

iWave AIR PURIFICATION

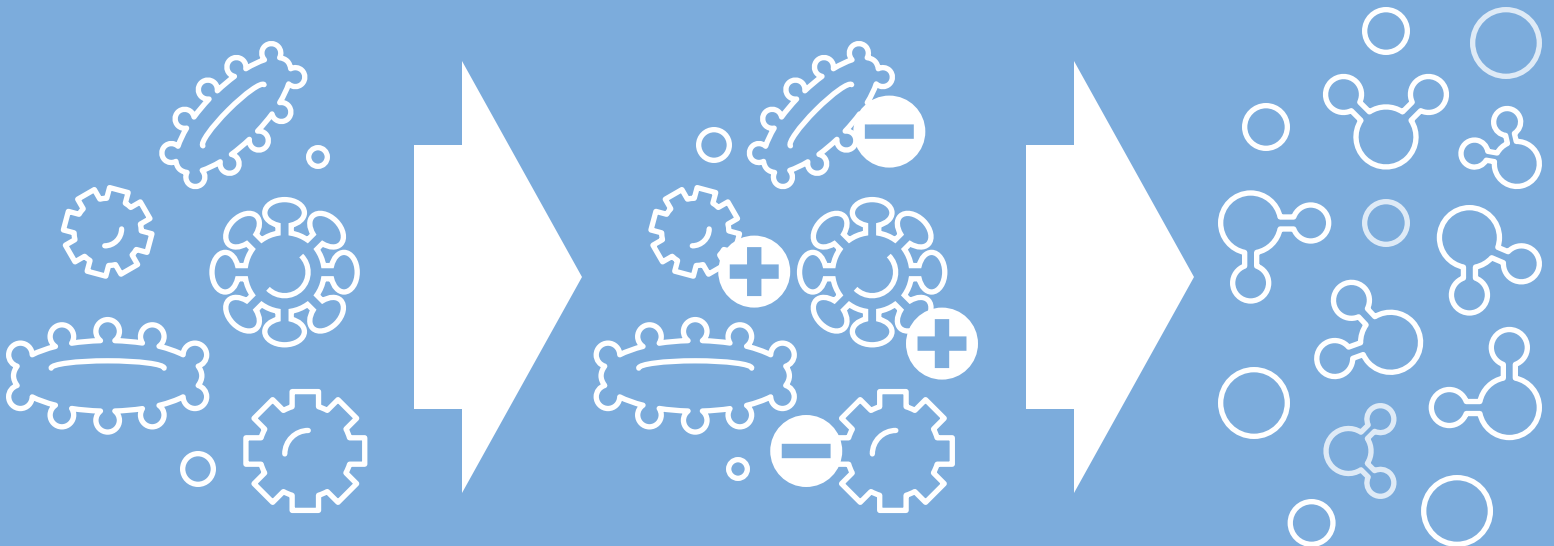
How the iWave Technology Works

iWave works to safely clean the air inside industrial, commercial and residential buildings. The patented technology uses an electronic charge to create a plasma field filled with a high concentration of positive and negative ions. These ions address harmful IAQ issues such as pathogens, VOCs, odors, and particulate. The ions produced travel within the air stream into the occupied spaces, cleaning the air everywhere the ions travel, even in spaces unseen.

**Harmful Particles
(including pathogens)**

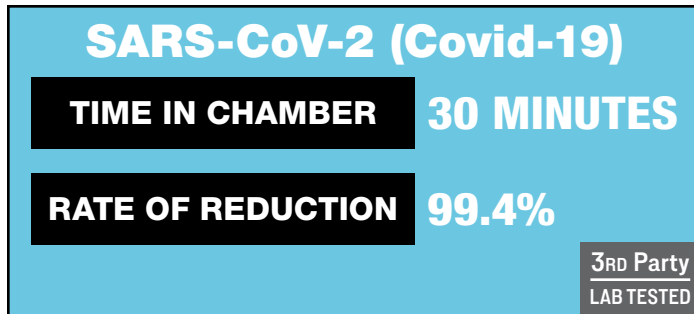
**Positive and Negative Ions
Defeat Pathogens**

