Liquid Scintillation

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Introduction:

Liquid scintillation provides a method for analyzing the concentration of radioactivity in an unknown sample. Detection is achieved by converting the kinetic energy of a nuclear emission into light energy. This conversion is accomplished by adding a scintillation cocktail to an unknown sample. Solvent molecules in the scintillation cocktail become excited by the radiation which results in the excitation of a fluorescent molecule. When the fluor molecule returns to its ground state a blue flash of light is emitted. The light is captured by a detector and recorded as a radioactive emission called a count.

Applications:

- TLC Spot Quantitation
- Counting Samples bound by filters
- Counting Tissue Samples
- Counting $^{14}CO_2$
- Counting samples purified by Electrophoresis
- Wipe testing to identify radioactive contamination

Liquid Scintillation Sample Preparation with the ML500 diluter:

The ML500 is used to create standards and prepare sample dilutions for Liquid Scintillation. The following key features make the ML500 ideal for this application:

- A borosilicate glass and PTFE fluid path to minimize sample carryover
- Stored methods to eliminate the chance for operator error
- A logging feature in the software to record all pump operations
- Small volume accuracy to increase reproducibility

Diluter Overview:

The ML500 Diluter is a semi-automated liquid handling device, ideal for repetitive and precise aspiration and dispensing over a wide range of volumes. The instrument is designed to:

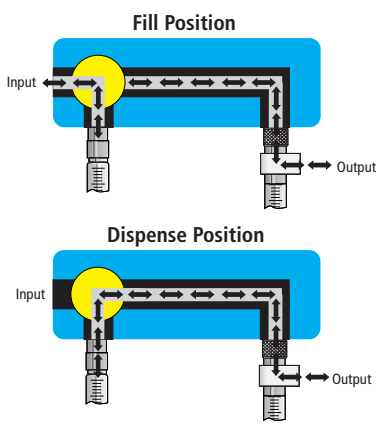
- Eliminate tedious volume changes associated with traditional dispensing techniques
- Reduce user to user variation
- Increase dispense accuracy and precision
- Decrease preparation time per sample
- Record the work performed in an electronic log

General Dilution Method:

The ML500 Diluter is a dual syringe instrument with one active valve above the diluent (left) syringe. The pump is primed by filling the syringe with diluent through the input valve position and then dispensing from the output position. Once air bubbles are removed, the system is ready to prepare samples:

Step 1: The left syringe fills with the appropriate volume of diluent.
Step 2: The probe is positioned in the sample while the sample (right) syringe is triggered to aspirate the desired volume.
Step 3: The probe is positioned over the diluent vial and both syringes are triggered to dispense the sample followed by the diluent.
Note: The dilutent washes the sample from the tubing
Step 4: Repeat steps 1-3 for the remaining samples in the experiment.

Note: When using a viscous scintillation cocktail it is important to use the 12 gauge tubing and to slow the syringe speed to avoid cavitation. In some cases larger fill tubing or a pressurized reagent vessel is necessary.



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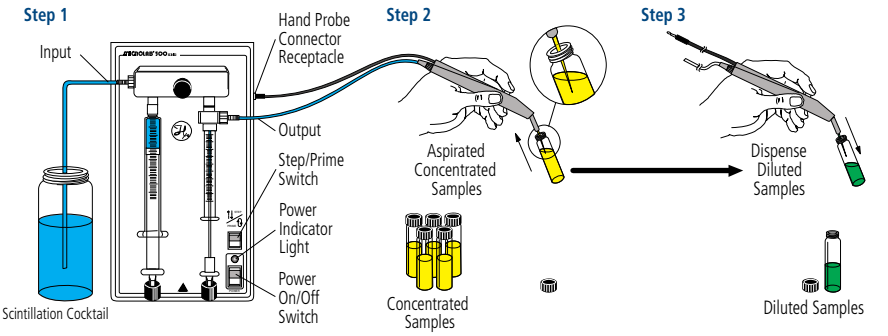

Figure 1. The figure illustrates steps 1-3 from the previous diluter overview section.

Ordering Information:

Hamilton Company offers three different ML500 series for Liquid Scintillation and a variety of additional fluid handling applications.

ML500A Series (p/n ML503115) – Basic Nonprogrammable MICROLAB*. This unit ships complete with an A series controller, diluter valve, tubing, concorde style hand probe, manual, 2.5mL diluent syringe, and a 250µL sample syringe.

ML500B Series (p/n ML530115) – Programmable MICROLAB*. This unit ships complete with a B series controller, diluter valve, tubing, concorde style hand probe, manual, 2.5mL diluent syringe, and a 250µL sample syringe.

ML500C Series (p/n ML531115 or ML560115) – Computer Controlled MICROLAB*. These units ship with the ML500 control software, manual, and a communications cable. A valve and probe package (p/n DILPKG) is available separately and provides the diluter valve, tubing, and concorde style hand probe. Syringes are also sold separately**.

*To learn more about the ML500 part numbers and series above please visit:
www.hamiltoncompany.com/diluters/model-features.asp
**To view replacement parts and accessories visit:
http://www.hamiltoncompany.com/diluters/accessories.asp