

# Airing Out Anthrax

While America continues to work around the clock to search for solutions that would thwart any future attempts of terrorist and biochemical attacks, a company located in Kennesaw, Georgia, has created groundbreaking technology that could not have come at a more appropriate time.

KES Science & Technology, Inc., a company renowned for its expertise in preserving perishables, is taking a giant leap forward to preserve freedom. The company is assuaging the fears and concerns of the American public with an

answer to the onslaught of anthrax-related incidences that followed the tragic events that affected our Nation on September 11, 2001.

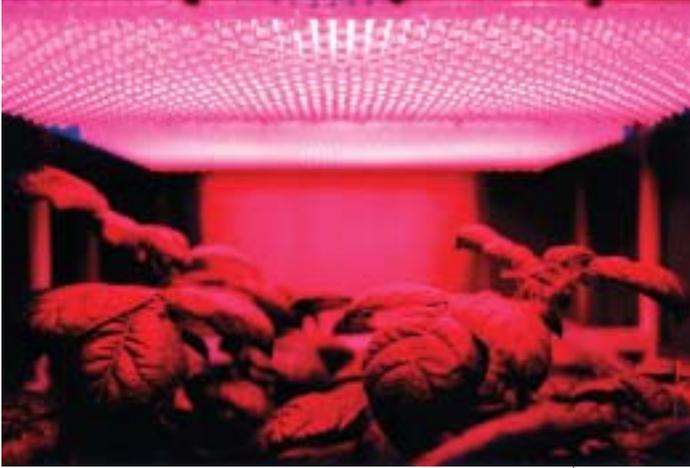
The AiroCide TiO<sub>2</sub> is an air purifier that kills 93.3 percent of airborne pathogens that pass through it, including *Bacillus anthracis*, more commonly known as anthrax. It is essentially a spinoff of the company's Bio-KES system, a highly effective device used by the produce industry for ethylene gas removal to aid in preserving the freshness of fruits, vegetables, and flowers. In 1994, scientists at the University of Wisconsin-Madison and the Wisconsin Center for Space Automation and Robotics (WCSAR) co-developed the original ethylene gas removal technology, also known as an ethylene scrubber. WCSAR, one of NASA's Commercial Space Centers, is sponsored by Marshall Space Flight Center's Space Product Development Office.

The TiO<sub>2</sub>-based ethylene removal technology that is incorporated into the company's AiroCide TiO<sub>2</sub> and Bio-KES products was first integrated into a pair of plant-growth chambers known as ASTROCULTURE™ and ADVANCED ASTROCULTURE™. Both chambers were designed and built by WCSAR, and have housed commercial plant growth experiments in space on either the Space Shuttle or the International Space Station. This technology is still used in enclosed plant growth chambers in commercial space research.

After the September 11th attacks, a KES employee questioned whether the Bio-KES system could be altered to eliminate pathogens from the air at a higher rate, considering its non-depleting Titanium Dioxide-formula catalyst material (TiO<sub>2</sub>) and ultraviolet bulb technology. More specifically, the employee wanted to know if the system could act as a combatant against airborne anthrax spores. Research proved a revelation, and the answer was yes.



A technician at KES Science & Technology, Inc., assembles the AiroCide TiO<sub>2</sub>, an air purifier that kills 93.3 percent of airborne pathogens that pass through it, including anthrax spores.



A first-generation ethylene scrubber, which used the same coating technology as the anthrax-killing device, removed ethylene inside the ASTROCULTURE™ plant growth unit during Space Shuttle mission STS-73 in 1995.

To reach this conclusion, researchers prepared a prototype of the AiroCide TiO<sub>2</sub> that consisted of 52 high-powered germicidal ultraviolet lamps, a catalyst bed of small pellets coated with TiO<sub>2</sub>, and a heating block set to 100 degrees Fahrenheit. The device was exposed to 1,386 *Bacillus thurengiensis* spores (*Bacillus thurengiensis* is a non-virulent member of the anthrax bacteria family that contains most of the same properties as the deadly germ). The spores made their way into a Plexiglas chamber situated over the intake port of the device, and were then introduced to an aerosolizing blast of bio-active hydroxyl radicals that was released from a compressed air cylinder.

After overnight incubation of the bacteria, researchers determined that of the 1,386 *Bacillus thurengiensis* spores consumed by the AiroCide TiO<sub>2</sub>, only 101 survived the experiment. Although the surviving spores are released from the machine's chamber, they are likely to be sucked back inside the device, without a chance to make it out alive, according to KES officials.

The AiroCide TiO<sub>2</sub> also has a proven record of destroying 98 percent of other airborne pathogens, such as microscopic dust mites, molds, and fungi. Moreover, the device is a verified killer of Influenza A (flu), *E. coli*, *Staphylococcus aureus*, *Streptococcus pyogenes*, and

*Mycoplasma pneumoniae*, among many other harmful viruses.

With its AiroCide TiO<sub>2</sub> technology, KES is quickly positioning itself as a harbinger in the fight against bacteria, especially in light of the various strains that are developing resistance to antibacterial products. The available unit, which is a flat, metal box approximately the size of a tabletop, is designed to be mounted to a ceiling, but can be placed on a wall, if necessary. Once properly installed, the unit is capable of purifying 15,000 cubic feet of air in a 24-hour period. Possible commercial applications for the device include mail rooms; kitchens; offices; conference rooms; break rooms; hospitals; doctors' waiting rooms; veterinary facilities; day care centers; and other common areas that are susceptible to bacteria. In addition, KES is planning to develop a residential model of the AiroCide TiO<sub>2</sub>, in response to an overwhelming demand from homeowners looking to stave off common household allergens. The proposed model would also likely benefit individuals who suffer from severe cases of asthma. ❖

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