What is ATP? What are the advantages and disadvantages of using ATP bioluminescence assay? The answers to these and other frequently asked questions.

A Q&A on ATP Bioluminescence Assay

Adenosine triphosphate (ATP) is the molecule used for energy storage by all types of living cells (animal, plant, bacterial, yeast, and mold). ATP transfers energy within living cells to power the enzymes needed for cellular functions. After cell death, ATP is broken down by autolysis within a few minutes.

What is ATP bioluminescence assay? ATP bioluminescence assay cell detection was first developed in the 1950s by NASA scientists who were interested in finding life (living cells) on other planets. In the food industry, it is a technique used to measure the cleanliness of a surface. ATP bioluminescence detects the amount of ATP, which is an indirect measurement of the amount of organic/food residue on a surface that has the potential to support microbial growth and also microbial biomass. In simple terms, it measures the dirt or filth on a surface indicating the need for cleaning and sanitizing.

ATP bioluminescence assay is probably the most widely used technique in the food industry for hygiene monitoring and cleaning validation. It was created mainly to validate the cleaning on a production surface before the use of the sanitizer.

What are the advantages of ATP bioluminescence assay? It is simple, highly sensitive, cost effective, rapid (compared to conventional methods which take days), and provides real-time results within minutes. It saves water used for rinsing and optimizes sanitizer use.

What is the ATP bioluminescence assay principle? All living cells (animals, plants, bacteria, yeast, and mold) contain ATP. ATP bioluminescence detects the amount of ATP, which is an indirect measurement of the amount of organic/food residue on a surface that has the potential to support microbial growth and also microbial biomass. In simple terms, it measures the dirt or filth on a surface indicating the need for cleaning and sanitizing.

The amount of bioluminescence light is measured by the Luminometer and is expressed in Relative Light Units (RLU). RLU numbers are directly proportional to the amount of ATP, and therefore the amount of organic/food residue or microbial biomass on the sampled surface.

What are other uses of ATP bioluminescence assay? ATP bioluminescence assay also are used to:
- Detect microbial load in raw milk (cfu/ml).
- Assess microbiological quality of beef and pork carcasses and minced meat (cfu/g).
- Monitor microbiological activity in indoor air (cfu/ml).
- Monitor sanitary conditions in clinical settings.
- Monitor yeast and bacteria in beverages and fruit juices.
- Monitor cleanliness (bio-burden) of NASA spacecraft (to limit terrestrial microbes being transferred to other planetary bodies) and to detect life (living cells) on other planets.
- Monitor water quality.
- Verify cleaning (whether equipment is clean enough to go for production).

What are the disadvantages of ATP bioluminescence assay? The disadvantages of the assay are that:
- It does not easily distinguish ATP from microorganisms, animals, and plants.
- Luminescence from food can affect the actual ATP bioluminescence readings.
- The presence of detergents, sanitizers, or other chemicals also can affect the readings.
- It is not very sensitive for spore detection since the level of ATP is very low in spores.
- It does not substitute using traditional microbiological analysis.

The author is Director of Microbiology and Food Safety Education, AIB International.

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