

LSC in Practice

Cocktails for Acidified Sea Water

Problem

A researcher called explaining that he was trying to determine ¹⁴C in phytoplankton in sea water. However, he needed to remove some interfering inorganic ¹⁴C by treating the sea water with 6 N hydrochloric acid. The final sea water sample was composed of 2.0 mL sea water + 0.5 mL 6 N hydrochloric acid. To this sample, 4.5 mL of cocktail was then added. The researcher was attempting to use ULTIMA Gold™ XR (PerkinElmer part number 6013119) but had obtained an unstable, milky white emulsion.

Discussion

Sea water alone is a fairly difficult sample type, and the addition of hydrochloric acid increased the difficulty. ULTIMA Gold XR has a limited capacity for sea water and is not optimal for use with strong mineral acids. Consequently, the failure of ULTIMA Gold XR

to accept this sample could be predicted. The only other cocktails which are known to work with sea water are ULTIMA Gold AB (PerkinElmer part number 6013309), ULTIMA Gold LLT (PerkinElmer part number 6013377) and Ultima-Flo™ AP (PerkinElmer part number 6013599). Hionic-Fluor™ (PerkinElmer part number 6013319) also has a moderate capacity for sea water but the researcher had requested a safer cocktail. To evaluate this system, the sample was added to the cocktails at 20 °C in two stages:

1. 4.5 mL cocktail + 2.0 mL sea water
2. 4.5 mL cocktail + 2.0 mL sea water + 0.5 mL 6 N hydrochloric acid

This sequence was used to confirm that the cocktails could accept the sea water at this loading and to verify that the hydrochloric acid interfered. The results were:

Cocktail (4.5 mL)	2.0 mL Sea Water	(2.0 mL) Sea Water + 0.5 mL 6 N HCl
ULTIMA Gold XR	Clear	White emulsion
ULTIMA Gold AB	Clear	White emulsion
ULTIMA Gold LLT	Clear	Clear

Cocktail (4.5 mL)	2.0 mL Sea Water	(2.0 mL) Sea Water + 0.5 mL 6 N HCl
ULTIMA-Flo AP	Clear	Clear
Hionic-Fluor	Slightly hazy	Separates in 2 phases

The above results show that both ULTIMA Gold LLT and Ultima-Flo AP are suitable for this type of sample at 20 °C.

The performance of ULTIMA Gold LLT could have been predicted since this cocktail was developed to

work with strong mineral acids and is known to work well with sea water.

Recommendations

ULTIMA Gold LLT was recommended to the researcher.

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