# LSC in Practice

## Counting $^{14}C$ in High Activity Sodium Carbonate Solution

### Problem

A researcher contacted PerkinElmer to report difficulties in determining the exact DPM of a high activity sodium carbonate solution. This laboratory was using PerkinElmer's ULTIMA Gold™ AB (PerkinElmer part number 6013309) and had observed unexpectedly low DPM results which steadily decreased when the sample was allowed to stand.

### Discussion

Although not immediately obvious, this researcher's difficulties are due to improper cocktail selection for the sample of interest.

Emulsifying cocktails, such as ULTIMA Gold AB, contain phosphate esters and are buffered to a slightly acidic pH. The addition of the sodium carbonate solution to the cocktail results in a reaction between the slightly acidic phosphate ester and the sample of interest. Carbon dioxide, a byproduct of this reaction, is released into the air. Unfortunately, the radioactive carbon from the sample becomes involved with the reaction, resulting in the release of $^{14}CO_2$.

This produces low results since the radioactivity has been released.

We have seen this problem in the past and had worked closely with another research laboratory to develop a procedure that would provide consistent results.

### Recommendation

We recommend the use of the following method to achieve good and reproducible results for high activity sodium carbonate solutions:

1. Use high performance glass vials (such as PerkinElmer part number 6001009 or 6001050).
2. Add 10.0 mL Pico-Fluor™ 15 (PerkinElmer part number 6013059) to a glass vial.
3. Add 1.0 mL water and shake to form a clear mixture.
4. Add 100 µL sodium carbonate solution and shake to form a clear mixture.
5. Determine the DPM using a $^{14}C$ toluene quench curve.

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