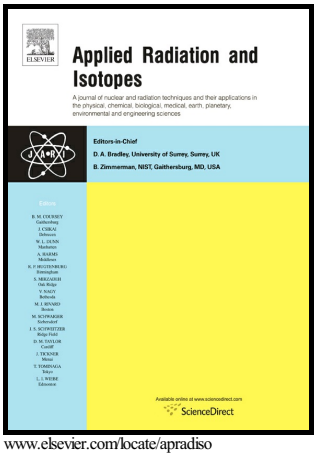

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Experimental and Monte Carlo Investigation of Mass Attenuation Coefficients of Fission Product Isotopes in Molecular Precipitates

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ABSTRACT

Mass attenuation coefficients for molecular precipitates have been measured and compared to results using the EGS5 Monte Carlo computer code and results from an empirical formula. This study assesses the mass attenuation coefficients of isotopes that can be readily produced by thermal neutron activation of elements in a reactor and precipitated in molecular compounds. Good agreement exists between measured results and EGS5 simulated results. Results are within reasonable agreement with the empirical mass attenuation formula. These results are further compared to simulated fission product isotopes. This study suggests mass attenuation coefficients of molecular precipitates can be approximated using EGS5, especially in the instance of radioisotopes produced predominantly through uranium fission.

KEYWORDS:

EGS5, mass attenuation, thermal neutrons, fission products

1. INTRODUCTION

The radiochemical study of fission product isotopes is often conducted with gas proportional counters. Procedures for preparation of these samples are found in literature [1-3]. Typically, in the final steps of sample preparation, precipitates are either vacuum filtered or electrodeposited onto planchets. The filter paper or planchet is then mounted onto a sample holder and positioned near the detector for counting. When preparing replicate samples of the same fission product isotope after irradiation, the initial samples will have the same specific activity. However, due to slight differences in chemistry and losses in preparation, the final samples will vary in thickness.