

Tetrachloroethylene (PCE)

Answers to Frequently Asked Questions

What is PCE?

Tetrachloroethylene (tet' ruh-klor' oh-eth' uh-leen), also known as perchloroethylene, PCE, or PERC, is a man-made liquid chemical not naturally found in the environment. It is nonflammable (does not burn) and has a sharp, sweet odor.

PCE is often used for dry cleaning clothes and removing grease from metal. It is also used to make other chemicals and can be found in some household products, like water repellents, silicone lubricants, spot removers, glues, and wood cleaner.

What happens to PCE in the environment?

PCE evaporates (changes from a liquid to a gas) easily into the air when it is used. It can also evaporate into the air if it is not properly stored or if it is spilled. In the air, PCE is broken down by sunlight or brought back down into the soil by rain.

PCE that spills or leaks into the ground can find its way into surface waters (like lakes, streams, and ponds) or soil, where it usually evaporates quickly. It can also leak through the ground and into groundwater (underground sources of drinking water). Some PCE in groundwater is broken down by microorganisms (tiny creatures like bacteria and fungi). PCE does not appear to collect in the bodies of fish or other animals that live in water.

How can PCE enter my body?

People can be exposed to PCE from household products, from dry cleaning industries or from dry-cleaned fabric, and from their occupation (work). Background levels (small traces of a chemical or substance) can be found in the air we breathe, in the water we drink, and in the food we eat. Breathing contaminated air and drinking contaminated water are the two most likely ways that PCE will enter a person's body.

Regardless of how it entered your body, most PCE leaves from your lungs when you breathe out within a few days. A small amount is changed into other chemicals by your liver and removed through urine.

Can PCE make me sick?

Contact with PCE can cause health problems. Whether you get sick from exposure to PCE depends on:

- How much you were exposed to (dose).
- How long you were exposed (duration).
- How often you were exposed (frequency).
- General health, age, and lifestyle. Pregnant women, babies and young children, the elderly, and people with chronic (on-going) health problems are more at risk.

Very high levels of PCE (especially in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, the inability to see colors correctly, difficulty in speaking and walking, passing out, and even death. If pure liquid PCE touches your skin often or for a long time, it can cause irritation.

Typical background levels of PCE will not cause these health effects.

How does PCE affect children?

There have not been enough scientific studies to know whether children are more at-risk of health effects from PCE exposure than adults. There is some proof that PCE exposure in pregnant mothers can cause birth defects in their babies, such as heart defects and cleft palate, but more studies are needed to confirm these results.



PCE is a chemical commonly used in dry-cleaning businesses. Bringing freshly dry-cleaned clothes or fabrics into your home can bring PCE into your home, as well. (Image source: Shutterstock)

Does PCE cause cancer?

The U.S. National Toxicology Program (NTP) lists PCE as “reasonably anticipated to be a human carcinogen”. This means that based on scientific proof, PCE likely causes cancer in humans.

PCE has been shown to cause liver tumors in mice and kidney tumors in male rats. There is limited scientific proof that PCE causes cancer in humans.

When scientists studied dry-cleaning workers who often used PCE, they found cancers of the esophagus (throat) and cervix, plus Non-Hodgkin lymphoma (a type of blood cancer). The workers may have also been exposed to other chemicals on the job, so it is difficult to say whether the PCE was responsible for causing their cancer.

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

The amount of PCE in your body can be measured through your breath, like the test to measure for alcohol. Because PCE is stored in the body’s fat and is slowly released into the bloodstream, it can be detected in the breath for weeks after a heavy exposure.

PCE and its by-products (other chemicals that are created when your body breaks down PCE) can be detected in the blood. These tests are simple to perform but are not available at most doctors’ offices and must be done at special laboratories that have the right equipment.

Some by-products of PCE are also created when your body breaks down other chemicals that are not PCE. This can make it difficult to tell from a medical test that measures these by-products whether they were created from exposure to PCE or exposure to another chemical.

Keep in mind that these tests may show the amount of PCE in your body, but they cannot tell you whether you will have health problems because of it.



(Image source: Wikimedia Commons)

How does the federal government protect my health from PCE?

The federal government develops regulations and recommendations to protect the public from the harmful effects of PCE.

Different agencies set guidelines for PCE in:

- Drinking Water. The U.S. Environmental Protection Agency (EPA) sets the maximum level of PCE in drinking water at 0.005 parts PCE for every million parts water (0.005 ppm, or 0.005 mg/L). The U.S. EPA recommends that, above this level, there is a danger of liver problems and a risk of cancer for people who are often exposed.
- Workplace Air. The Occupational Safety and Health Administration (OSHA) has set a limit of 100 parts PCE to every million parts workplace air (100 ppm) for employees working an 8-hour workday over a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that PCE be handled as a potential human carcinogen, and recommends that levels in workplace air be as low as possible.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2014. Toxicological profile for tetrachloroethylene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Report on Carcinogens, 14th Edition; U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program. 2016.

Where Can I Get More Information?

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