

# OZONE GENERATORS THAT ARE SOLD AS AIR CLEANERS

## Introduction

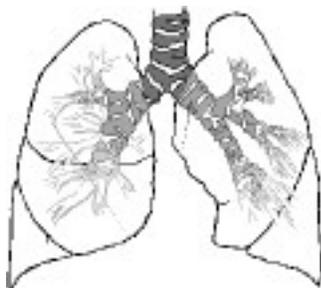
Ozone generators that are sold as air cleaners intentionally produce the gas ozone. Often the vendors of these ozone generators make statements and distribute material that lead the public to believe that these devices are always safe and effective in controlling indoor air pollution. For almost a century, health professionals have refuted these claims.

## What Is Ozone?

Ozone is a molecule composed of three atoms of oxygen -- the oxygen molecule we breathe that is essential to life has only two. Many of us are familiar with ozone as a hazardous outdoor air pollutant in large cities. While ozone can usually be found at low levels in indoor and outdoor air, harmful levels of ozone can be formed in the atmosphere through the interaction of sunlight with certain chemicals emitted to the environment (such as automobile emissions) and by high voltage discharges in some electrical equipment. Because ozone is reactive, it can change the chemical composition of many materials and substances, often in a destructive way. Manufacturers of ozone generators rely on this characteristic to support their claims of the benefits of the devices.

## How Is Ozone Harmful?

***Whether in its pure form or mixed with other chemicals, ozone can be harmful to health.*** The same chemical properties that allow high concentrations of ozone to react with organic material outside the body give it the ability to react with similar organic material that makes up the body, and potentially cause harmful health consequences. When inhaled, ozone can damage the lungs. Relatively low amounts can cause chest pain, coughing, shortness of breath, and throat irritation. Ozone may also worsen chronic respiratory diseases such as asthma and compromise the ability of the body to fight respiratory infections. People vary widely in their susceptibility to ozone. Healthy people can experience breathing problems when exposed to ozone. The elderly, families with children, and people with respiratory diseases such as asthma are the most susceptible to the toxic effects of ozone, and are among the most likely to be interested in using an indoor air cleaner. Recovery from the harmful effects can occur following short-term exposure to low levels of ozone, but health effects may become more damaging and recovery less certain at higher levels or from longer exposures.



Manufacturers and vendors of ozone devices often use misleading terms to describe ozone. Terms such as "energized oxygen" or "pure air" suggest that ozone is a healthy kind of oxygen. Ozone is a toxic gas with vastly different chemical and toxicological properties from oxygen. Several federal agencies have established health standards or recommendations to limit human exposure to ozone.

## Are Ozone Generators Effective In Controlling Indoor Air Pollution?

***Available scientific evidence shows that, at concentrations that do not exceed public health standards, ozone is generally ineffective in controlling indoor air pollution.*** The concentration of ozone would have to greatly exceed health standards to be effective in removing most indoor air contaminants. In the process of reacting with chemicals indoors, ozone can produce other chemicals that themselves can be irritating and corrosive. Furthermore, if used at concentrations that do not exceed public health standards, ozone applied to indoor air does not effectively remove viruses, bacteria, mold, or other biological pollutants.

## If I Follow Manufacturers' Directions, Can I Be Harmed?

**Some studies show that ozone concentrations produced by ozone generators can exceed health standards even when one follows manufacturer's instructions.** There are many brands and models of ozone generators on the market. They vary in the amount of ozone they can produce. In many circumstances, the use of an ozone generator may not result in ozone concentrations that exceed public health standards. But many factors affect the indoor concentration of ozone so that under some conditions ozone concentrations may exceed public health standards.

## Why Is It Difficult To Control Ozone Exposure With An Ozone Generator?

**Many factors affect ozone concentrations** including the amount of ozone produced by the machine(s), the size of the indoor space, the amount of material in the room with which ozone reacts, the outdoor ozone concentration, and the amount of ventilation. These factors make it difficult to control the ozone concentration in all circumstances.

The proximity of a person to the ozone generating device can also affect one's exposure. The concentration is highest at the point where the ozone exits from the device, and generally decreases as one moves further away.

Manufacturers and vendors advise users to size the device properly to the space or spaces in which it is used. Unfortunately, some manufacturers' recommendations about appropriate sizes for particular spaces have not been sufficiently precise to guarantee that ozone concentrations will not exceed public health limits. Also, using a more powerful machine increases the risk of excessive ozone exposure.

## What Other Methods Can Be Used To Control Indoor Air Pollution?

**The public is advised to use proven methods of controlling indoor air pollution.**

The three most common approaches to reducing indoor air pollution, in order of effectiveness, are:

- ♣ Source Control: Eliminate or control the sources of pollution;
- ♣ Ventilation: Dilute and exhaust pollutants through outdoor air ventilation, and
- ♣ Air Cleaning: Remove pollutants through proven air cleaning methods.

Of the three, the first approach--source control--is the most effective. This involves minimizing the use of products and materials that cause indoor pollution, employing good hygiene practices to minimize biological contaminants (including the control of humidity and moisture, and occasional cleaning and disinfection of wet or moist surfaces), and using good housekeeping practices to control particles.

The second approach--outdoor air ventilation--is also effective and commonly employed. Ventilation methods include installing an exhaust fan close to the source of contaminants, increasing outdoor air flows in mechanical ventilation systems, and opening windows, especially when pollutant sources are in use.

The third approach--air cleaning--is not generally regarded as sufficient in itself, but is sometimes used to supplement source control and ventilation. Air filters, electronic particle air cleaners and ionizers are often used to remove airborne particles, and gas adsorbing material is sometimes used to remove gaseous contaminants when source control and ventilation are inadequate.

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This fact sheet has been created for the H.E.L.P. for Kids Project.

The information contained in this informational fact sheet has been derived from the U.S. EPA document "Ozone Generators That Are Sold As Air Cleaners: An Assessment of Effectiveness and Health Consequences". The complete EPA document can be ordered from the U.S. EPA's Indoor Air Quality Information Clearinghouse (IAQ INFO), PO Box 37133, Washington D.C. 20013-7133, or by phone 1-800-438-4318.

