

LSC in Practice

Measurement of ^3H in Dilute Sulfuric Acid

Problem

One of PerkinElmer's field sales engineers forwarded a request for assistance regarding the selection of the optimal cocktail for use with a sample containing 4.5 mL deionized water and 0.036 N sulfuric acid. The nuclide of interest was ^3H , and polyethylene vials were used extensively in the laboratory. In addition, the researcher's laboratory currently used Opti-Fluor™ for other samples and our representative hoped that this same cocktail could be used for this sample type.

Our representative had identified ULTIMA Gold™ AB as an alternate cocktail.

Discussion

We prepared the sample by diluting sulfuric acid to 0.036 N and used this solution to evaluate various cocktails. With some cocktails, the modification of water with a small amount of acid increases the capacity for water. However, with other cocktails this modification can result in a decrease in sample capacity. From prior experience, we suspected that Opti-Fluor would not be suitable for this reason, and evaluated ULTIMA Gold, ULTIMA Gold AB, ULTIMA Gold LLT, and Poly-Fluor™ with this sample (PerkinElmer part numbers 6013329, 6013309, 6013377, and 6013279, respectively).

Unless otherwise stated, all work was carried out at 20 °C, and the results of our tests were as follows:

With ULTIMA Gold, the addition of an additional 1.0 mL of cocktail produced a clear microemulsion at 20 °C which remained stable for 24 hours. With both ULTIMA Gold AB and ULTIMA Gold LLT, an increase in temperature above 25 °C induced instability, and conversely, with ULTIMA Gold a reduction of temperature to below 20 °C caused instability.

Recommendations

We recommend either ULTIMA Gold AB or LLT although the other cocktails could be used if the limitations mentioned above are observed. In addition, we recommend that the researcher check this system in glass vials to visually confirm stability prior to using polyethylene vials.

Cocktail (10.0 mL)	+ 4.5 mL 0.036 N H ₂ SO ₄	Notes
Opti-Fluor	Unstable white emulsion	
ULTIMA Gold	Slight phase separation	On the absolute edge of stability
ULTIMA Gold AB	Clear	Stable for 24 hours
ULTIMA Gold LLT	Clear	Stable for 24 hours
Poly-Fluor	Unstable white emulsion	

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