

INVESTIGATION OF NEUTRON RESONANCES OF
 ^{247}Cm IN THE 0.5-20 eV ENERGY RANGE

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The neutron resonance parameters of ^{247}Cm were calculated from the transmission of a curium sample measured by the time-of-flight method. The measurements were performed in a horizontal neutron beam from the SM-2 reactor. The neutron pulse was formed by a mechanical selector with three rotors suspended in a magnetic field [1]. The path length of the spectrometer was 91.7 m and the best resolution 120 ns/m.

The sample investigated was made from a powder of stable curium oxide (Cm_2O_3) calcined at 900-1100°C with known oxygen content. The impurities included ^{243}Am and ^{240}Pu , the latter accumulating in the sample as a result of decay of ^{244}Cm . The maximum content of ^{247}Cm at the time of measurement was 0.64×10^{-4} at./b. The content of inert impurities apart from oxygen did not exceed 3%. Transmission was measured in the 0.5-20 eV neutron energy range with a statistical error of 1-2% at the tails of the resonance. The neutron background did not amount to more than 2% of the effect.

The neutron resonance parameters were calculated by the shape method using the single-level Breit-Wigner formula [1]. Since the neutron resonance parameters of ^{244}Cm , ^{245}Cm , ^{246}Cm , ^{248}Cm , ^{243}Am and ^{240}Pu are well known [2-6], it was possible to identify the neutron resonances of ^{247}Cm from the measured transmission and calculate their parameters (see table). In Refs [3, 5-6] the neutron resonances of ^{247}Cm with energies of 1.247, 3.19 and 18.1 eV are erroneously assigned to ^{245}Cm . A neutron resonance with an energy of 2.919 eV had not been previously detected.

We identified only five neutron resonances of ^{247}Cm with high values of $2g\Gamma_n$. This is due to the fact that the ^{247}Cm content of the sample is low (1.7 mg) and the resonances of this isotope are identified against the background of a large number of resonances of ^{244}Cm , ^{245}Cm , ^{246}Cm , ^{248}Cm , ^{243}Am and ^{240}Pu situated in the energy range in question.

Table
Neutron resonance parameters of ^{247}Cm

E_0 , eV	Γ , meV	$2g_n^2$, meV
1.247 ± 0.005	74 ± 4	0.56 ± 0.09
2.919 ± 0.010	70 ± 30	0.10 ± 0.04
3.189 ± 0.010	103 ± 6	1.0 ± 0.1
9.55 ± 0.03	166 ± 60	0.91 ± 0.33
18.1 ± 0.1	210 ± 170	3.7 ± 1.5

REFERENCES

- [1] BELANOVA, T.S. et al., Atomic Reactor Research Institute preprint, NIIAR P-6 (272) Dimitrovgrad (1976).
- [2] Neutron Cross-sections, BNL-325, Third Ed. 1973, Vol. 1.
- [3] BELANOVA, T.S. et al., At. Ehnerg. 42 1 (1977) 52.
- [4] BENJAMIN, R.W. et al., Nucl. Sci. Eng. 55 4 (1974).
- [5] BELANOVA, T.S. et al., in Trudy konf. "Nejtronnaya fizika" (Proc. Conf. "Neutron physics") izdat TsNIIatominform pt 3 (1976) 224.

Translator's Note: Ref. [6] not supplied.