Gross Alpha Counting

Gross alpha counting provides a rapid method for determining plutonium in various materials when it is the only alpha emitter present.

Principle of Technique

For solutions, an aliquot of the sample is evaporated onto a planchet. The alpha activity of the residue is first measured roughly with an LLNL "Blue" alpha meter to verify adequate activity and then the final measurement is performed with a dual-chamber alpha spectrometer.

Samples

Form. Solid or liquid.

Size. 10 mL to several mL.

Preparation. Samples of liquid are usually evaporated onto platinum disks to form a solid deposit.

Limitations

The analyte must be an alpha emitter. Mixtures of alpha emitters may require chemical separation. The chemical composition of the sample and the presence of other alpha-active elements affect sample preparation.

The limit of detection for plutonium is 20 ng. The efficiency of the counter is 30%.

Estimated Analysis Time

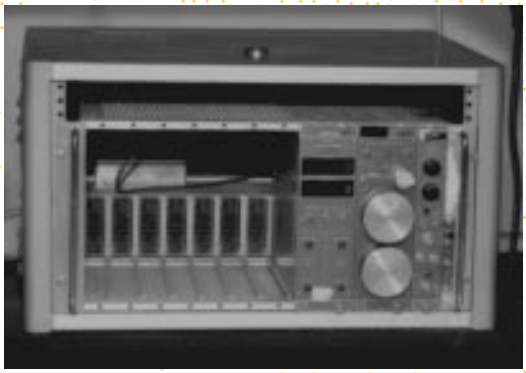
After preparation of the sample, 1 to 10 min are required for gross alpha counting.

Capabilities of Related Techniques

Alpha pulse-height analysis is used to distinguish among several alpha-emitting isotopes. XRF has comparable sensitivity, but it is not isotope specific.

Examples of Applications

- Rapid determination of trace amounts of Pu in materials such as cooling water, vacuum-pump oil, and miscellaneous deposits.



Gross alpha counting multi-channel analyzer.

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