Application Note AT-100

General Air Treatment Notes

(Overview)

Ozone is the second most powerful oxidant. It is widely used to supplement or replace chlorine in a variety of processes including water treatment. Oxidants kill microorganisms and precipitate various chemicals. Water treatment applications include public water supplies, bottled water, waste water, laundry and car wash water (to reduce the amount of heating and soap needed), swimming pools, and aquariums. Ozone generators for water injection are often quite powerful, so leaks in their piping systems can be immediately hazardous to health. Eco Sensors instruments are widely used to monitor workplace ozone levels.

Another large application for ozone is treatment of air for indoor air quality (IAQ) often done through the building's heating and air conditioning (HVAC) system. The air is made odor-free and fresh. Typical current applications include bars, restaurants, casinos, meeting rooms, hotel rooms, airport facilities, other public places, and homes. Ozone carefully applied in these applications can be very effective in reducing VOCs (but not particulates which require filters), but the chemistries involved are not yet well understood nor widely published so the approach is not fully supported by some authorities. Nevertheless, if the ozone concentration is kept at a safe level (say below .05 ppm), this approach is probably healthier than chemical treatments such as using *air fresheners*. Eco sensors instruments are used for area ozone level studies, fixed concentration monitors, and ozone generator controllers much like a thermostat would control a furnace.

Ozone is also used in plant growing, preserving fruits and vegetables from microorganisms, providing a healthier environment for raising pigs, chickens and other animals, for etching and cleaning semiconductors, experimental applications in medicine, and other areas. Very little is yet published about procedures and results.

Our instruments are also used to measure ozone given off by processes such as electric power generation and plastic film treatment.

Why It Is Important To Measure Ozone At Various Points In The Room:

Ozone concentrations can vary greatly at various locations, and the concentrations are often highest in unexpected places. Key points to consider are:

- Ozone is much heavier than air and tends to sink to lower levels.
- Ozone has a low vapor pressure and so it does not try to fill the room uniformly. It tends to stay where it is.
- Ozone tends to cling to rough surfaces such as fabrics and breaks down (converts back to oxygen) when passing through restricted and obstructed passageways.
- Ozone reverts back to oxygen with a *half life* (time to go to half of its original concentration) typically of 10-30 minutes.
- Ozone can be confused by instrumentation with other oxidizing gases such as chlorine compounds, acid fumes, and oxides of

nitrogen (NOx). Strong *reducing* gases, such as vapors of alcohol and solvents, can reduce the apparent concentration of ozone.

- Ozone has a sweet smell, but the odor threshold varies widely by the person and by ambiental conditions. Therefore *smell* is not a reliable test for the presence or concentration of ozone.

The important measurement is:

What is the ozone concentration at the breathing level where room occupants will be?

For ozone introduced via HVAC systems with good room air circulation, the alternate point of measurement is near the entrance to the return air duct.

Allowable Ozone Levels

The allowable concentration of ozone in the workplace usually ranges from .05 to .10 ppm depending on the time of exposure and the regulatory agency involved. Most installations are programmed to keep the ozone concentration below .05 ppm.