

At LuminUltra, we are committed to providing high quality test kits to anyone that needs fast and reliable results about the microbiological characteristics of any process! Visit www.luminultra.com to learn about all the exciting opportunities that our technology can bring to your application.

Whereas traditional microbiological tests require days for feedback and measure only a fraction of the microorganisms, 2nd Generation Adenosine Triphosphate (ATP) test kits from LuminUltra measure total microorganisms and provide feedback in minutes!

In this test kit instruction guide, you will learn...

- Where this kit can be used;
- How 2nd Generation ATP technology works;
- How to handle and store components of this kit;
- How to perform tests;
- How to calculate and interpret results; and
- Where to find more information and how to contact us.

Choosing the Right Test Kit



QGO-M Test Kit (QGOM-100C)

LuminUltra provides 6 core test kits for measuring total microbiological concentration via ATP, each tailored to specific applications:

- Quench-Gone Aqueous (**QGA™**):
For low-solids water-based samples, such as drinking, cooling and oilfield waters.
- Quench-Gone Organic Modified (**QGO-M™**):
For low-solids organic-based samples, such as fuel, oily brine and lubricants.

NOTE: For samples that are more difficult to filter and/or have large quantities of inhibitory components (such as latex polymers, concrete admixtures, and personal care products), the QGO-M XL Pre-Dilution is available.

- Deposit & Surface Analysis (**DSA™**):
For measuring deposits and surfaces, including corrosion products and slimes.
- QuenchGone21™ Industrial (**QG21I™**):
For high-solids process fluids, including paper process and other wash waters.
- QuenchGone21 Specialty (**QG21S™**):
For chemical product testing, such as slurries, adhesives and other coatings.
- QuenchGone21 Wastewater (**QG21W™**):
For wastewater and bioprocessing samples, whether influent, bioreactor or effluent

All test kits are designed to be used with any photomultiplier-based luminometer. New users are advised to acquire the kit or kits of their choice to pair with the Field Kit & Luminometer Package (Product # **EQP-PAC**) when getting started with LuminUltra's 2nd Generation ATP test kits.

LuminUltra Technologies Ltd.

440 King Street, King Tower, Suite 630
Fredericton, New Brunswick, Canada E3B 5H8
+1-506-459-8777

support@luminultra.com
www.luminultra.com

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Where to use the QGO-M Test Kit

NOTE: The QGO-M test kit is fully compliant with ASTM Standard E 2694 for the measurement of ATP in Metalworking Fluids and D 7687 for the measurement of ATP in fuels, fuel/water mixtures and fuel-associated water.



The Quench-Gone Organic Modified (QGO-M) test kit is designed for low-solids

organic-based samples. Using a single analysis, you will be able to quickly measure total microbiological concentration in any organic sample with a wide detection range. Use QGO-M to detect total microbiological activity in:

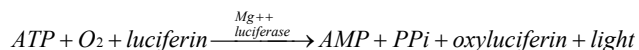
- ✓ Metalworking Fluids
- ✓ Finished Fuels
- ✓ Hydrocarbon Diluents
- ✓ Lubricants
- ✓ Crude Oil
- ✓ Oily Brines

...and more! In general, the QGO-M test kit is used in samples having more than 10% free oil and/or salinity content. For samples with less than 10% free oil and/or salinity, use the Quench-Gone Aqueous (QGA) test kit. For samples that are more difficult to filter and/or have large quantities of inhibitory components (such as latex polymers, concrete admixtures, and personal care products), use the QGO-M XLPD kit.

NOTE: When testing finished fuels and lubricants, it is recommended that aqueous and organic phases be analyzed separately where ever possible so as to ensure reliable interpretation of results. When testing organic phases of fuels and lubricants, ensure that they meet water content standards (from ASTM, ISO, or otherwise) prior to proceeding with the analysis. For example, diesel fuels should contain ≤ 500 ppm water and sediment (per ASTM D 975 and D 7467), while jet fuels should contain ≤ 30 ppm (per ASTM D 1655).

