

# Fast Microbiological Results in Aqueous Samples for Food & Beverage Quality Control

## Purpose

Hach®'s purpose is to make water analysis better – faster, simpler, greener, and more informative. Traditional microbiological testing takes several days for results, is technique-sensitive, and is too slow to take any action. This isn't conducive to the needs of food and beverage customers who need to assess the conditions of their processing facilities quickly. To solve these issues, Hach partnered with LuminUltra, who has developed an ATP microbiological test for aqueous samples. These tests provide total microbial counts in less than 5 minutes, and can even help differentiate between bacteria and larger cells such as yeast and mold.

## Background

ATP or Adenosine Triphosphate is the main energy carrying molecule for all forms of life. This makes the measurement of ATP a direct indication of total microorganisms.

If you have seen a firefly at night, then you have seen the ATP measurement process in action. Simply put, ATP recovered from microorganisms is mixed with the enzyme Luciferase to produce light which is measured in a luminometer.

**MORE MICROORGANISMS = MORE ATP = MORE LIGHT**

## “Swab” or “Pen” Testing vs. Aqueous Sampling

ATP testing originated decades ago with the use of 1<sup>st</sup> Generation swab-based devices. These systems effectively measure microbial content on surfaces in food and medical hygiene applications. They provide a qualitative “pass/fail” confirmation of surface cleanliness and are still effective tools in many Hazard Analysis Critical Control Point (HAACP) programs today. However, swab testing carries some drawbacks:

1. **Sampling Accuracy** – Swabs only detect ATP on the surface with which they come in contact. They can't measure an entire system, as some surfaces are inaccessible, and the bioburden often differs from one surface to another.
2. **Unsuitable for Fluids** – Swab testing can't be used to measure aqueous samples. If swabs are dipped in a fluid, it renders the measurement inaccurate due to significant sensitivity limitations.
3. **Qualitative Results** – Swabs provide a qualitative “pass/fail” measurement or Relative Light Units (RLU) rather than a quantitative estimate of microbial counts that can be compared to other traditional tests.

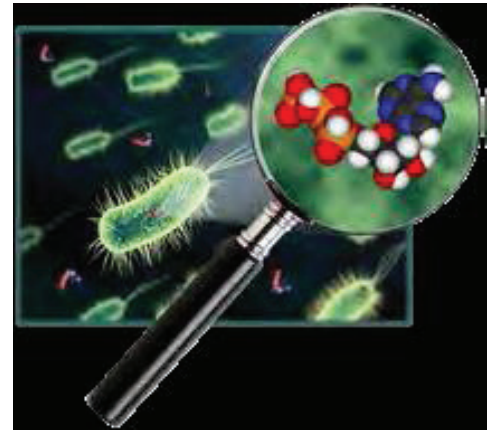


Figure 1. Adenosine Triphosphate (ATP)

## ATP in Aqueous Samples

LuminUltra developed 2<sup>nd</sup> Generation ATP technology to deliver fast, complete, and accurate microbiological measurement in fluids. Both portable and easy to use, LuminUltra test kits provide an interference-free indication of **total microbial quantity within minutes** of sample collection. Rapid microbial testing in Quality Control offers the following advantages:

1. **Sampling waters and other fluids**; not just surfaces
2. Complete extraction and recovery of ATP catches all microorganisms
3. Quantified ATP values that can **correlate to CFUs or HPCs**
4. Ability to **measure yeasts and molds** by isolating them via filtration

## Mitigating Risk

Regular water cycle testing within a food or beverage facility can quickly characterize the risk of microbial contamination. Inlet water and purified water can be tested in minutes to detect contamination incidents at the earliest point.

Measuring ATP through the CIP process can ensure adequate cleaning and help pinpoint potential contaminated areas. Similarly, verifying the cleanliness of rinse water enables immediate termination of the CIP process; saving excessively long cleaning cycles and water wastage.

## Summary

Aqueous ATP measurement represents a leap forward in rapid microbiological testing. This advance makes microbial testing faster, simpler, and more informative so that food and beverage customers can mitigate risks and conserve resources. Consider this tool, “microbiology for non-microbiologists”.

If there are applications that merit online or continuous ATP measurement, Hach can provide a unique solution for that as well. Please consult your local Hach representative.



Figure 2. Luminometer and ATP Data Management

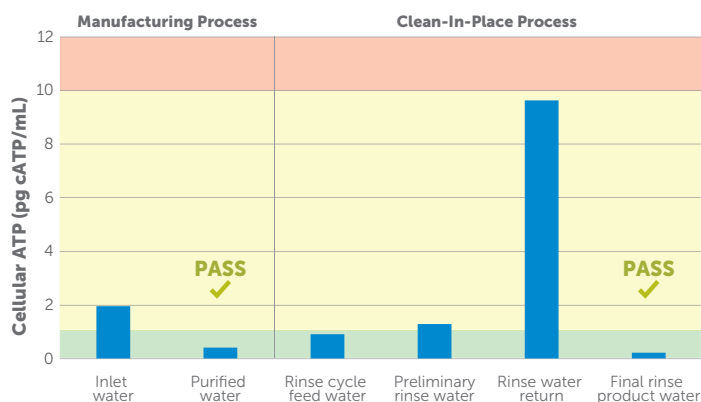


Figure 3. ATP screening tests in production and CIP rinses

## Peace of mind with 24/7 online monitoring

There is also continuous monitoring of microbial load with the Hach® EZ7300, the world’s first microbiology analyzer using the ATP firefly assay. The EZ7300 Series Analyzers monitor total bacterial and pathogen load in water by measuring the intracellular ATP of live microorganisms present in the sample. The analyzer can be used as an early warning system with focus on water safety, as high intracellular ATP values indicate a potential risk in exceeding a threshold value.

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