public occurs mainly through breathing industrial emissions, drinking, swimming, or showering in water that has been contaminated, or using consumer products containing trichloroethylene. Low levels of trichloroethylene ranging from 0.25 to 0.31 parts per billion (ppb) have been detected in many drinking water samples throughout the United States. Trichloroethylene has been detected in ambient air at levels less than 1 part per billion (ppb). Trichloroethylene has been detected in small concentrations in many processed foods as a result of its use in cleaning equipment.

What happens to trichloroethylene when it enters the environment?

Most of the trichloroethylene released into the environment comes from its use to remove grease from metals. It can also enter the air and water when it is disposed of at waste sites. It evaporates easily, but can stay in the soil and in groundwater for a long time. It breaks down in the air in the presence of sunlight. Trichloroethylene present in surface waters or on soil surfaces evaporates into the air. It is highly mobile in soil and susceptible to leaching into the groundwater.

How does trichloroethylene get into and leave the body?

Trichloroethylene enters the body by breathing air or drinking water containing it. About half the amount breathed in gets into the bloodstream, the rest is breathed out. Most of ingested trichloroethylene is absorbed into the blood. If liquid trichloroethylene comes in contact with the skin, some of it can enter the body, although not as easily as by breathing or swallowing it. Once in the blood, the liver changes much of the trichloroethylene into other chemicals. The majority of these breakdown products leave the body in urine within a day.

How can trichloroethylene affect my health?

Inhaling trichloroethylene vapors at very high concentrations in occupational settings may cause irregular heart beat, heart functions failure, unconsciousness, and death. Inhalation of moderate amounts of trichloroethylene in occupational settings may cause headaches, dizziness, poor coordination, difficulty concentrating, facial numbness, and lung irritation. Consumption of alcohol and exposure to trichloroethylene at the same time can result in "degreaser's flush", a temporary redness and itching of the back, neck, and face. Long term occupational exposures at high concentrations may cause liver and kidney damage. Skin contact with high levels of trichloroethylene can cause skin rashes in some people.

How likely is trichloroethylene to cause cancer?

There is no conclusive evidence that trichloroethylene causes cancer in humans. However, studies in experimental rats and mice have shown increases in tumors of the lung, liver, kidney, testicular, and lymphoma following inhalation and oral exposure to trichloroethylene. Animals were given very high doses of trichloroethylene in these studies. The U.S. Environmental Protection Agency (EPA) does not classify trichloroethylene as a probable human carcinogen. However, scientific literature suggests that trichloroethylene is a likely human carcinogen.

(Over)

Are there any reproductive and developmental effects from exposure to trichloroethylene?

Despite limited reports of reproductive and developmental effects associated with trichloroethylene, no conclusive evidence has revealed a causal association between trichloroethylene exposure and developmental effects in humans. Although trichloroethylene has the ability to cross the placenta and possibly expose the fetus, fetal toxicity has not been observed in experimental animals. There are some reports of an increased number of children born with heart defects whose mothers consumed water contaminated with trichloroethylene for several years. However, these studies are not conclusive because other chemicals were also present in the water and may have contributed to these effects. Also, the levels of trichloroethylene in water were very high.

Is there a medical test to show whether I have been exposed to trichloroethylene?

Exposure to large amounts of trichloroethylene can be assessed by blood and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene. Recent exposure to trichloroethylene, can be detected through breath, blood, or urine tests. The breath test, if it is performed soon after exposure, can indicate exposure to relatively small amounts of trichloroethylene.

What is the air quality standard for trichloroethylene?

There is no indoor air standard. However, there are standards for workplace air. The Occupational Safety and Health Administration (OSHA) has established the permissible exposure limit (PEL) of 100 parts per million (ppm) trichloroethylene in workplace air. This limit is based on an eight-hour time-weighted average for a 40-hour workweek. A short-term exposure limit (STEL) has been established at 200 ppm for a 15-minute exposure.

What is the drinking water standard for trichloroethylene?

EPA sets the standards for public drinking water. These standards or limits are known as Maximum Contaminant Levels or MCLs. EPA has promulgated an MCL of 5 ppb in the public drinking water supply for trichloroethylene. This standard was derived based on its classification as a probable human carcinogen and based on the assumption that a person drinks 2 liters of water a day for 70 years. Consuming water with levels of trichloroethylene consistently above the MCL over a long period of time (many years) may increase the risk of adverse health effects, especially cancer. Based on extrapolation of data from animal studies and theoretical models, it is estimated that a lifetime exposure to drinking water containing trichloroethylene at 5 ppb may increase the risk of 2 additional cases of cancer in a population of one million people.

What does VDH recommend if high levels of trichloroethylene are found in drinking water?

VDH recommends installing a carbon filtration device to remove trichloroethylene contamination from drinking water.

Where can my physician or I get more information?

Virginia Department of Health, Division of Environmental Epidemiology, (804) 864-8182.

Agency for Toxic Substances and Disease Registry at <http://www.atsdr.cdc.gov/tfacts19.html>

U.S. Environmental Protection Agency Web site at <http://www.epa.gov/ttn/atw/hlthef/tri-ethy.html>

If you are interested in finding information on corrective measures to reduce trichloroethylene in drinking water, call the Virginia Department of Health, Office of Drinking Water at (804) 864-7500.

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