

AirSource Technology Glossary

Below are terms relevant to understanding the technology behind AirSource® and indoor air pollution in general.

Advanced Oxidation Process	IAQ/IEQ	Photohydroionization™*
Antimicrobial	Indoor Air Pollution	Photohydroionization Module
Bacteria	Ion	Photocatalytic Oxidation
Bacteriostatic	Ionization	Superoxide Ion
Catalyst	Ionizer	Tri-metallic Catalyst
Corona Discharge	Microbes	Toxin
Electron Generation	Microbial	UL Certification
Electro-magnetic Field	Microorganism	Ultraviolet (UV) Light
EPA	Mold	VOCs
FDA	MVOCs	
Fungi	Mycostatic	
Gas/Gases	Mycotoxin	
HEPA	Needlepoint Ionization	
HVAC	Ozone	
Hydroperoxides	Particulate	

ADVANCED OXIDATION PROCESS: An advanced state of oxidation typically employing a photocatalyst to enhance an oxidant, such as oxygen. Oxidation is a chemical reaction in which an oxidant breaks down a contaminant. Oxidation always occurs simultaneously with reduction, in which another chemical gains the electrons lost from the oxidized chemical.

ANTIMICROBIAL: Destroying or inhibiting the growth of microorganisms.

BACTERIA: (plural of bacterium) Bacteria are microscopic unicellular prokaryotic organisms characterized by the lack of a membrane-bound nucleus and membrane-bound organelles. They are remarkably adaptable to diverse environmental conditions. Bacteria are found in the bodies of all living organisms and on all parts of the earth.

BACTERIOSTATIC: Inhibiting the growth and reproduction of bacteria.

CATALYST: Substance that can cause a change in the rate of a chemical reaction without itself being consumed in the reaction; the changing of the reaction rate by use of a catalyst is called catalysis.

CORONA DISCHARGE: Corona can be defined as a type of localized discharge that results from high, non-uniform electric fields. It causes deterioration of the insulator and sometimes causes complete breakdown. A corona discharge is capable of producing oxides of nitrogen, which are pollutants, and generates electromagnetic radiation that may disturb radio and TV reception. The obvious ways to detect a corona are by sight

and sound. At high voltages, corona produces visible light and audible noise. Corona can also be detected by using various types of measuring equipment. When observed, corona may appear as a faint glow. (AirSource units do NOT use corona discharge. Rather, they use an ultraviolet lamp to produce light energy as a photocatalyst. While powerful enough to create the advanced oxidation process, the UV lamp does not create oxides of nitrogen that can be irritating to the lungs and eyes.)

ELECTRON GENERATION: The proprietary technology in the AirSource 3000 for reducing particles from the air. The Electron Generator produces an expanding negative electrostatic field. As particles that have an excess positive charge pass through the field, they will pick up negative charges until the particles are at a neutral state. When this is accomplished, the particles will not repel other like-charged particles next to them and will be drawn by gravity to the nearest horizontal surface where they can be vacuumed or swept up.

ELECTRO MAGNETIC FIELD (EMF): Electrostatics tells us that there is an electric field surrounding a stationary charge. Magnetostatics tells us there is a magnetic field when there is a steady current. In general, when charges move in a non-steady manner, the electric and magnetic fields that surround them also change in a non-steady manner. The disturbances of the "electromagnetic field" travel outward from the "moving source" at the speed of light.

The AirSource 3000 does NOT produce an electromagnetic field. It only produces an electrostatic field that shares electrons with the surrounding air.

ENVIRONMENTAL PROTECTION AGENCY (EPA): Agency of the U.S. government, with headquarters in Washington, D.C. It was established in 1970 to reduce and control air and water pollution, noise pollution, radiation, and to ensure the safe handling and disposal of toxic substances. The EPA engages in research, monitoring, and the establishment and enforcement of national standards. The EPA does not *approve* air treatment devices.

FOOD AND DRUG ADMINISTRATION (FDA): Agency of the Public Health Service division of the U.S. Department of Health and Human Services. It is charged with protecting public health by regulating food, drugs, dietary supplements, cosmetics, and medical devices to ensure these products are safe, effective (if applicable) and truthfully labeled.

