

Measurement of disintegration rates and absolute γ -ray intensities.

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The majority of practical radioactive materials decay by modes that include γ -ray emission. The most easily observed, distinctive feature of a particular decay is the pattern of energies and intensities of x and γ rays. For questions of “how much” or “how pure”, it is necessary to know the absolute intensities of the major radiations and the relative intensities of the minor radiations. We are applying liquid scintillation counting, with some pulse height discrimination, to measurements of disintegration rates. These applications require either very pure samples or precise information on relative activities present in a sample. This information is obtained from radiochemical analysis. Liquid sources are used for both liquid scintillation and quantitative γ spectroscopy. These sources entail more γ ray absorption than “point” sources, but the absorption can be well known in contrast to point sources that can be quite non-uniform. Radioactive decay chains afford *a priori* knowledge of relative activities. We will describe studies of the chains originating from ^{227}Th and ^{228}Th that yield absolute γ -ray intensities with $\sim 0.5\%$ accuracy and comparable information on liquid scintillation counting efficiencies.