Global Plasma Solutions

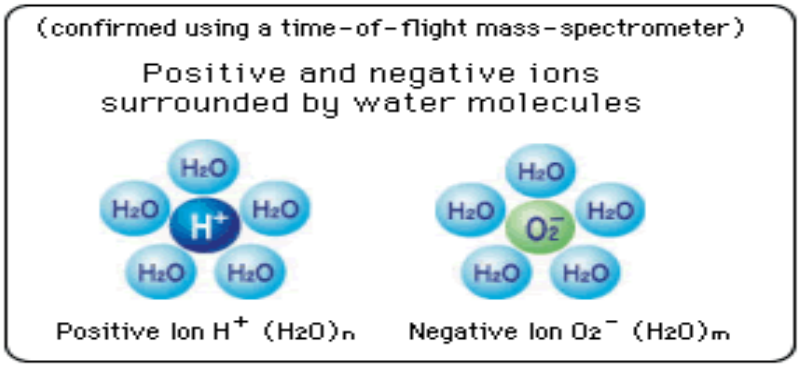
What does Plasma Kill?

Global Plasma Solutions' bi-polar ionization generator creates cold plasma discharge that consists of positive ions (H^+) and negative ions (O_2^-) from water vapor in the air. These ions have the property of clustering around microparticles and gases, and thus, they surround harmful substances such as airborne mold, virus, bacteria, volatile organic compounds and allergens. At that point, a chemical reaction occurs on the cell membrane surface and they are transformed into OH radicals, a powerfully active but unstable material, which robs the harmful substance of a hydrogen atom (H). As a result, they are inactivated by severing the protein on the cell membrane, opening holes. The OH radicals instantly bond with the removed hydrogen (H), forming water vapor (H_2O), and return to the air.

1) The GPS generator creates bi-polar ionization (cold plasma), replicating the same positive and negative ions found abundantly nature, for example, in woods and forests. Ions are found in the highest concentrations where the ocean meets the shore and high elevation in the mountains. GPS' plasma process will artificially create the ions found in these desirable locations and supply them into the building, enhancing the indoor air quality. The ions turn into OH radicals only on the surface of harmful substances to inactivate them, so they are completely harmless to the human body and pets.

2) GPS plasma will effectively eliminate bacteria, virus, mold and volatile organic compounds by working directly on the air contained in the entire zone and duct.

3) The plasma process consumes a miniscule amount of electricity, less than a 5 watt light bulb, in most applications.



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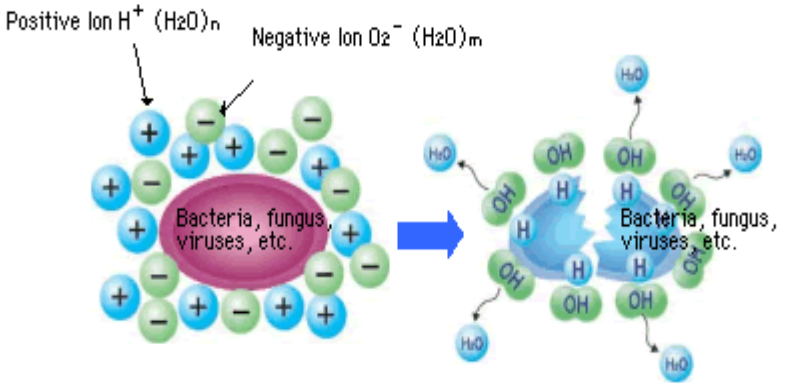
Various Pathogens that Plasma Kills

Target Substance	Species	Testing & Verification Organization	Date of Announcement
Fungi	Cladosporium (black mold, mildew)	Ishikawa Health Service Association	September 2000
		Universitäklinikums Lübeck University Clinic (Germany) (proliferation control effect)	February 2002
		CT&T (Professor Gerhard Artmann, Aachen University of Applied Sciences)	November 2004
	Penicillium, Aspergillus	Universitäklinikums Lübeck University Clinic (Germany) (proliferation control effect)	February 2002
	Aspergillus, Penicillium (two species), Stachybotrys, Alternaria, Mucorales	CT&T (Professor Gerhard Artmann, Aachen University of Applied Sciences)	November 2004
Bacteria	Coliform bacteria (E. coli)	Ishikawa Health Service Association	September 2000
	E. coli, Staphylococcus (aureus), Candida	Shanghai Municipal Center for Disease Control and Prevention, China	October 2001
	Bacillus subtilis	Kitasato Research Center of Environmental Sciences	September 2002
		CT&T (Professor Gerhard Artmann, Aachen University of Applied Sciences)	November 2004
	MRSA (methicillin-resistant Staphylococcus aureus)	Kitasato Research Center of Environmental Sciences	September 2002
		Kitasato Institute Medical Center Hospital	February 2004
	Pseudomonas, Enterococcus, Staphylococcus	Universitäklinikums Lübeck University Clinic (Germany)	February 2002
	Enterococcus, Staphylococcus, Sarcina, Micrococcus	CT&T (Professor Gerhard Artmann, Aachen University of Applied Sciences)	November 2004