**The ions address particulate, and
breakdown harmful VOCs into
harmless compounds.**



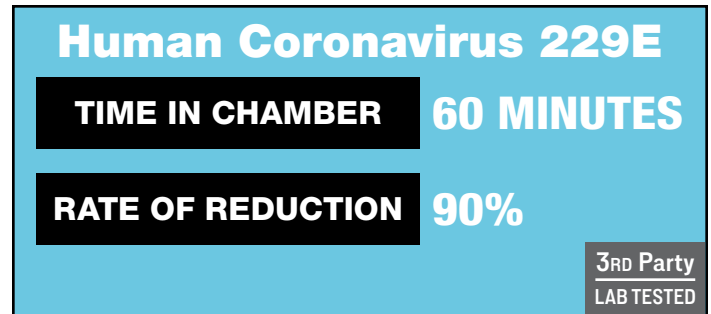
How iWave Addresses Pathogens

The ions produced by iWave's NPBI technology are attracted to harmful pathogens. When the ions combine on the surface of a pathogen, they rob the pathogen of the hydrogen necessary for them to survive. Substantial testing has been conducted to confirm the kill rates of various pathogens. Below is a chart that shows the results of testing that has been completed by various third party, independent testing firms.



This test was run using the iWave-C Air Purifier P/N 4900-10 in a test designed to mimic ionization conditions like that of a commercial aircraft's fuselage.

Based on viral titrations, it was determined that at 10 minutes, 84.2% of the virus was inactivated. At 15 minutes, 92.6% of the virus was inactivated, and at 30 minutes, 99.4% of the virus was inactivated.



This test was run in a test chamber in a lab setting with the Nu-Calgon iWave-R Air Purifier P/N 4900-20.

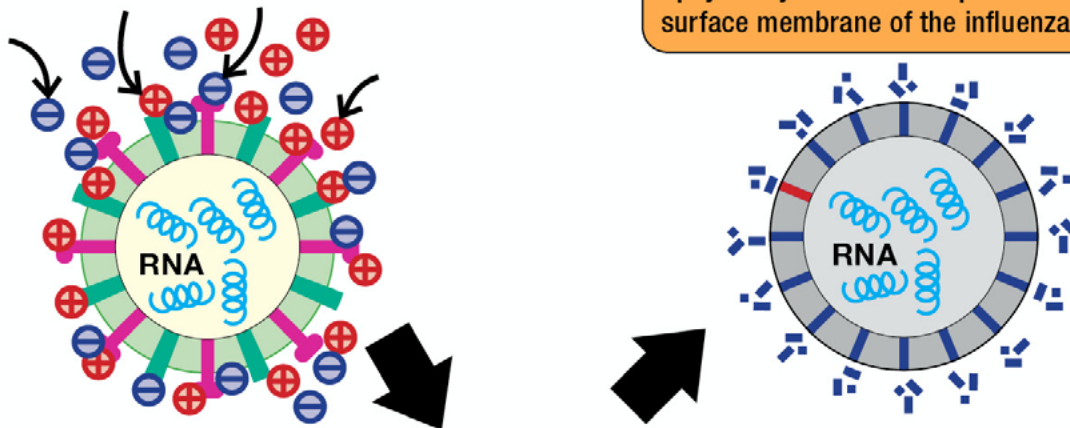
A petri dish containing a pathogen is placed underneath a laboratory hood, then monitored to assess the pathogen's reactivity to Needle Point Bi-polar Ionization (NPBI) over time. This controlled environment allows for comparison across different types of pathogens.

Rapid, Continuous Air Cleaning

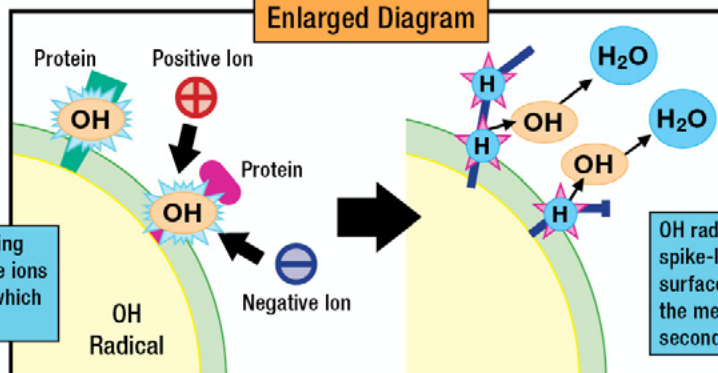
iWave's NPBI technology releases a high concentration of positive and negative ions that immediately begin attaching to particulates, which includes pathogens and other harmful compounds. As these ions enter the air stream, they offer continuous treatment throughout the entire facility or home.

