

MEASUREMENT OF TOTAL ALPHA ACTIVITIES IN THICK SAMPLES
BY MEANS OF Si SEMICONDUCTOR DETECTOR

Dobrilović Lj., Šmelcerović M., Paligorić D., Simović M., Bojović T.^{*},
Drndarević V.

Inst. of Nucl. Sci. "B. Kidrič", Belgrade, ^{*}VMA - Belgrade - Yugoslavia

The method of total alpha activity measurement in thick samples from the environmental materials is being used to determine the contamination level for its simplicity and rapidity in comparison with other methods based on chemical separation and measurement of isolated radionuclide from the mixture. This method is applied as well to decide upon the need of using the separation procedures.

Measurement of total alpha activity needs samples of homogeneous activities and depending on the activity level, concentration of the activities in the samples. Since samples might be beta and gamma contaminated, selective measurement of alpha activity in the presence of beta and gamma radiation is necessary.

The method of measuring total alpha activities in the samples of saturation thicknesses is described in this paper. Food samples and water were treated. A method for activities homogenization in the samples by an electrical mill was developed. For concentrating the activities of food samples the wet-ashing procedure by H_2O_2/Fe^{2+} was applied. Depending on the type of the sample concentrating factor was between 20 and 500.

A Si semiconductor detector type ORTEC CRO21-300-100 was used for total alpha activity measurement. Optimal conditions for detecting alpha radiation of ^{239}Pu in the presence of beta and gamma radiation were determined for the samples of saturation thicknesses. For the supply voltage of 50 V and discrimination level of 1 MeV selectivity for detection alpha radiation relative to beta radiation of $^{90}Sr-^{90}Y$ was $\approx 10^4$ for thin sources. The efficiency of detection of alpha radiation for thick sources defined as the ratio between count rates and specific activity was $3 \cdot 10^{-6}$ imp.s⁻¹.Bq⁻¹.kg.

The detection limit of ~ 300 Bq kg⁻¹ can be obtained for counting period of 24 hours. The measurement of an annual average permissible concentration^{*} applying the procedure for concentration the activities in the samples.

^{*}Službeni list SFRJ, 13. juli 1979.god., br. 32, 1047-1054.