

Real-time Microbiological Feedback to Protect Product Quality!

Microbial growth in industrial chemicals can present a major problem. If left unchecked, microbial contamination in raw materials and intermediate products can compromise manufacturing process performance and equipment integrity. These same sources can also impact final product quality, which if not properly maintained can spoil products while sitting on the shelf. The best solution is early, accurate detection for proactive rather than reactive treatment.



Early detection is now possible in Paints and Coatings via LuminUltra's **Total Control MGC (TCM) ATP** test kit. This advanced, 2nd Generation ATP test kit provides users with the ability to accurately measure total microbial content in paints and coatings in **5 minutes or less**. When it comes to proactive microbial risk management, LuminUltra's test kits are the ideal tools to help **save time & money** and **reduce risk!**

Validating the ATP Analysis

ATP is the central energy carrying molecule for all forms of life. Successful measurement of ATP provides an indication of total microbial concentration, which is an ideal basis to assess product cleanliness and guide biocide dosing initiatives. This validation report will present results from a laboratory study done using the TCM tATP test method on several batches of paint samples.

Special Considerations

LuminUltra has determined that pre-dilution of paints and coatings in sterile water assists in promoting good sample transfer, mixing, and reaction properties. A **1mL paint/coating sample to 9mL water dilution** is recommended.

Method Reproducibility

The TCM tATP measurement shows good reproducibility when measured on diluted paint samples. Table 1 summarizes duplicate results for 3 samples and presents the calculation of the Coefficient of Variation (CV), which is a measure of the variability between replicate measurements. A lower CV represents superior reproducibility.

Table 1 – Reproducibility of Duplicate Measurements

Sample	[ATP] Rep 1 (pg ATP/mL)	[ATP] Rep 2 (pg ATP/mL)	[ATP] Average (pg ATP/mL)	[ATP] Standard Deviation	[ATP] Coefficient of Variation
#1	15802	13448	14625	1664	11%
#2	1289	1747	1518	324	21%
#3	51.55	63.00	57.27	8.10	14%

In general, the Coefficient of Variation is considered to be satisfactory in the range of 10 to 25%. For all samples, reproducibility was within this range, indicating good performance.

Comparison to Other Microbial Tests

The standard for measurement of microorganisms in paints and coatings is the culture test. Certain other ATP methods exist for measurement of microorganisms, although they are not ideal for paint or coating samples. Table 2 summarizes the results of three different microbial monitoring systems for the same samples above. TCM tATP is reported as concentration of pg ATP/mL, competing ATP is reported as RLU, and all culture tests are reported as CFU/mL. All numbers are reported as the average of duplicate analyses.

Table 2 – Comparison of Microbial Measurement Methods

Sample	LuminUltra TCM tATP (pg ATP/mL)	Competing ATP (RLU)	3M Petrifilm™ Aerobic Plate Count (CFU/mL)
#1	14625	35.0	1.1 x 10 ⁸
#2	1518	21.0	6.6 x 10 ⁷
#3	57.27	11.5	3.3 x 10 ³

Comparing the ATP methods, LuminUltra's TCM tATP method appears to recover much more ATP than the competing method, especially for larger microbial readings. Compared to the competing ATP method, TCM tATP measurements are provided in actual ATP concentrations, not arbitrary RLU readings which are unique to the testing conditions (i.e. reagent batch, temperature, and luminometer make/model).

Response to Process Changes

For a test method to be useful for process guidance and control, it must respond logically and sensitively to changes. In lieu of biocide treatments, such changes can be simulated by diluting contaminated samples in clean samples.

To assess the response of the TCM tATP test method versus the culture method, one contaminated paint sample was diluted 1/10 and 1/100 in a clean paint sample. These samples were then analyzed using both the TCM tATP method and the culture test to verify linearity. In Figure 1 these results are presented using a linear fit on a log-log plot.

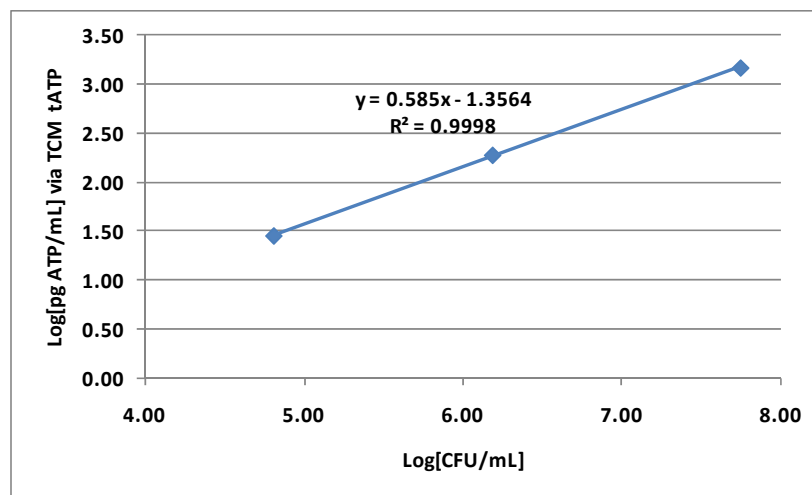


Figure 1 – Response to Dilution for TCM tATP versus Aerobic Culture Test (log scale)

These results demonstrate that the TCM tATP method will generally trend in the same direction as the culture tests traditionally utilized for quality control checking of paint and coating samples. Because different culture tests will return varying results and because each manufacturing will have their own defined control ranges, it is important to **establish a baseline** comparing TCM tATP, culture test, and other performance data prior to developing control criteria!

Sensitivity

Based on the use of a Kikkoman C-110 LumiTester luminometer and the TCM tATP test kit, the low detection limit for paint and coating samples is approximately **50 pg ATP/mL**.

NOTE: If required, amplified sensitivity can be achieved. Please inquire for this option.

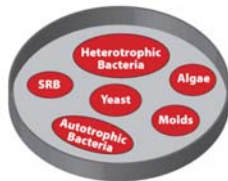
Real-time Information for Same-Shift Problem Solving!

Rather than waiting days to obtain test results using traditional culturing methods, TCM tATP provides on-the-spot results you need to take action during the same work shift. Moreover, these kits detect all living organisms, not just the relatively small percentage that form colonies in typical growth media.

Traditional 'Total' Plate Counts



LuminUltra Quench-Gone



Measurement	Traditional Total Counts	LuminUltra Quench-Gone
Speed	Days	Minutes
Portability	Not portable	Portable
Accuracy	Counts only microbial 'particles' regardless of size	Counts all cells individually
Specificity	Detects only organisms that can grow on media	Detects all organisms

Microbiological threats are best addressed in their early stages of growth. The real-time feedback and full portability of LuminUltra's test kits allows operators to identify, address, and validate threats during the **same shift!** And, at only dollars per test, LuminUltra's test kits provides you with an affordable compliment to your existing microbiological measurement programs that helps you **save time & money** and **reduce risks**.

Get Started Today!

Spoiled products affect your bottom line. With early detection, most events of product spoilage can be eliminated. **Saving a single batch from spoilage can often pay for the entire annual cost of testing for one plant!** For a modest investment, TCM tATP can help you improve your product protection initiatives, resulting in real savings, reduced risk, and increased customer confidence! Contact Aqua-tools today to get started with TCM tATP.



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