Positive and negative ions surround the surface membrane of the airborne virus.

A chemical reaction takes place that physically breaks down proteins in the surface membrane of the influenza virus.



Enlarged Diagram



Through a chemical reaction occurring on the virus membrane surface, the ions are transformed into OH radicals, which are powerfully active but unstable.

OH radicals steal hydrogen atoms from the spike-like proteins that protrude from the surface of the virus membrane, opening holes in the membrane. When the OH radicals acquire a second hydrogen atom, they form water (H₂O).

(Information taken from collaborative research done in association with Professor Gerhard Artmann of Aachen University of Applied Sciences in Germany.)

How iWave Treats VOCs and Odors – Understanding Electron Volt Potential

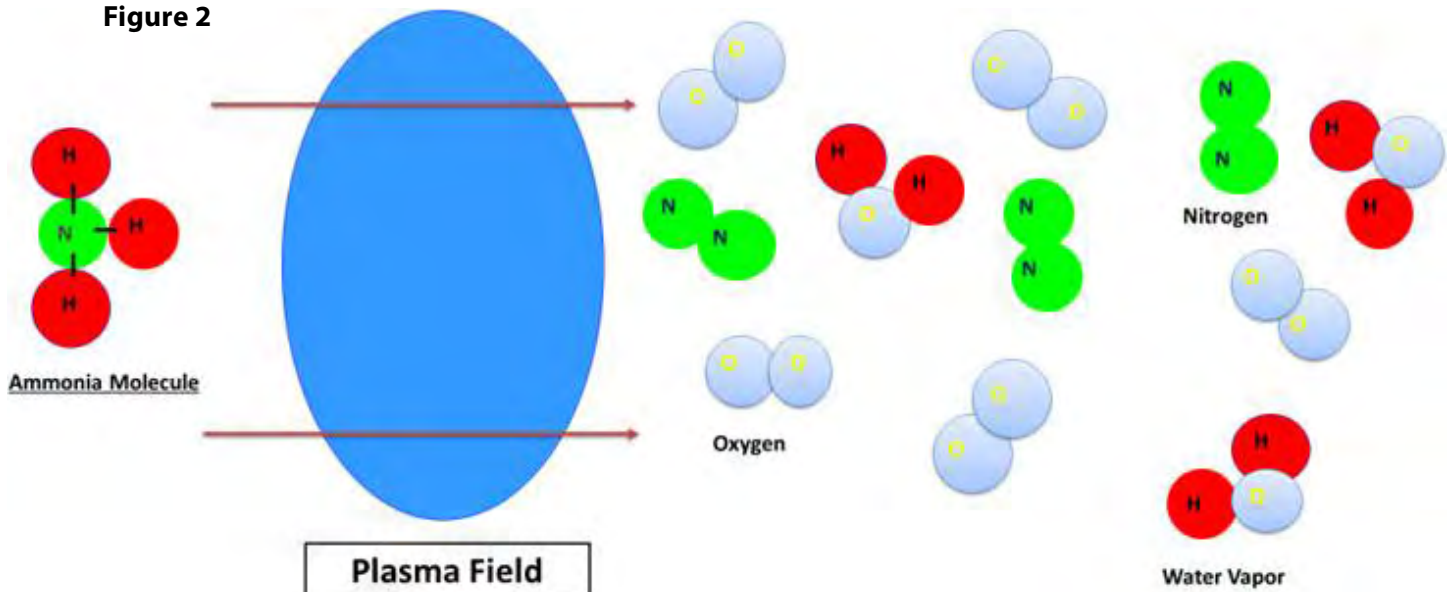
The ions produced by iWave’s needle point bi-polar ionization (NPBI) devices break down gases with electron volt potential numbers below 12. The harmful gases are reduced to compounds or molecules already prevalent in the atmosphere, including oxygen, nitrogen, water vapor and carbon dioxide. The compounds are a result of the contaminants entering the NPBI field. Formaldehyde, for example, which is off-gassed by building furnishings, is known to be carcinogenic. Formaldehyde has an Electron Volt Energy of 10.88 eV. Formaldehyde breaks down to carbon dioxide and water vapor when it encounters the NPBI plasma field, thus eliminating the health hazard. Another example is ammonia, with a 10.07 eV. Ammonia is typically produced by occupants of a space, and best understood as typical body odor. Ammonia breaks down to nitrogen and water vapor (see figure 2). The power output is controlled to less than 12.07eV to prevent the formation of ozone. Every gas in the atmosphere has an electron volt potential. The chart below (figure 1) shows a sample of eV potential for several compounds. Understanding the relationship of power to eV is critical when designing air purification systems to produce the desired effect, while avoiding the formation of ozone and other by-products. NPBI technology has been certified by UL as an ozone free technology. Therefore, ozone, aldehydes and ultra-fine particles are not created. iWave has been successfully used in hospitals, offices, airports, schools, arenas, gyms, airplanes, veterinary offices, and restaurants, to name a few applications.

