FLUORESCENCE APPLICATIONS

ANALYSIS OF ALUMINUM USING THE MODEL LS-50

The analysis of aluminum is becoming increasingly common due to its implication in renal dysfunction and its toxic effects in marine and freshwater (1). A popular fluorescence detection method involves the use of the highly specific chelating agent morin coupled with the Tergitol-XD micelle system to enhance the fluorescence of the chelate and protect it from interference (2).

METHOD

Tergitol-XD was obtained from Sigma Chemical Co. Morin (spot test grade) was obtained from BDH. Deionized water was used throughout. All other reagents were BDH 'AnalaR' grade.

A 10 ppm stock solution of aluminum was prepared by dissolving 0.176 g of aluminum potassium sulfate dodecahydrate in water, adding 1 mL of 50% sulfuric acid, and diluting to 1 litre in water. Morin solution was freshly prepared by dissolving 0.1 g morin in 100 mL ethanol containing 5% water and 9% methanol. Acetate buffer (pH 2.8) was prepared by dissolving 8.1 g sodium acetate in 100 mL of 3.6 N sulfuric acid.

Samples were prepared for measurement by transfer of an aliquot of the aluminum solution to a 10 mL graduated flask into which 1 mL of 5% Tergitol-XD and 0.5 mL of morin solution were added. The solution was then diluted to 10 mL with acetate buffer.

Analysis was performed using the PerkinElmer Model LS-50 Luminescence Spectrometer.

RESULTS

Figure 1 shows the effect of aluminum on the emission spectrum of morin in the Tergitol-XD micelle. Background fluorescence is probably due to a small amount of aluminum from the glassware and water supply. Excitation and emission wavelengths were 416 and 488 nm respectively, slits 15/20 nm.

The calibration graph for aluminum is shown in Figure 2.

Linearity was observed over the range 40 ppt - 400 ppb (equivalent to approximately $10^{-9}$ M to $10^{-5}$ M). The detection limit, defined as the concentration of sample producing a signal-to-noise equal to twice that of the background, was found to be approximately 40 ppt ($1.3 \times 10^{-9}$ M).
REFERENCES
