

## Ozone (O<sub>3</sub>)

Ozone or trioxygen (O<sub>3</sub>) is a triatomic molecule, consisting of three oxygen atoms. It is an allotrope of oxygen that is much less stable than the diatomic oxygen, O<sub>2</sub>. Ground-level ozone is an air pollutant with harmful effects on the respiratory systems of animals or humans. The ozone layer in the upper atmosphere filters potentially damaging ultraviolet light from reaching the Earth's surface. It is present in low concentrations throughout the Earth's atmosphere. Ozone has many industrial and consumer applications.

### **Where does ozone come from?**

Ozone is produced by ultraviolet light from the Sun hitting the Earth's atmosphere (especially in the ozone layer), lightning and as a byproduct of other types of pollution.

Certain electric devices (such as air ionizers) can also produce ozone. Ozone generators that are sold as air cleaners intentionally produce the gas ozone. Often the vendors of 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.

### **Why measure ozone ?**

Ozone can be "good" or "bad" for people's health and for the environment, depending on its location in the atmosphere. The stratosphere, or "good" ozone layer extends upward from about 6 to 30 miles and protects life on Earth from the sun's harmful ultraviolet (UV) rays. In the troposphere, the air closest to the Earth's surface, ground-level or "bad" ozone is a pollutant that is a significant health risk, especially for children with asthma. It also damages crops, trees and other vegetation. It is a main ingredient of urban smog.

Ozone is highly volatile and is not likely to remain present in a building unless an ozone generating device is operating, therefore you may not need to test for indoor ozone during an IAQ Building Assessment. If you suspect high concentrations of outdoor ozone, you may want to test for ozone outdoors. Ozone gas from outdoors may enter the building and react with other building materials (as an oxidant) to produce secondary out-gassing products which are also irritants or potentially unsafe.

A study conducted by the U.S. Department of Energy's Lawrence Berkley National Laboratory has discovered that as ozone levels rise outside so does the incidence of sick building syndrome. The indoor concentrations of sensory irritants such as formaldehyde, and organic acids, including pentanal, hexanal and nonanal, increased with rising outdoor ozone as well.

### **How do I measure ozone ?**

If you are going to measure ozone, there are a variety of meters for measuring ozone. You can Google “ozone meters” for a selection of meters. Pick a meter based on your needs and budget. You can Google “passive ozone measurement” for alternative measurement devices.

### **What are normal levels that I might find?**

Ozone is highly reactive and volatile and will not last long in an indoor environment.

### **What standards are there for ozone ?**

The EPA has not established standards for ozone in indoor air, however ozone is a criteria pollutant and an outside standard has been established. The outdoor air quality standard for ozone is 0.075 ppm over an 8 hour average. (To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.)

Occupational Safety and Health Administration (OSHA) established a Permissible Exposure Limits over an 8-hour, time-weighted average value of 0.1 ppm.

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 62.1-2007 recommends ozone be limited to 0.08 ppm.