RAPID SCREENING OF RADIOACTIVE CURIUM (CM) IN FOOD BY SOLID PHASE EXTRACTION LIQUID SCINTILLATION COUNTING

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Concerns over radioactive food contamination from nuclear and radiological activities rise considerably with aging nuclear power plants, continuing nuclear proliferation, and potential breach in safeguarding nuclear materials. To ensure food safety in the event of an accidental or intentional release of radioactive materials, a robust and high throughput liquid scintillation counting technique for detecting alpha radioactivity in a broad range of foods is critically needed.

A rapid radioanalytical method for screening radioactive curium in contaminated foods will be presented. Radioactive Curium was isolated from food matrix using DGA resin (*N*,*N*,*N'*,*N'*-tetra-n-octyldiglycolamide) after digestion of sample in 8M nitric acid. The extracted Cm was reclaimed from the resin using 0.1M HCl -0.1M H2C2O4 and alpha radioactivity of Cm was quantified by alpha/beta discriminative liquid scintillation counting. Two Cm isotopes of most concern, i.e., Cm-234 and Cm-244, were found to be selectively and quantitatively retained by DGA resin that effectively eliminates matrix and radiometric interferences. The method was developed and validated using meat, grain, vegetable, dairy, and composite food samples spiked with known amounts of Cm-234 and Cm-244. The method was capable of recovering >95% of Cm-234 and Cm-244 added to the food samples with 1 gram of DGA resin and 15 minutes of extraction. The study results showed that matrix and natural radiometric interferences can be adequately removed to meet the detection limit required for addressing radiological safety concerning Cm contamination of foods. The experimental results, instrument optimization, and minimization of alpha/beta crossover interference will be discussed.