How Does ATP Testing Work?

LuminUltra's test kits are based on the measurement of ATP. ATP is a direct and interference-free indicator of total living biomass. ATP is measured using the firefly luciferase assay, where a sample containing ATP is introduced to a solution containing the enzyme Luciferase, which naturally occurs in the tails of fireflies, to produce light. The light is detected in a **luminometer** as Relative Light Units (RLU).



The QGO-M test kit utilizes a 5-minute filtration-based analysis to measure a parameter called Cellular ATP (cATP™). cATP represents ATP from living microorganisms in suspension in a fluid and therefore is a direct indication of the **planktonic** population.

While QGO-M is optimized to measure down to **0.25 pg ATP/mL** using standard procedures and equipment, there is essentially no limit to the sensitivity of this method. Procedural adaptations can be used to amplify the low-range sensitivity when necessary. Contact LuminUltra for more details on this option.

Getting Started

LuminUltra's test kits contain all of the consumable materials required to run their specified number of tests (Defined by the last 2 or 3 digits of the product code). To use these test kits, LuminUltra recommends one of the following equipment bundles:

- Field Kit & Luminometer (**EQP-PAC**):
Field Case, Micropipettors, Kikkoman Lumitester.
- Bench Materials & Luminometer (**EQP-BTM**):
Micropipettors, Kikkoman Lumitester, Test Tube Racks.
- Kikkoman Lumitester™ C-110 (**EQP-LUK**):
Kikkoman Lumitester luminometer & accessories.



Field Kit & Luminometer Package (EQP-PAC)

NOTE: LuminUltra's test kits can be used with the majority of photomultiplier tube-based luminometers. Contact LuminUltra to confirm compatibility of your luminometer.

LuminUltra is sensitive to the needs of each individual customer. Our expert staff can consult with you to determine the best means by which the data collected

from our test kits can be integrated into your existing data management practices. We have multiple software platforms and can even assist you to integrate ATP data directly into existing control systems, process historians, and data archives.

Getting started with QGO-M is easier with direct training. LuminUltra can supply you with on-site auditing and training services, web-based training, and one-on-one consultation to get your process improvement program off the ground. Contact us today to learn more!

Test Kit Contents and Storage

When you receive your QGO-M test kit, utilize the following guidelines for material storage. Note that the presence and quantity of each item listed below will depend on test kit size and type.

QGO-M Test Kit Contents & Storage Conditions

Component (LuminUltra P/N)	Store At	Shelf Life
Luminase™ Dropper (Lu-5mL) <i>Luciferase Enzyme Reagent, 5mL</i>	4°C*	4 mo*
UltraCheck™ 1 Dropper (UC1-5mL) <i>1 ng ATP/mL Standard, 5mL</i>	20°C	12 mo
UltraLyse™ 7 Bottle (UL7-125mL) <i>cATP Extraction Reagent, 125mL</i>	20°C	12 mo
UltraLute™ Bottle (ULu-500mL) <i>cATP Dilution Reagent, 500mL</i>	20°C	12 mo
LumiClean™ Bottle (LC-500mL) ** <i>Filter Wash Reagent, 500mL</i>	20°C	12 mo
Quench-Gone Organic Syringe Filters, 25/pk (DIS-SFQGO-25) ***	20°C	-
20mL Syringe, PP/PP, 25/pk (DIS-S20-25)	20°C	-
60mL Syringe, PP/Neoprene, 5/pk (DIS-S60-5)	20°C	-
100 to 1000µL Blue Pipette Tips, 100/rack (DIS-PT1-100R) ****	20°C	-
1 to 5mL Natural Pipette Tips, 50/pk (DIS-PT5-50) ****	20°C	-
12x55mm Test Tubes, 50/pk (DIS-CT12-50)	20°C	-
17x100mm Test Tubes, 25/pk (DIS-CT17-25)	20°C	-
17mm Caps, 25/pk (DIS-C17-25)	20°C	-

* Luminase shelf life can be extended to 6 months when frozen, or can be left at room temperature for as long as 3

weeks during routine use. Note that the Luminase supplied in QGO-M kits is NOT interchangeable with other forms of Luminase (i.e. Luminase^W, Luminase Lite, and Luminase^{XL}).

