

February 22, 1996

## Trapping $^{14}\text{CO}_2$ in Potassium Hydroxide

**Problem:**

A researcher called one of our offices to report a suspected contamination problem with one batch of Packard's Hionic-Fluor™ (Packard part number 6013319).

The researcher was using Hionic-Fluor to count  $^{14}\text{CO}_2$  that had been trapped in 2 M potassium hydroxide, which acted as an absorber in this sample collection system. After collection, by bubbling the gas through the absorber solution, 2 mL of sample were added to 10 mL of Hionic-Fluor. When counting the prepared homogeneous sample, the researcher was observing backgrounds that were over 100 CPM (0 - 156 keV) and stable for longer than 12 hours.

The stability of the high backgrounds indicated contamination, rather than chemiluminescence, which prompted the researcher to report the problem to a Packard Application Laboratory.

**Discussion:**

Upon receipt of the report, we immediately tested our retained samples of the suspected lot against an alternate lot.

Testing was conducted under the following conditions:

- |                    |  |
|--------------------|--|
| 1. Instrument      | Packard Tri-Carb® Model 1900 operated at 20 °C             |
| 2. Windows         | 0 - 156 keV and 4 - 156 keV                                |
| 3. Vials           | High performance glass vials (Packard part number 6001015) |
| 4. Cocktails       | Hionic-Fluor (lots number 5041 and number 5091)            |
| 5. Cocktail volume | 10.0 mL  |
| 6. Sample          | 2.0 mL of 2 M KOH  |

Under the conditions listed above, we obtained backgrounds of 70 to 100 CPM for both lots of Hionic-Fluor. These backgrounds did not decay over a 12 hour period and the spectrum strongly suggested an isotopic contamination.

We repeated our comparison testing but substituted 2 M NaOH as the sample and only observed normal background levels for both lots of cocktail.

Consequently, we determined that the background problem was associated with the potassium hydroxide, due to high levels of naturally occurring radioactive  $^{40}\text{K}$ .

**Recommendation:**

To avoid this unexpected source of contamination, we recommended that the  $\text{CO}_2$  absorber solution be changed from potassium hydroxide to sodium hydroxide. Our prior research indicates that the same  $\text{CO}_2$  capacity will be achieved without the potential for unwanted backgrounds.