

INDOOR AIR POLLUTION

Is indoor air pollution really a health threat?

Very much so. Pollutants in indoor air may pose a greater threat to health than those in outdoor air do. Some modern school buildings with sealed windows have been closed because of complaints by students, faculty, and staff of burning eyes and lungs (the so-called sick building syndrome). The short-term effects of breathing polluted indoor air are eye irritation, headache, dizziness, nausea, sleepiness, and poor concentration.

Indoor air pollutants have many sources. They may be sucked in from the outside by the ventilation system. Building materials sometimes release pollutants that circulate indoors. Building maintenance workers may use solvents and other irritating chemicals that are recirculated in the air because of inadequate ventilation. Indoor activities such as smoking, sweating, and just plain breathing can release air pollutants like methane, carbon dioxide, contaminated water, and particulates into a limited indoor air supply.

Modern construction techniques have promoted the use of materials that can give off such noxious fumes as formaldehyde from foam insulation and radon (a disintegration product of radium) from concrete. Other materials such as asbestos, pesticides, fiberglass dust, carpet adhesives, wall insulation, plywood, and particleboard can all release dangerous airborne chemicals if they are improperly used.

Wouldn't indoor air pollution have a noticeable odor?

We often think of air pollution as causing unpleasant odors. However, the worst pollutants very often can not be smelled at all, even at fatal levels. Every winter people are killed when their malfunctioning space heaters spew carbon monoxide into an unventilated room. These heaters should be checked annually to ensure that they are functioning correctly, and they should not be operated without proper ventilation.

Carbon monoxide is an invisible, odorless gas that can accumulate when there is inadequate ventilation, or a lack of oxygen to replace the oxygen consumed by the heating system. It is also produced by automobiles, but it is nearly impossible for it to accumulate outdoors to a level that will cause asphyxiation. Carbon monoxide can kill because in high concentrations (for example, in a house), it displaces oxygen in red blood cells. The red blood cells can no longer deliver oxygen to the brain or other tissues. Low concentrations of carbon monoxide displace only some of the oxygen in the red blood cells. This results in relatively minor symptoms like the headache and irritability caused by outdoor smog.

Inhaled particulates of asbestos lodge in the lung and can be transported to the lymph nodes, resulting in a fatal degenerative lung disease called asbestosis and a virulent cancer called mesothelioma. Cigarette smoking combined with asbestos exposure multiplies the risk of dying of cancer 54 times.

The cost to remove asbestos insulation from over 14 thousand of the nation's schools has been estimated by the government at 1.4 billion dollars! It has also been estimated that over 100 thousand persons have already died from asbestos exposure. Even if every shred of asbestos could be eliminated from now on, there would still be 350 thousand deaths in the next 10 years from previous exposure.

The major problem in the home, however, comes from combustion gases, particularly carbon monoxide, nitric oxide, and smoke from tobacco, kitchen stoves, heaters, wood stoves, and fireplaces. When these are combined with inadequate ventilation, especially in the winter months, the result can be poisonous air.

Other problems develop when air-conditioning units are not properly maintained. Microbes growing on the filter can spread throughout a building. When this happened in Philadelphia at the 1976 American Legion convention, a mysterious form of pneumonia, later called Legionnaires' disease, was fatal to some of the conventioners. The causative bacterium was named *Legionella pneumophila*.

Indoor air pollution can be created by the improper use or overuse of cleaning solvents, floor waxes, furniture polish, bathroom cleaners, and room deodorizers.



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When you use these products, be sure to open all windows and provide good ventilation with a fan.

Other sources of indoor air pollution are the indiscriminate use and storage of pesticides, herbicides (weed killers), cleaning fluids, paints, and solvents. People who work regularly with chemicals such as paints and solvents suffer increased rates of leukemia and other types of cancer.

If you use a bug bomb to rid your room or apartment of fleas left by a previous occupant's cat, follow the instructions very carefully. If you are applying pesticides or herbicides to the garden, use protective gloves to avoid absorbing these substances through the skin, and don't breathe the fumes. Simply mishandling the liquid bleach you use in your laundry or swimming pool can result in permanent lung damage from inhaling chlorine gas fumes.

You need only read the labels on the containers under the sink to discover you have a great number of very poisonous chemicals right there. Here is a list of common household aerosol spray products and a few of their ingredients:

- Furniture polish - dinitrobenzene, 1,1,1-trichloroethylene, petroleum distillates, silicone, wax morpholine
- Spot remover - perchloroethylene
- Oven cleaner - sodium hydroxide, hydroxyethyl cellulose, polyoxyethylene fatty ethers
- Drain cleaner - 1,1,1-trichloroethylene, petroleum distillates
- Disinfectant - phenol, cresol
- Chlorine bleach - 4-chloro-2-cyclopentylphenol, diethanolamidolauric acidamide
- Tile cleaner - tetrasodiummethylenediamine
- Prewash treatment - perchloroethylene, petroleum distillate
- Window cleaner - sodium nitrite, isopropyl alcohol, ethylene glycol, ammonium hydroxide
- Disinfectant spray - trisopropanolamine morpholine
- Air freshener - propylene glycol morpholine, ethanol
- Deodorant spray - hydrated aluminum chloride, isopropyl myristate talc, triglycerides
- Hair spray - vinyl acetate copolymer resins, polyvinylpyrrolidone resins, ethanol, lanolin
- Shaving foam - stearic acid, triethanolamine, menthol, glycerol

The indoor use of these sprays as well as many common paint sprays, insecticides, plant sprays, and pet sprays can result in the buildup of acute toxic levels in a very short time. Aerosols should be used with extreme caution. Very often these chemicals miss their targets when sprayed and mix with dust to be recirculated by the ventilation system if they are used indoors.

In office buildings and schools, the innocuous-looking copying machine can be the source of ammonia or methanol fumes or of ozone. The photocopier should be well ventilated directly to the outside.

By far the most difficult indoor air pollutant to control or eliminate is tobacco smoke. Smoke subsides very slowly and is adsorbed on nearly all indoor surfaces, causing it to linger for days. The heavier components of smoke penetrate furniture, clothing, bedding, carpets, and drapes and cannot be completely removed. The negative effects of smoking are so strong that smokers who live in unpolluted areas still have a four times greater incidence of respiratory and circulatory diseases than do nonsmokers who live in the most polluted areas of the world.

Recent studies have demonstrated that passive smoking, or breathing air that is contaminated by the smoke of others, is a significant health risk. A study in Japan found that the nonsmoking spouses of men who smoked died from lung cancer at twice the rate of other nonsmokers. According to the 1979 surgeon general's report, smoking is related to 350 thousand deaths a year in the United States, nearly one out of five deaths. If you are a nonsmoker, it would be wise not to tolerate smoking in your indoor environment. If you are a smoker, do your friends and associates a favor and smoke outside.

