The Science Link

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Helping Facilities Detect and Eliminate Harmful Microorganisms

By Robert Kravitz

For thousands of years, man has been mystified by fireflies – about 1,900 species of nocturnal, glow-in-the-dark beetles. In fact, these bioluminescent insects have inspired poets and delighted children for centuries. It was theorized that their blinking light was used to attract mates and possibly fend off predators. However, how they managed to produce the light in their abdomen and blink it so precisely was a mystery.

Finally, the secret was revealed. In the late 1940s, scientists discovered that a dissolved gas lets the firefly's nervous system switch on its flash of light. In a complex arrangement among nerve cells, light-producing cells, and an enzyme-assisted reaction, the firefly's lantern emits that greenish glow that is so common in the early summer twilight in many parts of the world.

Interestingly, a similar technology is now being used in cleanrooms, laboratories and clean manufacturing facilities worldwide to detect the presence of germs, bacteria and other potentially dangerous microorganisms on a variety of surfaces and objects by the way these microorganisms "glow." With this knowledge in hand, these facilities are better able to protect the clean, sanitary, and hygienic standards necessary for working in these types of facilities, as well as building occupant health.

Detecting Adenosine Triphosphate

"All living things have a universal source of energy used to power their cells known as adenosine triphosphate, or ATP," says Matt Morrison, communications manager for Kaivac, Inc., developers of the No-Touch Cleaning™ System, which markets a soil and microorganism rapid detection system called the SystemSURE PLUS ATP. "The ATP molecule is enormously intricate, and we are just now beginning to understand how it works. However, we know that it is present in all living organisms and biological residues."

According to Morrison, if ATP is detected on a surface or instrument, it means that microorganisms and life-supporting residue for these germs are present.

"And since samples are generally taken after cleaning, testing for ATP will provide important feedback on the effectiveness of the cleaning processes and systems used in cleanroom-type locations," he says. "Administrators in these types of facilities can then use this information to help maintain and improve the cleaning and hygienic standards of their facilities when and where necessary."

Measuring for ATP

ATP technology is not new. It was first developed in the early 1970s. However, the

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original equipment involved in performing ATP testing was large, slow, and rather cumbersome to use. However, with the latest technology, using an ATP machine is actually quite simple. Some systems are hand-held – about the size of a television remote control – and can analyze a surface by following these steps:

- A swab, pre-wetted with an enzyme extractant, is applied to the sample or test area. Care must be taken not to touch the swab to any areas other than the area of interest.
- The swab is returned to a shaft housing where it may be stored for up to four hours.
- The swab is then inserted into the ATP testing equipment.
- Test results should be available in approximately 15 seconds, which is why these systems are referred to as “rapid” monitoring.

“If ATP is present, it will glow, just like the abdomen of a firefly glows,” says Morrison. “The glow from the ATP is analyzed by the monitoring equipment and given in relative light units (RLU). The higher the RLU, the more ATP – and the greater the need for more thorough and effective cleaning of the surface area tested.”

Improving Cleaning with ATP and Other Science

“Using testing equipment to help detect the presence of microorganisms on surfaces is the first step in finding where a problem area exists,” says Morrison. “Once discovered, implementing cleaning systems and processes to eradicate the problem not only helps maintain hygiene standards, making it necessary in cleanrooms and similar facilities, but it brings science into cleaning as well.”

According to Morrison, the jan/san (professional cleaning and maintenance) industry is moving quickly toward more high-performance, science-based cleaning testing and technologies.

“This is the result of a much greater emphasis on cleaning for health,” he says. “And it serves as an example of how ATP and other science-based testing and cleaning technologies can work together.”

He believes that using this approach, contaminated surfaces in clean rooms, clean manufacturing facilities and similar locations can be detected before they have a chance to mar or negatively impact scientific work areas or become a health hazard. And, retesting a surface after cleaning – with little or no evidence of ATP present – indicates that the area has been cleaned efficiently to ensure it is clean and hygienic and that building occupant health is protected.

Robert Kravitz is a former building service contractor and now a writer for the professional cleaning and building industries.

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