



Application Overview

Metalworking Fluid Management using Quench-Gone Organic Modified (QGO-M)

Microbial Contamination Results in Less than 5 minutes!

Microbial growth in metalworking fluids presents a major problem. Storage tanks, recirculation lines, filters, and other equipment can become fouled through microbial proliferation and metabolic activity, which results in a myriad of problems. These problems include compromised product quality from microbially influenced corrosion (MIC), equipment and filter plugging, and health risks from bioaerosols. The best solution to these problems is early detection and treatment. Rapid detection is now possible through LuminUltra's Quench-Gone Organic Modified (QGO-M) ATP test kit. This advanced test kit provides the user with an accurate measure of total microbial content in any metalworking fluid in less than 5 minutes.

How does QGO-M Work?

Adenosine triphosphate (ATP) is a molecule that is present in all living cells. Although ATP has been used to quantify biomass in water and other non-complex fluids since the mid-1950's, interferences – particularly from organic molecules and dissolved iron – has prevented the test from being useful in metalworking fluids (MWF). In the original method, light (luminescence) emitted from an extract of firefly tails was shown to be proportional to the number of microbes in a water sample. The luminescence was caused by the action of the enzyme luciferin on the substrate luciferase. The current method uses synthetic luciferin and luciferase, but the concept remains the same.

Use QGO-M to help optimize continuous biocide dosing, to guide system cleaning, and to audit fluid

change-out cycles! When it comes to metalworking fluid system management, LuminUltra's QGO-M test kit is the ideal tool to help save time & money and reduce risk!

NOTE: The QGO-M test kit is fully compliant with ASTM Standard E2694 for the measurement of ATP in Metalworking Fluids.

The Ideal Tool for Today's Economic Climate

With the current state of the economy, it is more important than ever to conserve and protect precious product resources. Microbial spoilage can cause downtime which can lead to inefficient production and wasted metalworking fluids. Biocide usage and dosing without an accurate microbiological profile of a system can lead to costly errors. Real time data from the QGO-M ATP Test Kit can be a money saving tool in these difficult economic times.



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Why Wait Until Tomorrow to Solve Today's Problems?

The standard for measurement of microorganisms in metalworking fluids are culture tests. These tests have the advantage of measuring specific types of microorganism communities such as bacteria, yeast or mold. However, the requirement for days of incubation to obtain results makes same-shift problem solving impossible. Furthermore, more than one measurement may be required to gauge the extent of contamination.

Rather than waiting days to obtain test results, QGO-M provides on-the-spot results that you need to take immediate action during the same work shift. In addition, QGO-M detects all living organisms, not just the relatively small percentage that form colonies in typical growth media found on culture media. The ideal microbial growth control program for metalworking fluids would incorporate the real time complete measurement of total microorganisms provided by LuminUltra's QGO-M test kit, with follow-up testing done using culture tests to validate control mechanisms to guard against specific bacteria, yeast and mold!

The QGO-M Method

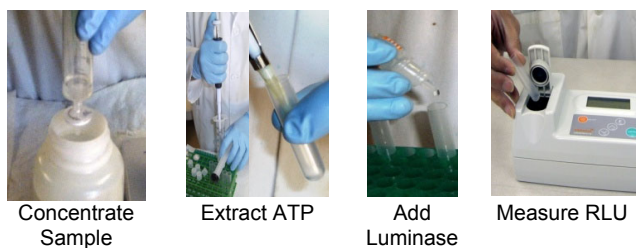


Figure 1 – The QGO-M Procedure

The QGO-M method (Figure 1) begins with a concentration step. A 5.0 mL sample is passed through a syringe filter. The filter is then washed with LumiClean to remove all interfering chemicals but leaves the microbial cells that have been trapped on the filter. The rinsed filter is air dried, and then the cells on the filter are lysed to release their ATP. The ATP extract is diluted and 100µL of sample is mixed with 100µL of Luminase (luciferin-luciferase reagent) and placed into a luminometer. The raw data, in relative light units (RLU), are converted to Log pg

ATP/mL by comparison against RLU from the UltraCheck ATP reference standard.

MWF Validation for QGO-M

Used, high-bioburden field samples of 3 MWF formulations (emulsifiable oil, semi-synthetic and synthetic) were diluted in fresh preparations of the same formulations in order to determine whether fluid type affected QGO-M ATP test results. Fluid-type did not affect test results significantly at the 95% or 99% confidence levels.

Based on these laboratory results, a 12-week field trial was conducted to validate the test method. The study, conducted at **Caterpillar, East Peoria, IL**. Twelve sump systems were monitored weekly for alkalinity, QGO-M ATP, CFU bacteria/mL, pH, microbicide concentration, and refractive index (°Brix). All three fluid types and a variety of machining operations (broaching, drilling, grinding, and lathing) were represented in the study. Results are summarized as follows:

- Number of samples: 93
- Number of machines: 7
- Average CV for Log₁₀[pg ATP/mL] = **11%**
- R (Log₁₀[pg ATP/mL] : Log₁₀[Bacteria]): **0.88**

The results demonstrated that QGO-M accurately measures microbial contamination AND that heavy microbial contamination affects key MWF performance properties*.

* The QGO-M test kit is fully compliant with ASTM Standard E2694 for the measurement of ATP in Metalworking Fluids. The research described above that contributed to method's approval is presented in Passman et al. Real-time Testing of Bioburdens in Metalworking Fluids using ATP as a Biomass Indicator (Abstr. 561437, STLE Annual Meeting, Orlando FL, 2009). Reprints are available upon request.

QGO-M provides you with multiple benefits:

- ✓ Real-time feedback enables quick action against microbial problems.
- ✓ Complete measurement guards against product deterioration from microbially influenced corrosion (MIC).
- ✓ Perform rapid quality control checks in lines and tanks.
- ✓ Fully portable, easy-to-use equipment and test kits.
- ✓ Compatibility with any photomultiplier tube luminometer.
- ✓ Adjustable measurement range with high sensitivity.
- ✓ Monitor deposits and biofilms with the Deposit & Surface Analysis (**DSA**) add-on kit.
- ✓ Monitor make-up water quality with the Quench-Gone Aqueous (**QGA**) test kit. Contaminated make-up water can provide a microbial 'seed' and exacerbate microbial problems in MWF systems.

Realize a New Level of Control with QGO-M!

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

Want to Learn More?

For more information, including other applications, product specifications, case studies, and product video demonstrations, to place an order or for technical support, visit www.luminultra.com today!

