A Template for the Calculation of Strontium-90 Activity

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An Excel worksheet has been programmed as a template to calculate sample ^{90}Sr activity by measurement of its ^{90}Y progeny. The template also consolidates all the information pertaining to the sample analysis and radioassay. As a result, the workbook, which consists of a completed template and associated worksheets, serves as an electronic record for audit trail purposes.

In the radiochemical method, standardized yttrium carrier is added to the purified ^{90}Sr and the ingrown progeny is milked by precipitation as yttrium hydroxide. The yttrium is converted to yttrium oxalate and the precipitate is filtered onto a tared filter paper disk. After weighing to determine chemical recovery, the oxalate is mounted on a nylon planchet and beta counted in a low-background anti-coincidence gas flow proportional counter. Total counts are recorded every 100-minutes for a period of approximately 66-hours (40, 100-minute cycles). The counting data are copied to the template and the ^{90}Y decay constant determined by the Excel linear least squares regression program. The resultant decay constant is imported into the template where it is converted to the corresponding half-life. Cell color, programmed for specified limits, indicates the acceptance or rejection of sample ^{90}Y radiometric purity. Plots of the regression line are generated using Excel's graphical capabilities.

Yttrium and strontium (^{85}Sr) yields and ^{90}Y ingrowth, are calculated after entering the appropriate data into the template. Counter efficiencies and backgrounds are imported from associated worksheets where historical instrument data are stored. The total uncertainty associated with the sample activity is also calculated.

The presentation includes a demonstration using actual experimental data.