

# Ionization and Airborne Oxidation is Full of Hot Air



With catchy names like “cold plasma,” misleading terminology, and new acronyms like NPBI, ionization is still the same science that in 1933 was deemed of no use for general ventilation while also creating harmful oxidizing metabolites like ozone<sup>1</sup>. ASHRAE’s current position on ionization is simple, studies have shown zero to limited health benefit and ASHRAE warns against any technology in which ozone is a byproduct, in any amount<sup>2</sup>.

Currently being marketed for air filtration, ionization is using an electrical charge to create positive (cation) and/or negative (anion) ions in the atmospheric air including many dangerous and deadly reactive molecules as the byproducts<sup>3</sup>. With many different methods, by flooding the air with ions, a desired effect is to use the electrostatic attraction to collect particulates on the nearest grounded source.

Through the production of dangerous and deadly reactive oxygen molecules, ionization technologies make claims regarding air disinfection. Studies have shown limited and overstated antimicrobial effects of these ionization and oxidation products<sup>4</sup>. Proven amounts of ions required for disinfection of individual microbial species are non-existent with even less discussion regarding robust organisms like mold.

Ionization and oxidation technologies advertise energy savings based on less air exchanges not based on mechanical improvements. They simply sell recycling of air to save energy. Frighteningly, field studies on ionization technologies have been shown to have increased the amount of dangerous pollutants present when tested in schools<sup>5</sup>. Proven ASHRAE technologies like UVC save energy mechanically by removal of HVAC biofilms<sup>6</sup>. Ionization and oxidation have limited data on biofilm disinfection even showing potentially increased microorganism immunities in healthcare facilities based on exposures<sup>7</sup>.

## What is happening to my air?

## Undesired Effect

Positive and negative Ions create reactive species and oxidizers as a cleaning agent.	Reactive oxygen and nitrogen species and as well as oxidation with increased human exposure has been linked to cancer, aging, infertility, chronic disease, and death.
Airborne positively and negatively charged particles are attracted to nearby surfaces.	Mold, bacteria, dust, skin flakes, and feces are now stuck to walls, tables, and you.
Energy is potentially saved with less air exchanges.	Increased exposure to higher levels of toxic and performance draining carbon dioxide and increased exposure to ROS's, reactive nitrogen, ozone, and formaldehyde...known deadly metabolites of ionization.
Reactive species created via ionization degrade common airborne substances.	Plants (citrus, decorative flowers, cannabis), food, detergents, and wood have been proven to mix with the ROS (reactive oxygen species) to form formaldehyde, releasing into the air a known deadly carcinogen.

The science remains the same when it comes to ionization/oxidation and improving air quality. Exposure to the byproducts of ionization and oxidation are harmful and rather than disinfect and or remove particulates, ionization relocated them intact. Ionization when tested in the field has been proven to make air less safe and therefore ineffective for a filtration technology, the rest is just fancy marketing.

## Sources:

<sup>1</sup> "Observations on a Group of Subjects before, during and after Exposure to Ionized Air." Author(s): Yaglou, C. P.; Brandt, A. D.; Benjamin, L. C. Journal article: *Journal of Industrial Hygiene* 1993 Vol. 15 pp. 341-53

<sup>2</sup> ASHRAE Position Document of Filtration and Air Cleaning: Jan. 13, 2018

<sup>3</sup> Le Caër, Sophie (2011). "Water Radiolysis: Influence of Oxide Surfaces on H<sub>2</sub> Production under Ionizing Radiation". *Water*.

<sup>4</sup> Bactericidal action of positive and negative ions in air. *BMC Microbiol.* 2007 Apr 17;7:32.

Fletcher LA, Gaunt LF, Beggs CB, Shepherd SJ, Sleigh PA, Noakes CJ, Kerr KG.

<sup>5</sup> ASHRAE Journal- June 2019, Todd Crawford, Patricia Fritz, Member ASHRAE, and Thomas Wainman, New York State Department of Health, Albany, NY.

<sup>6</sup> ASHRAE-NY-14-C023 - UVGI in Hospital HVAC reduce VAP, Leach and Scheir

<sup>7</sup> Nosocomial Candidiasis: Emerging Species, Reservoirs, and Modes of Transmission, Michael A. Pfaller, *Clinical Infectious Diseases* 1996;22(Suppl 2): 889-94