** LumiClean is a solvent and has flammable properties. Store below 55°C at all times to prevent boiling. Consult MSDS sheet for more information and be sure to follow storage and handling guidelines.

*** Note that Quench-Gone Organic filters are optimized for compatibility with all organic fluids, including biofuels. These filters are recommended for use in all QGO-M analyses, although regular Quench-Gone filters may be used to test less aggressive fluids such as oil-contaminated water.

**** Pipette tips supplied in complete test kits are compatible with most Fisherbrand and Eppendorf adjustable micropipettors.

NOTE: If your application requires greater sensitivity, inquire about our XL kit option.

Preparing to Test

- New to 2nd Generation ATP technology? Before getting started, consult the training center at www.luminultra.com for video demonstrations, use guidelines, validation guidelines, and more!
- Be certain to allow **Luminase** to reach ambient temperature prior to use!
 - For room temperature (15 to 25 °C) storage, no warming is required.
 - For refrigerator (2 to 8 °C) storage, let stand at ambient for at least 1 hour prior to testing.
 - For freezer (-10 to -20 °C) storage, let stand at ambient for at least 2 hours prior to testing.
 - **Luminase** exposure to temperatures between 30 and 40 °C should be limited to 1-2 hours. Prolonged exposure will result in accelerated activity loss. Never expose to temperatures > 40°C.
 - For more information on **Luminase** storage and handling, consult the **Luminase** insert.
- If you are new to the use of micropipettors, consult the Micropipetting Fundamentals training materials on www.luminultra.com.

- Avoid analysis contamination by always using a new pipette tip for each pipetting step.
 - Avoid usage of expired test kit components. Contact LuminUltra to replace expired components.
 - Because ATP and bacteria are present on skin, do not to touch the surface of pipette tips.
 - Ensure that all assay tubes are clean inside and outside. Do not mark on assay tubes as this may impact light detection by the luminometer.
 - Microbiological characteristics of most samples will begin to change immediately upon collection. Analyze samples **within 2 hours of collection** whenever possible.
 - If samples cannot be tested within 2 hours of collection, store refrigerated (2 to 8 °C) and test within 24 hours of collection. Ensure that samples are first allowed to reach ambient temperature prior to testing.
 - Perform ATP analyses on the same sample used for measuring other parameters for reliable interpretation.
 - Waste reagent can be discarded as general waste in most cases. Consult MSDS for more information. Obtain MSDS and other product documentation from www.luminultra.com.
- for recommendations on pre-dilution or use one of our pre-dilution kits for maximum compatibility with the analysis procedure.
- When testing samples that yield low RLU values (i.e. $RLU_{cATP} \leq 50$ when using a Kikkoman Lumitester C-100 or C-110), it is recommended that you account for background noise in the test procedure prior to the final calculations.
 - To assess background noise, simply follow the procedure without adding any of the ATP-containing sample into the analysis.
 - Correct for background noise by subtracting the background RLU (RLU_{bg}) from the measured RLU (RLU_{cATP}) prior to executing calculations.
 - Typical RLU_{bg} when using a Kikkoman Lumitester C-100 or C-110 are ≤ 10 . If high RLU_{bg} are consistently observed, repeat assays in an area out of direct sunlight or intense lighting. If problems still occur, contact LuminUltra for assistance.
 - A single RLU_{bg} may be used for multiple analyses much like a single UltraCheck 1 RLU (RLU_{UC1}).
 - If dropper bottles become plugged or you encounter difficulty dispensing drops, remove and discard the dropper tip and use a pipettor to measure and dispense the reagent.