Allergens	Mite allergen (dust from dead mite bodies and feces), pollen	Graduate School of Advanced Sciences of Matter, Hiroshima University	September 2003
	Airborne allergens	Asthma Society of Canada	April 2004
Viruses	H1N1 influenza virus (Swine Flu)	Kitasato Research Center of Environmental Sciences	September 2002
		Seoul University, Korea	September 2003
		Shanghai Municipal Center for Disease Control and Prevention, China	December 2003
		Kitasato Institute Medical Center Hospital	February 2004
	H5N1 avian influenza virus	Retroscreen Virology, Ltd, London, U.K.	May 2005
	Coxsackie virus (summer colds)	Kitasato Research Center of Environmental Sciences	September 2002
	Polio virus	Kitasato Research Center of Environmental Sciences	September 2002
	Corona virus	Kitasato Institute Medical Center Hospital	July 2004

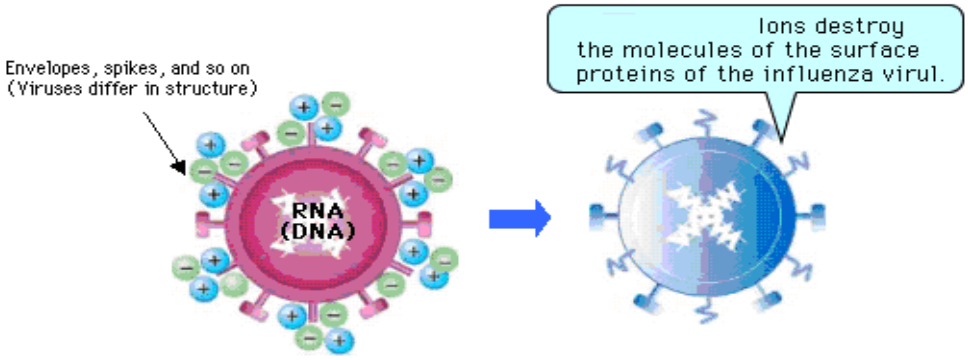
Mechanism of Plasma for Inactivating Airborne Fungi

The positive (H^+) and negative (O_2^-) ions cluster together on the surface of airborne fungi, causing a chemical reaction that results in the creation of highly reactive OH groups called hydroxyl radicals (•OH). The hydroxyl radical will take a hydrogen molecule from the cell wall of an airborne fungi particle. This process inhibits mold infestation as well as controls musty and household odors (caused in large part by mold fungi) as they occur.



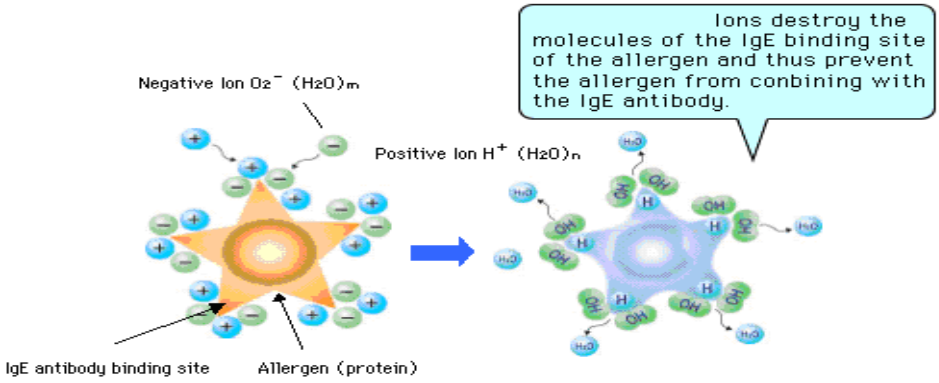
Mechanism of Plasma for Inactivating Airborne Virus

The positive (H^+) and negative (O_2^-) ions surround the hemagglutinin (surface proteins that form on organisms and trigger infections) and change into highly reactive OH groups called hydroxyl radicals (•OH). These groups take a hydrogen molecule from the hemagglutinin and change it into water (H_2O). The ions destroy the virus surface structure, for example its envelopes and spikes, on a molecular level. As a result, the virus cannot infect even if it enters the body.



Mechanism of Plasma for Deactivating Airborne Allergens

The positive (H^+) and negative (O_2^-) ions surround the airborne allergen and change into highly reactive hydroxyl radicals (•OH). The hydroxyls then deactivate the molecules of the IgE antibody binding site of the allergen. No allergic symptoms occur even if allergens enter the body.



GPS' plasma is a technology with many benefits. Plasma can kill many airborne pathogens, not just at the source of the plasma, but also in the zone where the heated or cooled air is being supplied. Ultraviolet light cannot kill pathogens outside of the blue light produced by the ultraviolet light tube, so the killing of ultraviolet light is limited to the effectiveness of the ventilation system to get the pathogen back to the air handler for control.

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Control of Gases and Odors with Plasma

While plasma is very effective at pathogen killing, it is also effective at controlling gases, odors and volatile organic compounds (VOC's). Just as the plasma surrounds pathogens and deactivates them, the plasma also surrounds gas molecules. As the gas molecules are attacked by the plasma, the molecular bond of the gas molecule is broken down, just as glue is broken down by contact with paint thinner, and the gas reverts back to its natural state. What the gas molecule starts out will depend on what it breaks down to. Using ammonia (NH3) as an example, ammonia breaks down to oxygen, nitrogen and water vapor when subjected to a plasma field of sufficient strength. Ammonia is an odorous chemical produced by occupants as well as cigarette smoke and some building materials.

When installed in a central HVAC system, zone odors are controlled such as ammonia, formaldehyde, cooking odors, bathroom odors, musty & mildew odors as well as other odors produced by the occupants and building furnishings and processes. The gases produced by the building materials are broken down to harmless gases already prevalent in the earth's atmosphere such as oxygen, nitrogen, water vapor or carbon dioxide. Contact Global Plasma Solutions to learn more today!

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