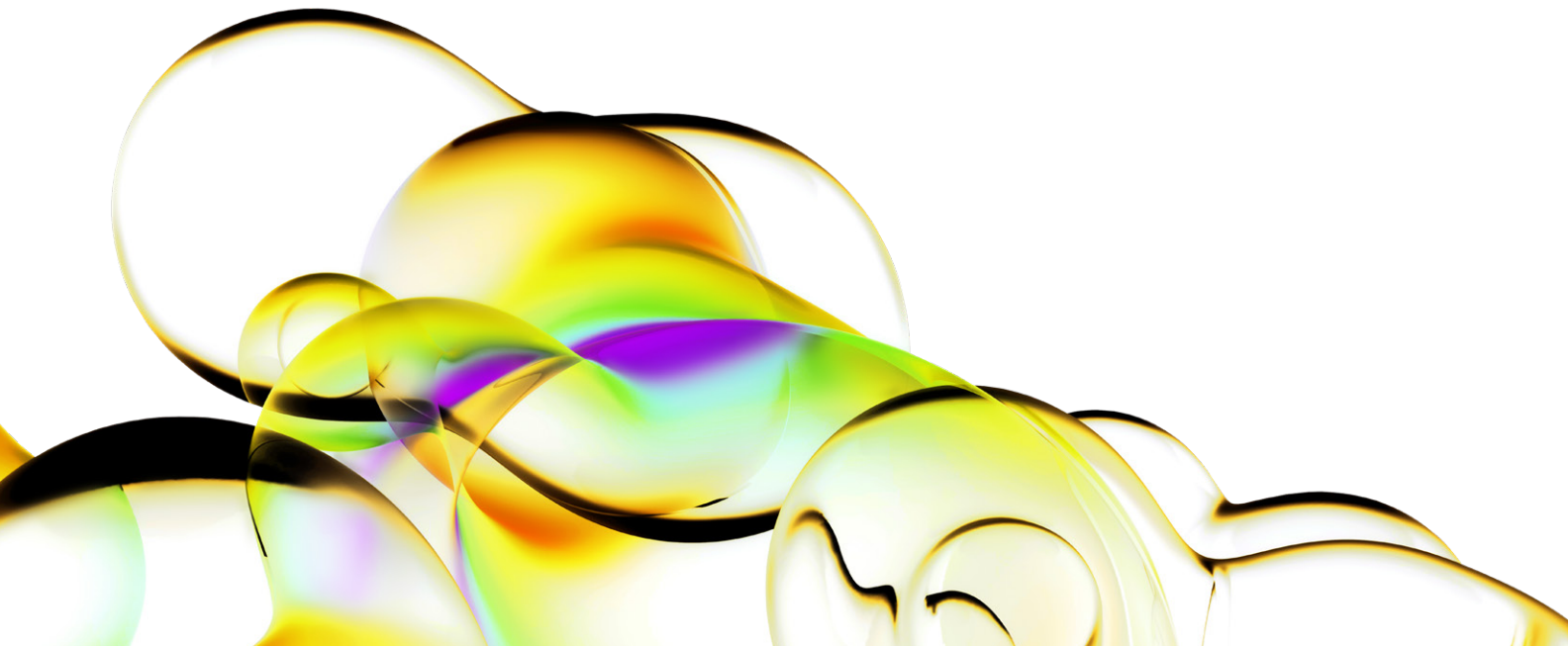
LSC cocktails in practice: Counting potassium hydroxide may produce high background due to ^{40}K.

Problem

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

The researcher was using Hionic-Fluor to count $^{14}CO_2$ 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 Revvity 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	Revvity Tri-Carb® Model 1900 operated at 20 °C
2. Windows	0-156 keV and 4-156 keV
3. Vials	High performance glass vials (Revvity part number 6001015)
4. Cocktails	Hionic-Fluor
5. Cocktail volume	10.0 mL
6. Sample	2.0 mL of 2 M KOH

Under the conditions listed below, we obtained backgrounds of 70 to 100 CPM for both lots of Hionic-Fluor. These backgrounds did not decay over a 12 hours 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}K.

Recommendation

To avoid this unexpected source of contamination, we recommended that the CO_2 absorber solution be changed from potassium hydroxide to sodium hydroxide. Our prior research indicates that the same CO_2 capacity will be achieved without the potential for unwanted backgrounds.

Revvity, Inc.
940 Winter Street
Waltham, MA 02451 USA
www.revvity.com