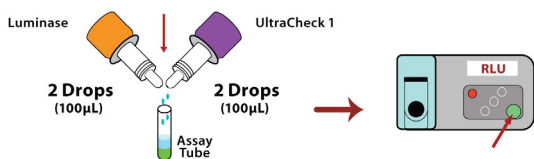
Diagnostics and Troubleshooting

- LuminUltra's test kits are the most robust and quantitative ATP test kits available. If you suspect you are encountering interferences in your application of these kits, first check to ensure you are using the correct kit type for your sample. If you are unsure or feel you have unique testing requirements, contact LuminUltra's support staff for assistance.
- If you encounter difficulty achieving complete filtration of your fluid sample, consider pre-diluting the sample in sterile water or buffer prior to Step 2 of the QGO-M cATP Analysis. Fluid samples with high solids content or complex nature (e.g. Polymer Latex, Crude Oil, Admixtures) may require pre-dilution prior to analysis to ensure reliable filtration and recovery of ATP. Contact LuminUltra

Step 1 – UltraCheck 1 Calibration

The **UltraCheck 1 (UC1)** Calibration converts luminometer RLU values into actual ATP concentrations. Perform one **UltraCheck 1** calibration per day or for each set of samples analyzed at the same time. Be sure that **Luminase** is allowed to reach ambient temperature prior to use.

PROCEDURE: Add 2 drops (100 μ L) of **UltraCheck 1** and 2 drops (100 μ L) of **Luminase** to a new 12x55mm test tube (the Assay Tube), swirl gently five times, immediately insert into the luminometer and measure. Record RLU_{UC1} for use in the final calculations.



NOTE: If $RLU_{UC1} \leq 5,000$ using a Kikkoman Lumitester C-100 or C-110, it is recommended to obtain a new bottle of Luminase for maximum sensitivity.

NOTE: RLU_{UC1} will fall over time for the same batch of Luminase. This is because of decreased luciferase enzyme activity. When followed, the guideline above ensures that there is sufficient activity to meet the specified detection limit.

Step 2 – QGO-M cATP™ Analysis

The QGO-M Cellular ATP (cATP) analysis measures ATP from living cells only. Perform one cATP analysis on each sample you wish to test.

2.1 – SELECT SAMPLE VOLUME

The QGO-M method allows flexibility in the amount of sample used for analysis. Use the following table to select the quantity of sample to be filtered in 2.2. As a general rule of thumb, the greater your sample volume, the greater the sensitivity you will be able to achieve!

QGO-M Sample Volume Recommendations

Sample Type	Recommended Volume (mL)
Crude Oil, Chemical Products	Diluted 1 to 10 *
Metalworking Fluids, Fuel Associated Water, Crude Oil	1 to 5
Finished Fuel, Lubricants **	10 to 20
Oily Brines	20

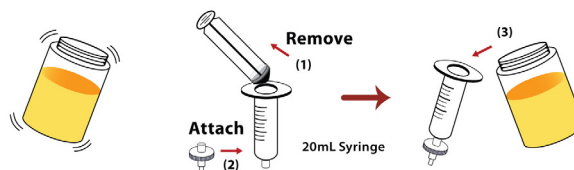
* High solids & complex fluids such as crude oil and chemical products should be pre-diluted prior to analysis using the QGO-M method. This ensures reliable filtration and recovery of cATP. The recommended dilution is 1mL sample in 9mL sterile and biocide-free water or buffer. Contact LuminUltra for pre-dilution product options, or choose the QGO-M XLPD test kit. Filter the volume of diluted sample specified in the above table.

** When testing finished fuels and lubricants, it is highly recommended that aqueous and organic phases be analyzed separately so as to ensure reliable interpretation. When testing fuels and lubricants, ensure that they meet water content standards (from ASTM, ISO, or otherwise) prior to

proceeding with the analysis. Diesel fuels should contain ≤ 500 ppm water and sediment (per ASTM D 975 and D 7467), while jet fuels should contain ≤ 30 ppm (per ASTM D 1655).