Figure 1

CHEMICAL	FORMULA	ELECTRON VOLT
Xylene *	C8H10	7.89
Styrene *	C8H8	8.46
Methyl Ethyl Ketone *	C3H8O	9.52
Ammonia	NH3	10.07
Acetaldehyde	CH3CHO	10.23
Ethyl Alcohol	C2H5OH	10.48
Formaldehyde	CH2O	10.88
Oxygen	O2	12.07

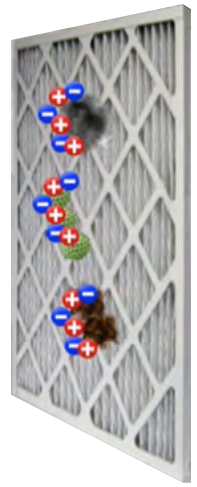
* Typical contaminants of concern as contained within ASHRAE 62.1
 Electron Volt Energy greater than 12eV, creates Ozone O3

Figure 2



How iWave Addresses Particulate

iWave's needlepoint bipolar ionization technology (NPBI) generates both positive and negative ions. In standard applications particle counts are normally in the range of 18 million particles per cubic foot. Most of these particles are below 0.3µm (microns) in diameter, which means they stay airborne almost indefinitely. Particles this small have very little mass and surface area. The air currents in the space have little leverage to move these particles back to the filter for capture. The ions emitted by the iWave cause some particles to become positively charged, while others become negatively charged. Because opposite charges attract, these particles become magnets and start sticking to one another, which is called agglomeration. As the particles become larger, they gain surface area and mass. The particle growth enables the airflow within the space to push against the larger surface and propel those particles to the filter where they can be captured. Blue Heaven Labs, a 3rd party laboratory, tested iWave's NPBI and confirmed that a system using a MERV 8 filter and NPBI will have similar particle control as a system using a MERV 13 filter without NPBI. This equates to fan energy savings and filter replacement cost savings.

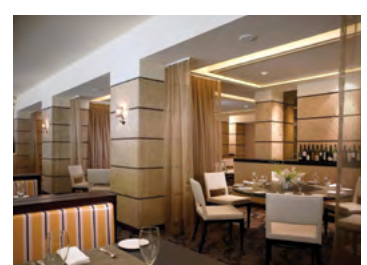


Ionization Helps Improve Filter Efficiency

MERV RATING	FILTER ONLY	FILTER + UVC***	FILTER + IONIZATION* **
6	6.2%	10%	34%
7	7%	12%	61%
8	11%	19%	84%
10	12%	35%	89%
13	46%	84%	97%
15	71%	97%	99%
16	76%	98.80%	99.90%
17 (HEPA)	99.90%	99.99%	99.999%

*Ionization increases the filter efficiency 4-5 MERV levels. **Does not take into account ionization kills in the space and on surfaces.
 ***UVC does not effectively kill airborne pathogens in high RH conditions¹ ¹ASHRAE technical paper on airborne infectious diseases

There's an iWave solution for any type of facility!



Hospitals and Healthcare	Gym and Athletic Facilities	Manufacturing Facilities
Higher Education	Assisted Living Facilities	Hotels and Resorts
Military and Government	Correctional Facilities	Residential
Restaurants	Recreational Facilities	Places of Worship



iWave-C

No maintenance air purifier for commercial and residential systems



iWave-R

Self-cleaning, maintenance-free air purifier for residential systems



iWave-M

Mini flexible air purifier for mini-splits and other systems



iWave-V

Low maintenance air purifier for residential systems