

Volatile Organic Compounds

Volatile organic compounds (VOCs) are a class, or group, of chemicals that evaporate easily. Exposure to certain VOCs may cause harmful health effects.

What are VOCs?

Volatile organic compounds (VOCs) are potentially hazardous gases that are emitted into the air from products or processes. Most VOCs have a strong odor that can be sweet and pleasant or foul and unpleasant. At room temperature, VOCs are usually a colorless gas.

VOCs are emitted, or released, by many common household products such as paints and stains, pesticides, new carpet, wood floors, cosmetics, and hairspray. VOCs are also released by gasoline, burning wood and other fuels, and by smoking cigarettes. Some common VOCs include:

- **Acetone**, found in nail polish remover, furniture polish, and some hobby chemicals.
- **Benzene**, found in paint, glue, and carpet. It also is released by gasoline and smoking cigarettes.
- **Formaldehyde**, found in flooring and some cosmetics.
- **Ethanol**, found in household cleaners and laundry detergents.
- **Naphthalene**, found in mothballs and other pesticides. It also is released by smoking cigarettes.
- **TCE**, found in degreasers, fabric cleaners, glues and markers.

For more information about individual VOCs, visit [ATSDR's Toxic Substances Portal: "Volatile Organic Compounds"](https://www.atsdr.cdc.gov/substances/) at www.atsdr.cdc.gov/substances/.

Can VOCs cause harmful health effects?

Yes, exposure to VOCs can cause a range of possible harmful health effects.

VOCs are a class of chemicals, not a single chemical. The health effects they could cause will depend on the exact exposure. Some VOCs are known to be highly toxic while others have no known health effects.

Because VOCs create strong odors, even relatively low levels can cause eye, nose and throat irritation, headaches, nosebleeds, fatigue (tiredness), nausea, and dizziness. Some people may experience an allergic skin reaction, such as itching, rashes or hives. People with asthma and other lung illnesses may have their conditions aggravated by exposure to VOCs.

Exposure to very high levels of VOCs may cause damage to the liver, kidney, or central nervous system (brain and spinal cord). High levels may also cause vision and memory problems.

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Do VOCs cause cancer?

Some VOCs are known carcinogens, meaning they can cause cancer in people. Others are suspected carcinogens, meaning they are thought to cause cancer in people, but more research is needed. For example:

- **Benzene** is known to cause leukemia, especially acute myelogenous leukemia.
- **Formaldehyde** is known to cause cancer of the nose and throat. It is suspected of causing leukemia.
- **TCE** is thought to cause kidney cancer.
- **Chloroform** may possibly cause cancer of the bladder, intestine, liver and kidney.
- **Naphthalene** may possibly cause throat cancer.

Do VOCs cause health effects in children?

Yes, children may have the same range of negative health effects that an adult might have.

Because children are still developing, they may have worse health outcomes after exposure to VOC chemicals than an adult. Also, children and babies often lower to the ground and may be closer to sources of VOC gases, such as carpet and wood flooring.

Pregnant woman exposed to VOCs or their unborn babies may also experience health effects, such as anemia or low birth weight. Chemicals may travel from the pregnant mother's body into the fetus.

How might I be exposed to VOCs?

Because VOCs are used in many household products, they are common in indoor air inside homes and businesses. VOC levels inside homes may be two to five times higher than in outdoor air.

A large amount of VOCs might be emitted, or released, when a spill occurs. Spilling a product such as gasoline or paint stripper causes lots of the VOCs to evaporate into the air. If this happens in an indoor area with poor fresh air circulation, the chemicals may be trapped inside for a long time.

Vapor intrusion may happen if there is a spill or release of chemicals containing VOCs near a home. When this happens, vapors in groundwater or soil move up into homes through cracks and imperfections in basements and crawl spaces. This contaminates the indoor air and exposes the residents of the home.

VOCs are usually gases at room temperature, so a person will most likely be exposed by inhaling fumes. VOCs are also used in many liquid products, such as cleansers, paint and cosmetics, so a person may also be exposed through skin contact or accidental swallowing when using these products.

I have been exposed to VOCs. Will I get sick?

Illness from exposure to VOCs known to cause health problems will depend on:

- **The amount** of chemical (dose) exposure.
- **How long** (duration) you were exposed.
- **How often** (frequency) you were exposed.

Personal factors, such as your age and overall health, may also determine whether or not you will get sick.

How can I protect myself from VOCs?

Remove sources of VOCs from the home when possible. Consider removing things such as carpeting or furniture pieces and replacing them with products made with low or no VOCs.

Avoid or limit use of products with high VOCs. Look for products like cleansers, paint and building supplies that have "Low VOCs" or "Very Low VOCs" on the label.

Look for alternative products that are made without VOCs. Look for products that have "No VOCs" or "Zero-VOC" on the label.

Use good ventilation (airflow) when using products that emit VOCs. Open the windows or the fresh air intake on your heating or cooling system when using products that produce high levels of VOCs, such as when you're painting a room or using nail polish remover. If it's possible, do the activity outdoors.

Store products that emit VOCs in well-sealed, clearly labeled containers outside of the home. Store products like paint, stains, pesticides, and glues in well-sealed, clearly marked containers in non-living areas of the home, such as in a shed or in the garage. Always keep out of the reach of children and pets.

Avoid smoking. In addition to releasing VOCs in your home, smoking is known to cause lung cancer and other health issues. For help with quitting, call the Ohio Tobacco Quit Line at 1-800-QUIT-NOW.

Consider using an air purifying unit. Common household items may emit VOCs for a long time, so using an air purifying unit (APU) can help reduce the amount of vapors in your indoor air. Based on U.S. Environmental Protection Agency (EPA) recommendations, choose an APU with an activated carbon filter or other absorbent filter designed to remove gases. Research has not yet shown whether filtering technologies like plasma or ultraviolet (UV) light can remove gases. For more information on home air filtration, review [U.S. EPA's Guide to Air Cleaners in the Home, 2nd Edition](#) at www.epa.gov/indoor-air-quality-iaq.

Reduce VOCs in your home by removing sources of VOCs and choosing low-VOC or no-VOC products.

For more information about chemical exposures and your health, visit the Bureau of Environmental Health and Radiation Protection, Health Assessment Section webpage at odh.ohio.gov/has.

Contact the ODH Health Assessment Section at BEH@odh.ohio.gov or by calling 614-728-9452.