2.2 – MEASURE SAMPLE VOLUME

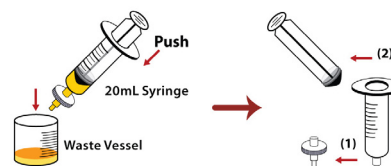
Mix your sample to ensure homogeneity. Remove the plunger from a 20mL syringe and attach a filter. Pour the appropriate volume of sample into the barrel of the syringe.



TIP: Alternatively, the syringe tip can be immersed into the sample and drawn into the barrel before attaching the filter, rather than pouring the sample into the barrel after attaching the filter. Be sure the syringe tip is clean if this mechanism is used.

2.3 – FILTRATION

Slowly push the entire sample volume through the filter and into a waste receptacle. Push the plunger far enough to filter the sample and stop to ensure that the filter remains wet. Detach the filter and remove the plunger.

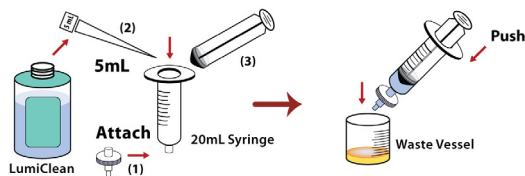


NOTE: If the full volume of sample could not be filtered, record the actual volume processed.

TIP: If increased sensitivity is desired, filter additional sample by repeating 2.2 and 2.3 using the same syringe and filter.

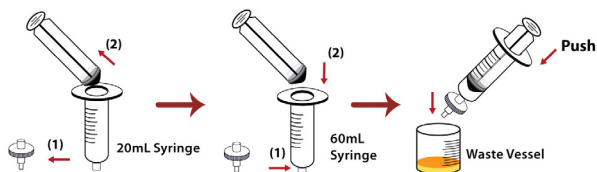
2.4 – FILTER WASHING

Re-attach the filter to the 20mL syringe barrel and use the micropipettor to add 5mL of **LumiClean** to the syringe barrel. Pass the **LumiClean** through the filter to dryness and collect into the waste receptacle.



2.5 – FILTER DRYING

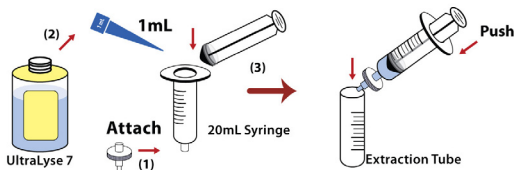
Detach the filter from the 20mL syringe barrel, and attach the filter to a 60mL syringe. While holding the filter tip over a waste receptacle, push the plunger through the barrel to dry the filter. Repeat this process a **second** time, first detaching the filter from the barrel before removing the syringe plunger.



TIP: The same 60mL syringe can be used to dry many filters. As a general rule, replace the 60mL syringe for every 20 tests performed, so long as the syringe is stored in a clean, dust-free location in its wrapper when not in use.

2.6 – EXTRACTION

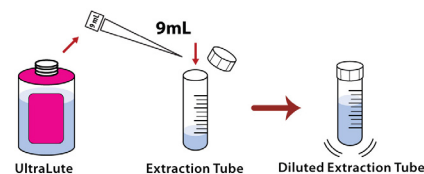
Re-attach the filter to the 20mL syringe barrel. Use the micropipettor to add 1mL of **UltraLyse 7** to the barrel. Pass the **UltraLyse 7** through the filter to dryness and collect in an unused 17x100mm test tube. This is called the Extraction Tube.



NOTE: At this point, the contents of the Extraction Tube can be capped and stored refrigerated between 2-8°C for up to 1 week prior to 2.7 and 2.8.

