The distribution of mass in the spontaneous fission of $^{252}\text{Cf}$ has been investigated by the radiochemical determination of the absolute fission yields for 35 mass chains. A summation of the mass-yield curve gives a summed value of 199.4% which is in very good agreement with the value of 200% in fission. The mean masses of the light and heavy group are located at 106.39 and 141.82, respectively. The average number $\nu$ of neutron per fission is $3.79\pm0.12$. The peak-to-valley ratio is larger than 370. The width at one tenth of the maximum of the light and heavy group are 26.7 and 26.8 mass number, respectively. A comparison of previous investigators has resulted in "recommended" yields for 35 mass chains.

Introduction

$^{252}\text{Cf}$ is an important fission nucleus which has a special value in the study of low energy fission process. The distribution of mass in the spontaneous fission of $^{252}\text{Cf}$ has been measured$^{1-6}$ by radiochemical method. Above all, the yield in spontaneous fission products of $^{252}\text{Cf}$ was reported by GLENDENN and STEINBERG.$^{1}$ However, the intensity of $^{252}\text{Cf}$ source used in too weak to measure fission yields less than 1 per cent. A more comprehensive study of a $^{252}\text{Cf}$ source with high intensity of $7\times10^7$ fission/min was then undertaken by NERVIK,$^3$ who measured yields of $2\times10^{-3}$

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Experimental

Preparing the $^{252}$Cf source and collecting the fission products

$^{252}$Cf was dissolved in 2N HNO$_3$ of solution using a platinum cathode. 10 ml of doubly distilled water, four drops of 0.1N HNO$_3$ and 10 µl of $^{252}$Cf solution were added to the cell. A $^{252}$Cf source was prepared at the 100 mA of current, 100 V voltage depositing for 30 minutes. The diameter of source obtained was about 6 mm.

The surface of $^{252}$Cf source was tightened by dropping about 20 µl of 0.06% VYNS 1,2-dichloroethane solution to form a film of 12 µg VYNS on the surface. Through the treatment the $^{252}$Cf atoms diffusing out from the surface of source can be arrested, but the fission products flying out were not arrested.

The fission fragments were collected on a 22 mm diameter, 0.2 mm thick aluminium catcher foil. The distance between catcher and source is 5 mm. Schematic diagram of the $^{252}$Cf source, measurement of fission rate and collected efficiency are given in previous work. The fission rate of $^{252}$Cf source determined is 12258 ± 4 fissions/sec (on July 24, 1980).

Radiochemical procedure

The catcher foils were dissolved in an acidic solution containing the given carriers. Isotope exchange between the fission fragment elements and carriers was completed. The specific fission elements were purified by normal or improved radiochemical procedures.

The samples were prepared for $\beta$, $\gamma$ counting and the chemical yields were determined. The radioactivity of samples was determined with suitable counters and the detection efficiencies have been calibrated. The spontaneous fission yield $Y$ for a given nuclide can be calculated according to the expression

$$Y = \frac{A}{Y_c \cdot e \cdot N_f \cdot (1 - e^{-\lambda T})}$$

(1)