

# Total Volatile Organic Compounds

## Air Quality Monitoring

Total Volatile Organic Compounds (TVOCs) refer to a broad range of organic chemical compounds, many of which are harmful to human health and the environment. These compounds are characterized by their high vapor pressure, which leads to their volatility under normal indoor atmospheric conditions. TVOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects.



TVOCs can originate from a variety of sources. They are commonly found in products we use daily, including paints, cleaning supplies, pesticides, building materials, furnishings, adhesives, air fresheners, and even certain types of textile. They can also be produced by activities such as cooking, smoking, or using wood-burning stoves. Industrial processes, wildfires and vehicle emissions are significant outdoor sources of TVOCs.

### How It Works

TVOC sensors work by detecting the presence and concentration of these compounds in the air. Particles Plus® air quality monitors use high quality photoionization detector (PID) sensors. This type of sensors use ultraviolet light to ionize the TVOCs in the air. When the compounds are ionized, they release electrons, which generate an electric current. The sensor measures this current to determine the concentration of TVOCs in the air.

### Common VOCs That Can Impact Human Health

- **Formaldehyde:** This is commonly found in resins used in the manufacture of composite wood products like hardwood plywood, particleboard, and fiberboard. It's also in building materials, insulation, and cigarette smoke. Exposure can cause irritation of the skin, eyes, nose, and throat. High levels of exposure may cause some types of cancers.
- **Benzene:** This VOC is found in tobacco smoke, stored fuels, and exhaust from cars. It's used in the manufacture of plastics, resins, synthetic fibers, rubber, dyes, detergents, drugs, and pesticides. Long-term exposure can lead to harmful effects on the bone marrow and can cause a decrease in red blood cells, leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection.
- **Toluene:** This is used in a variety of products, including paints, chemical reactants, rubber, printing ink, adhesives, lacquers, leather tanners, and disinfectants. Exposure can result in tiredness, confusion, weakness, memory loss, nausea, loss of appetite, and hearing and color vision loss. In severe cases, it can cause kidney or liver damage.
- **Ethylene Glycol:** This is used in antifreeze and de-icing solutions for cars, airplanes, and boats. It's also used in hydraulic brake fluids and inks used in stamp pads, ballpoint pens, and print shops. Exposure can cause a variety of harmful effects, such as breathing problems, nausea, vomiting, diarrhea, and even kidney damage.
- **Xylene:** This is used as a solvent in printing, rubber, and leather industries. It's also found in small amounts in airplane fuel, gasoline, and cigarette smoke. Exposure can lead to headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance.

Understanding TVOCs and their impact is crucial when working with products or services related to air quality, health, and environmental sustainability. It's essential to communicate the benefits of products like TVOC sensors effectively, emphasizing their role in improving indoor air quality and protecting health. This can be achieved by using data-driven strategies to highlight the prevalence of TVOCs and the potential health risks they pose, thereby demonstrating the value and necessity of such products.



### 8000 Air Quality Handheld Series

The Particles Plus® 8301-AQM2 Series Handheld Particle Counter and Environmental Monitor measures 0.3 to 25 µm particles with mass concentration and stores indoor air quality measurements of temperature, relative humidity, CO<sub>2</sub>, and TVOC. This instrument is the most versatile handheld Air Monitor available, with advanced power management and the industry's first sleep mode, allowing for battery operation of periods that can exceed a month on a single charge. The AQM Series can be used as a stand-alone battery operated instrument or it can be easily integrated into a building automation and facility monitoring system via Ethernet, USB or (optional) Wireless 802.11 b/g, RS485 or RS232 connection.

### 7000 Air Quality Benchtop Series

The Particles Plus® 7301-AQM2 Series Benchtop Particle Counter and Environmental Monitor measures 0.3 to 25 µm particles with mass concentration and stores indoor air quality measurements of temperature, relative humidity, CO<sub>2</sub>, and TVOC. This instrument is the most versatile benchtop Air Monitor available, with advanced power management and the industry's first sleep mode, allowing for battery operation of periods that can exceed a month on a single charge. The AQM Series can be used as a stand-alone battery operated instrument or it can be easily integrated into a building automation and facility monitoring system via Ethernet, USB or (optional) Wireless 802.11 b/g, RS485 or RS232 connection.



### 5000 Air Quality Remote Series

The Particles Plus® 5301-AQM2 Remote Air Quality Monitor measures and displays particle mass concentrations for PM<sub>1.0</sub>, PM<sub>2.5</sub>, PM<sub>5.0</sub> and PM<sub>10</sub> including temperature, relative humidity, CO<sub>2</sub> and TVOC. This wall-mounted instrument is the most versatile remote air quality monitor available for fixed installations. The advanced power management and the industry's first sleep mode, allows for long intervals between samples over extended and unattended operations. The AQM Series can easily integrate into a building automation and facility monitoring system via Ethernet, USB or (optional) Wireless 802.11 b/g, RS485 or RS232.

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