2.7 – DILUTION

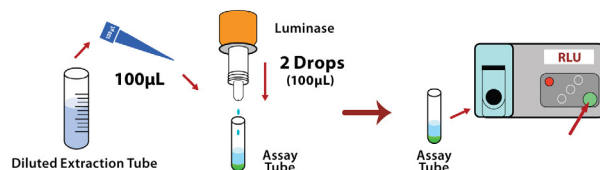
Add 9mL of **UltraLute** into the Extraction Tube. Cap and invert three times to mix. This is now called the Diluted Extraction Tube.



NOTE: At this point, the contents of the Diluted Extraction Tube are stable at room temperature for up to 4 hours.

2.8 – ASSAY

Using the micropipettor, transfer 100µL of the Diluted Extraction Tube contents to a new 12x55mm test tube (the Assay Tube), add 2 drops (100µL) of **Luminase**, swirl gently five times, immediately insert into the luminometer and measure. Record RLU_{CATP} for use in the final calculations.



NOTE: If RLU_{CATP} ≤ 10 on a Kikkoman Lumitester C-100 or C-110, you are below the low-detection limit. Report cATP (pg ATP/mL) = 0 in the final calculations, or select a larger volume in 2.1 and repeat the analysis.

NOTE: When RLU_{CATP} ≤ 50 on a Kikkoman Lumitester C-100 or C-110, it is recommended that you measure and subtract RLU_{bg} from your measurement. See Diagnostics and Troubleshooting. When possible, repeat the test procedure with a larger volume of sample to achieve a higher RLU_{CATP} and greater accuracy.

TIP: If “Scale Over” is returned, repeat the analysis using a smaller sample volume in 2.1.

Final Calculations

Following completion of QGO-M analyses, RLU values must be converted to ATP concentrations using the following calculations. For easy calculations, utilize **LumiCapture™** software available on www.luminultra.com. For manual calculations, see below.

Cellular ATP (**cATP**) represents the amount of ATP contained within living cells and is a direct indication of total living biomass quantity.

$$cATP (pg\ ATP / mL) = \frac{RLU_{cATP}}{RLU_{UC1}} \times \frac{10,000 (pg\ ATP)}{V_{Sample} (mL)}$$

NOTE: For pre-diluted samples, multiply the cATP concentration in pg ATP/mL by the appropriate pre-dilution factor prior to proceeding. For example, a 1 part sample in 9 parts of UltraLute pre-dilution would have a dilution factor of 10.

NOTE: When applicable, subtract RLU_{bg} from RLU_{cATP} prior to executing the above calculation.

To communicate results on the same basis as traditional culture tests, cATP results are converted into Microbial Equivalents (**ME's**). This is based on the established conversion that 1 E. coli-sized bacteria contains 0.001 pg (1 fg) of ATP.

$$cATP (ME / mL) = cATP (pg\ ATP / mL) \times \frac{1\ ME}{0.001\ pg\ ATP}$$

NOTE: For more discussion on the quantity of ATP per cell, visit www.luminultra.com.

Because many traditional culture-based methods report results in a similar fashion, it is sometimes convenient to report cATP results in ME/mL using Scientific Notation (i.e. **## x 10[#]**) or on a **Log₁₀** format for comparison purposes.

Interpretation Guidelines

Once QGO-M cATP results are calculated, microbial control can be evaluated. ATP-based measurements are extremely sensitive to changes in total microbial quantity. In general, processes will have the best microbial control when **cATP is minimized**.

LuminUltra's ATP test kits can be used to audit microbial quantity to reveal differences at different process locations in an effort to quickly assess the 'hot

spots' within a process that require more immediate attention.

For process control, daily monitoring using ATP test kits will give you true total microbial quantity parameters to trend over time against process characteristics and performance.