FUNGI: (Plural of fungus) Fungi belong to the kingdom of heterotrophic single-celled, multinucleated, or multicellular organisms, including yeasts, molds, and mushrooms. Previously classified in the plant kingdom, fungi are nonmotile, like plants, but lack the vascular tissues that form the true roots, stems, and leaves of plants. Unlike algae or plants, fungi lack the chlorophyll necessary for photosynthesis and must therefore live as parasites or saprobes. Typically they release digestive enzymes onto a food source, partially dissolving it to make the necessary organic or inorganic nutrients available.

Some fungi are pathogenic to humans and other animals. Some molds, in particular, release toxic chemicals called mycotoxins that can result in poisoning or death.

GAS (GASES): In physics, gases are one of the three commonly recognized states of matter, the other two being solid and liquid. A substance in the gaseous state has neither definite shape nor definite volume. Like liquids, gases are fluids and assume the shape of their containers. Unlike liquids, they will expand to fill any container, regardless of its size. All gases condense into liquids or solids when sufficiently cooled or compressed.

HEPA: High Efficiency Particulate Air (filter) is a disposable, extended medium, dry type filter with a particle removal efficiency of no less than 99.97 percent for 0.3 micrometer particles.

HVAC: Heating, Ventilation, and Air-Conditioning system. A system for regulating the temperature, humidity, cleanliness, and distribution of air.

HYDROPEROXIDES: A group of atoms consisting of a compound containing the monovalent group OOH that is considered an entity in various kinds of reactions.

IAQ: Indoor Air Quality refers to the quality of the air in the indoor environment. This may also be referred to as Indoor Environmental Quality (IEQ). Typical symptoms of poor IAQ may include headaches, eyes and/or skin irritation, nasal congestion, and dry and/or irritated nose or throat.

INDOOR AIR POLLUTION: Air pollutants that occur within buildings or other enclosed spaces, as opposed to those occurring in outdoor, or ambient air. Some examples of indoor air pollutants are nitrogen oxides, smoke, asbestos, formaldehyde, and carbon monoxide.

ION: An electrically charged atom. An atom that has lost one or more of its electrons is left with a positive electrical charge; those that have gained one or more extra electrons are left with a negative charge.

IONIZATION: The process of electrically charging atoms or molecules.

IONIZER: A product that emits ions. Negative ions can be produced by copying any of the ways that nature uses - ultraviolet (lamps), radioactive sources, etc. In most cases, the methods are too dangerous, too expensive or just impractical. For this reason, most manufacturers use the method called "corona discharge" which is similar to lightning. A high voltage (but at extremely limited current, for safety) is applied to one or more needles. Electricity is a flow of individual electrons. And these electrons, supplied by the internal circuit, are pushed down the needle towards the point. The nearer they get to the point, the closer they become forced together. Electrons naturally repel each other, so as they reach the tip, the pressure becomes too much and they "jump" off, onto the nearest air molecule, ionizing it. By adjusting the voltage level, the needle profile, and the various materials used, this process can be made very efficient. As the negative ions repel

each other, they are driven from the needles as a gentle breeze, forming a dense "cloud" in front of the ionizer.

MICROBES: See Microorganism. Grouped by physical and behavioral characteristics, microbes fall into the following major categories: viruses, bacteria, protozoa, and fungi. Not all microbials are removed or reduced by AirSource units.

MICROBIAL: Of, relating to, caused by, or being microbes.

MICROORGANISM: A microscopic organism, especially a bacterium, fungus, or a protist.

MOLD: A common term for microscopic forms of fungi; a growth of fungi forming a furry patch, as on stale bread or cheese. Mold and fungi are organisms with rigid cell walls but no chlorophyll. The most common indoor molds are Cladosporium, Penicillium, Aspergillus, and Alternaria . All molds may cause allergic reactions in humans sensitive to mold. Molds will grow anywhere indoors where there is moisture and a food source. Many building materials provide this needed food source - many consist of cellulose materials that are particularly suitable for mold growth when they are wet. Examples include paper and paper products, cardboard, ceiling tiles, wood, and wood products.

