

LSC in Practice

Sample Loading for ULTIMA Gold XR

Problem

One of our chemicals and supplies field specialists contacted our laboratories for help in determining the sample loading capacity of ULTIMA Gold™ XR (PerkinElmer part number 6013119) for specific solvents that were not listed in the standard literature. The researcher wanted to count his samples in methanol, acetonitrile and benzene.

Discussion

ULTIMA Gold XR is capable of accepting very high loading of the three solvents named above, provided that the solvents are 100% pure. If, however, the methanol or the acetonitrile contains some water, the percentage loading for the combined mixture will be reduced.

In the case of methanol, the presence of as little as 5% water will have a significant effect on the percentage loading. In contrast, if acetonitrile contains 5% water, the sample loading is virtually unaffected. Since benzene is not miscible with water, there is no problem and ULTIMA Gold XR can accept 10 mL of benzene in 10 mL of cocktail.

We tested both methanol and acetonitrile to illustrate this effect and have tabulated the results below:

Sample	mL of Sample in 10 mL of Cocktail at 20°C
Methanol (100% pure)	10.0 mL
Acetonitrile (100% pure)	10.0 mL
Methanol/water (95/5 i.e., 5% water)	3.5 mL
Acetonitrile/water (95/5 i.e., 5% water)	10.0 mL
Methanol/water (90/10 i.e., 10% water)	3.0 mL
Acetonitrile/water (90/10 i.e., 10% water)	9.0 mL

The table above shows that ULTIMA Gold XR can accept up to 10 mL of pure solvent (methanol, acetonitrile) in 10 mL of cocktail at 20 °C, and shows the effect of the presence of water.

Recommendation

The single most important step in liquid scintillation counting is proper sample preparation. As this brief illustrates, a cocktail's high sample loading capacity for individual solvents may not be valid when solvents are mixed together. Whenever a new solvent system or solvent mixture is encountered, the researcher should carefully evaluate the system. The evaluation should include the use of glass vials to permit inspection of the sample and the detection of two-phase separation, precipitation or color formation.

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