When utilizing ATP test kits it is important to remember that every process is different. During **audits**, relative comparisons from point to point are a reliable means to assess your process, while for **daily monitoring** it is important to establish a baseline trend before making control decisions. To get started, LuminUltra provides the following guidelines in units of **pg cATP per mL**:

QGO-M cATP Interpretation Guidelines

Application	Good Control (pg cATP/mL)	Preventive Action (pg cATP/mL)	Corrective Action (pg cATP/mL)
Finished Fuels, Conventional Lubricants *	< 10	10 to 100	> 100
Crude Oil, Fuel Associated Water, Oily Brines, Chemical Products	< 100	100 to 1,000	> 1,000
Metalworking Fluids, Fire-Retardant Lubricants	< 1,000	1,000 to 10,000	> 10,000

* The interpretation guidelines provided above are based on samples that meet defined standards (from ASTM, ISO, or otherwise) for water content. For example, diesel fuels should contain ≤ 500 ppm water and sediment (per ASTM D 975 and D 7467), while jet fuels should contain ≤ 30 ppm (per ASTM D 1655). If the sample has greater water content than defined as acceptable by the standard, interpretation guidelines may vary. Contact LuminUltra for interpretation advice.

NOTE: These interpretation guidelines are designed for generic risk management guidance **only**. Users are encouraged to establish their own control ranges on which to base process decisions. LuminUltra and its affiliates do not accept any liability for any decision or assessment taken or made as a consequence of using this test kit.

Ordering Information

- New to 2nd generation ATP technology? Start by ordering the Field Kit & Luminometer Package (Product # **EQP-PAC**) and the test kit(s) of your choice.
- When reordering materials for testing, it is preferred to order complete kits. QGO-M is available in four formats:

Description	Part #
QGO-M, 100 Tests, Complete *	QGOM -100C
QGO-M, 100 Tests, Reagents Only	QGOM -100
QGO-M, 25 Tests, Complete *	QGOM -25C
QGO-M, 25 Tests, Reagents Only	QGOM -25

* Complete kits include LuminUltra-manufactured reagents plus all consumables (tips, tubes, filters, syringes) required to run analysis. If you supply your own consumables, reagent only kits are available.

- To obtain pricing information, inquire about other products and services, or to place an order, contact LuminUltra or your authorized representative.

LuminUltra Technologies Ltd.

440 King Street
 King Tower, Suite 630
 Fredericton, New Brunswick
 Canada E3B 5H8
 Tel: +1-506-459-8777
 Fax: +1-506-453-9860
sales@luminultra.com
www.luminultra.com

- Major credit cards (Visa, MasterCard, AMEX) are accepted. Contact LuminUltra by phone to place credit card orders.



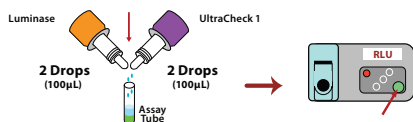
- Orders generally ship within 3 business days. You will receive order confirmation via Fax or Email.

Lumitester is a trademark of Kikkoman Corporation, all other trademarks are the property of LuminUltra Technologies Ltd.

NOTE: Please refer to Test Kit Instructions during first product use and for additional details including legal statements.

Step 1 – UltraCheck™ 1 Calibration

Perform one UltraCheck 1 calibration per day or per each set of samples analyzed.



NOTE: If $RLU_{UC1} \leq 5000$ using a Kikkoman Lumitester™ C-100 or C-110, obtain a new bottle of Luminase.

Step 2 – QGO-M™ cATP™ Analysis

2.1 - SELECT SAMPLE VOLUME

Determine volume of sample to filter.

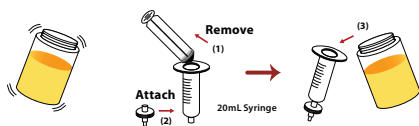
Sample Type	Recommended Volume (mL)
Crude Oil, Chemical Products	Diluted 1 to 10*
Metalworking Fluids, Fuel Associated Water	1 to 5
Finished Fuel, Lubricants**	10 to 20
Oily Brines	20

* See note in Test Kit Instructions for sample pre-dilution recommendations.

