

LSC in Practice

⁴⁵Ca Adsorption onto Glass Vials

Introduction

Our field sales engineer told us about a laboratory that was measuring ⁴⁵Ca and had encountered unexpectedly low counts. The researchers asked for assistance, suspecting sample preparation to be the primary problem.

The sample of interest was aqueous CaCl₂ (0.0000375 M) and the assay was being performed in 7 mL glass vials (PerkinElmer part number 6000167).

The sample preparation steps were not complex: mix 0.5 mL of the sample with 3 mL of liquid scintillation cocktail. After preparation, about 50,000 counts (vial A) were present, and expected. Subsequently, three 0.35 mL aliquots were taken from vial A and these were used to fill three additional vials: B, C and D.

After these preparation steps, vial A should contain about 35,000 counts while vials B, C and D should each contain about 5,000 counts.

Unfortunately, the actual counting results were as follows:

Vial A = 50,000 counts

Vial B = 0

Vial C = 0

Vial D = 0

It was suspected that the CaCl₂ was being adsorbed onto the glass of the vial body.

Discussion

We agreed with the researchers' suspicions regarding adsorption of the ⁴⁵Ca onto the glass in the vial.

This effect is known to happen and with the incredibly low concentration of the sample, this is a very distinct possibility.

Recommendations

We recommended switching to polyethylene vials to avoid this problem. In addition, if glass vials are preferred, we recommend the addition of nonradioactive CaCl₂ to the cocktail prior to the addition of the sample (e.g., 0.1 mL of 0.1 M CaCl₂). The addition of the CaCl₂ will "precoat" the glass vial surface with Ca and help prevent the sample from adhering to the glass.