MVOCS: Microbial Volatile Organic Compounds are volatile chemicals produced by the metabolism of fungi and bacteria.

MYCOSTATIC: Of or relating to a mycostat (an agent that inhibits the growth of molds).

MYCOTOXIN: Certain molds (such as Aspergillus, Fusarium, Penicillium, Chaetomium and Stachybotrys) release chemicals during their metabolic cycle called mycotoxins, which can be toxic to humans and animals. These chemicals can be found in the mold spores, within the mold itself, and in the materials that the mold is growing. Inhalation of mold spores or dust containing mycotoxins can result in human exposure with potentially severe health effects.

NEEDLEPOINT IONIZATION: One of the methods of ionizing air. When a high voltage is applied to a conductive surface that is not grounded, electrons will build up until they find a place to "jump off." A sharply pointed surface, such as a needlepoint, allows the electrons to easily escape and ionize the air surrounding the point. The type of ionization produced (positive or negative) depends on the type of electrical charge applied to the needlepoint.

OZONE: Oxygen with an extra, loosely held oxygen atom that aggressively attaches itself to organics and microbials and thereby oxidizes them. Ozone is formed when ultraviolet radiation or electrical discharge splits the molecule of the stable form of oxygen (O₂). Ozone is one of the three allotropes (forms) of oxygen.

PARTICULATE: A state of matter in which solid or liquid substances exist in the form of aggregated molecules or particles. Airborne particulate matter is typically in the size range of 0.01 to 100 micrometers. Particulate matter is a suspension of fine solid or liquid particles in air, such as dust, fog, fume, mist, smoke, or sprays. Particulate matter suspended in air is commonly known as an aerosol.

PHOTOHYDROIONIZATION™*: The proprietary Photohydroionization process in the AirSource units is a complicated chemical chain of events that leads to the production of particular oxidizing or "cleansing" ions. Ultraviolet light strikes the Tri-metallic Catalyst target and starts the advanced oxidation process. Electrons are made available to react with oxygen, ozone, and a small amount of moisture in the air at the surface of the Tri-metallic Catalyst. Superoxide ions and the hydroperoxides are created and serve as "cleansing" ions that treat the air.

PHOTOHYDROIONIZATION MODULE: The Photohydroionization Module in AirSource units contain the unique ultraviolet (UV) lamp and the Tri-metallic Catalyst that drive the Photohydroionization reaction.

PHOTOCATALYTIC OXIDATION (PCO): A chemical reaction influenced or initiated by light that removes electrons from a catalyst and adds those electrons to a compound.

SUPEROXIDE ION: An ion formed by the combination of one molecule of dioxygen (O₂) and one electron (e⁻).

TRI-METALLIC CATALYST: A suspension of three metals specially coated on the targets in the Photohydroionization Module that, when struck by ultraviolet light, produce a photocatalytic oxidation, leading to the advanced oxidation process.

TOXIN: A poison produced by the metabolic activity of living organisms (usually a bacterium) that may damage the living body. See Mycotoxin.

UL CERTIFICATION: Underwriter's Laboratory is an organization that tests and certifies electrical devices and appliances for consumer safety. Although UL certification is not mandatory, a seller is responsible for ensuring the safety of the product he/she sells. The AirSource 3000 has been tested to the electrical and mechanical requirements of the UL 867 standard.

ULTRAVIOLET LIGHT (UV): The portion of the electromagnetic spectrum extending from the violet, or short-wavelength, end of the visible light range to the x-ray region. Ultraviolet (UV) radiation is undetectable by the human eye, although when it falls on certain materials it may cause them to fluoresce - i.e., emit electromagnetic radiation of lower energy, such as visible light.

VOCS - VOLATILE ORGANIC COMPOUNDS (OR CHEMICALS): Chemicals containing carbon are called organic. Volatile means that they evaporate or get into the air easily which make them easier to breathe in. Examples of common VOCs include benzene and trichlorethylene, and organics produced by microbes. See MVOCs.

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