** When testing finished fuels and lubricants, it is highly recommended that aqueous and organic phases be analyzed separately so as to ensure reliable interpretation. When testing fuels and lubricants, ensure that they meet water content standards (from ASTM, ISO, or otherwise) prior to proceeding with the analysis. Diesel fuels should contain ≤ 500 ppm water and sediment (per ASTM D 975 and D 7467), while jet fuels should contain ≤ 30 ppm (per ASTM D 1655).

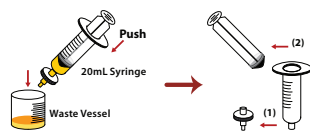
2.2 - MEASURE SAMPLE VOLUME

Add sample to syringe.



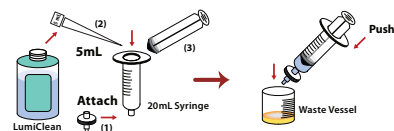
2.3 - FILTRATION

Filter sample to concentrate microorganisms.



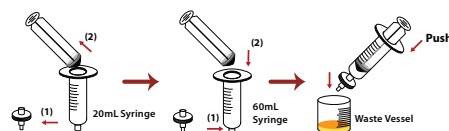
2.4 - FILTER WASHING

Wash filter of organic contaminants.



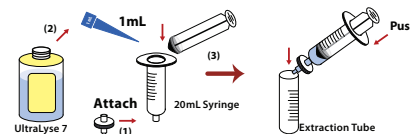
2.5 - FILTER DRYING

Dry filter to remove volatile organics.



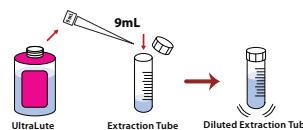
2.6 - EXTRACTION

Extract ATP from filter.



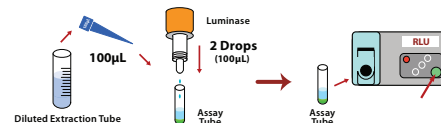
2.7 - DILUTION

Dilute out interferences.



2.8 - ASSAY

Measure ATP concentration.



NOTE: If $RLU_{cATP} \leq 10$ on a Kikkoman Lumitester C-100 or C-110, you are below the low-detection limit.

NOTE: If $RLU_{bg} \leq 50$ on a Kikkoman Lumitester C-100 or C-110, consider accounting for RLU_{bg} . See Test Kit Instructions.

Final Calculations

$$cATP \text{ (pg ATP / mL)} = \frac{RLU_{cATP}}{RLU_{UC1}} \times \frac{10,000 \text{ (pg ATP)}}{V_{Sample} \text{ (mL)}}$$

$$cATP \text{ (ME / mL)} = cATP \text{ (pg ATP / mL)} \times \frac{1 \text{ ME}}{0.001 \text{ pg ATP}}$$

NOTE: 1 ME (Microbial Equivalent) assumes 0.001 pg (1 fg) ATP per cell.

Interpretation Guidelines

Application	Good Control (pg cATP/mL)	Preventative Action (pg cATP/mL)	Corrective Action (pg cATP/mL)
Finished Fuels, Conventional Lubricants*	< 10	10 to 100	> 100
Crude Oil, Fuel Associated Water, Oily Brines, Chemical Products	< 100	100 to 1,000	> 1,000
Metalworking Fluids, Fire-Retardant Lubricants	< 1,000	1,000 to 10,000	> 10,000

NOTE: Interpretation Guidelines are provided for general guidance. For best results, establish your own baseline and control levels.

* The interpretation guidelines provided above are based on samples that meet defined standards (from ASTM, ISO, or otherwise) for water content. For example, diesel fuels should contain ≤ 500 ppm water and sediment (per ASTM D 975 and D 7467), while jet fuels should contain ≤ 30 ppm (per ASTM D 1655). If the sample has greater water content than defined as acceptable by the standard, interpretation guidelines may vary. Contact LuminUltra for interpretation advice.