All Photocatalytic Oxidation (PCO) Systems Are Not the Same

The term "PCO" refers to an air purification technology for which there are numerous embodiments. All PCO systems use ultraviolet light to excite a catalyst such as titanium dioxide which in turn oxidizes or "breaks down" typical volatile organic compounds (VOC's)in indoor environments. While all PCO systems share this basic principal there is a wide variety of different approaches to PCO system designs and materials used in PCO reaction chambers. These differences can result in dramatically different treatment results.

What are the different types of design of PCO indoor air treatment systems?

There are two basic designs of PCO indoor air treatment systems.

- One type is designed for centralized air treatment.This design uses PCO components that are placed in a centralized air duct that service a large area such as an entire office building. While indoor air in a centralized system is periodically recirculated the number of recirculation cycles can below. This PCO system design is therefore more of a "single pass" system in that air flows through the PCO components once before it is distributed within a building.

- The second type is a portable room air treatment system.This design uses PCO components that are packaged in a portable room air treatment system in which air in the room is continually recycled and treated with PCO over and over again.This type of "multi pass" system maximizes the PCO treatment cycles for air in a given space.

What are the different types of materials used in PCO reaction chambers?

- Some systems coat titanium dioxide on to a plate which is exposed to ultraviolet light in an air stream. While these systems will produce a PCO reaction, the reaction is not maximized. This design is more prone to produce in complete PCO reactions resulting in a less than complete breakdown of VOC's.

- Other systems utilize a catalyst support material with an extremely high surface area such as a fiber mesh similar to that used in typical room air filters. This high surface area material is then coated with a nano-particle sized catalyst which turns the material in to an extremely effective PCO reaction chamber. This type of reaction chamber can then be further enhanced by the addition of small amounts of platinum on the catalyst surface. Platinum dramatically speeds up the PCO reaction process by ten times or more compared to materials without platinum. PCO systems with this type of reaction chamber maximize the potential for the complete breakdown of VOC's into carbon dioxide and water.

Can PCO produce formaldehyde as a byproduct in the treatment of indoor air?

As a VOC is broken down by PCO it goes through numerous reaction stages. In a single pass PCO reaction with less than optimized catalyst reaction chamber materials there is the potential for incomplete break down reactions to occur. In such cases it is possible to create low levels of formaldehyde in air at a given stage of the process as has been demonstrated in some academic research. The key to insuring that formaldehyde is not present as a residual byproduct of treated indoor air is to use PCO systems that both maximize the number of air treatment cycles and that utilize catalyst reaction materials that optimize the PCO process. The Photox™ Advanced Air Purification System accomplishes both of these goals. The portable room air treatment design allows for the constant treatment of room air with multiple and continual treatment cycles. With this design the indoor air is continually retreated with PCO. The Photox™ proprietary high surface area fiber mesh carrier with nano-particle sized catalyst plus the addition of platinum provides a reaction chamber that has been demonstrated to produce orders of magnitude greater reactivity than other PCO systems.