

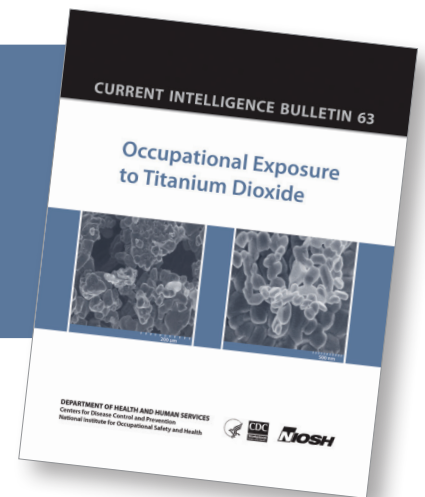


Is there really a health risk from titanium dioxide in PCO air purifiers? Or is it just hype coming from manufacturers of competing technologies?

Lately there have been documents circulating suggesting that a 2011 bulletin from the CDC singles out titanium dioxide (TiO_2) as a cancer risk and that PCO air treatment devices (which all use TiO_2 as a catalyst) are unsafe for that reason. This could not be further from the truth.

It is true the CDC did publish a document (CIB 63) warning of potential risks to factory workers from chronic exposure to high levels of airborne TiO_2 particles.

NIOSH recommends exposure limits of 2.4 mg/m³ for fine TiO_2 and 0.3 mg/m³ for ultrafine (including engineered nanoscale) TiO_2 , as time-weighted average (TWA) concentrations for up to 10 hours per day during a 40-hour work week. NIOSH has determined that ultrafine TiO_2 is a potential occupational carcinogen but that there are insufficient data at this time to classify fine TiO_2 as a potential occupational carcinogen.



Titanium dioxide is a safe, stable, and nontoxic material used in a wide variety of common products including toothpaste, makeup, and sunscreen. PCO air treatment devices also use TiO_2 as a catalyst. Like many industrial materials, there may be some risk to workers exposed to large quantities of airborne ultra-fine TiO_2 particles over long periods of time (although the CDC document states that "...there are insufficient data at this time to classify fine TiO_2 as a potential occupational carcinogen").

But the TiO_2 in our PCO device will never be released into the airstream because it is firmly adhered to the PCO media (activated carbon) and is engineered to remain there for the life of the product via a process known as sol-gel chemistry. More importantly, if it were released into the air all at once, it would be such a small amount (roughly equivalent to a single application of powdered face makeup) that it would be undetectable in the airstream and would pose no conceivable threat to human health.

The sol-gel process is used for the fabrication of metal oxides, especially the oxides of silicon and titanium. The process involves conversion of monomers into a colloidal solution (sol) that acts as the precursor for an integrated network (or gel) of either discrete particles or network polymers. Sol-gel chemistry is commonly used in advanced material science with applications including a wide variety of manufactured products.

So why the hype? Because the recent ASHRAE Position Document on Filtration and Air Cleaning has challenged the safety and effectiveness of ozone, ROS, and ion generating air treatment devices, manufacturers of these products are scrambling to maintain market share despite the bad news. PCO, being the best alternative, becomes a target.

So, is PCO air treatment safe? In section 2.3 of the ASHRAE position document recognizes the effectiveness of PCO and validates the use of chemisorbent media (such as Patriot activated carbon cells) but raises no concerns at all concerning carcinogenic risks from TiO_2 . This peer reviewed document from the HVACR industry's most highly respected trade organization was published in 2015, the engineers and scientists involved would certainly have known about the 2011 CDC document and would have included these concerns if they were relevant.