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Letters to the Editors

Dysprosium Resonance Integrals

A value for the infinitely dilute absorption resonance integral of natural dysprosium, previously reported by us[1], was found to be in substantial disagreement with several subsequent determinations. The former value of 1310 ± 220 *b*, obtained from the Reactivity Measurement Facility (RMF) and Advanced Reactivity Measurement Facility-I (ARMF-I) measurements, has been changed to 1810 ± 440 *b* after correcting an inadvertent error in the calculations. This compares favorably with the tentative value of 1970 ± 180 obtained from measurements made on a new set of samples in ARMF-II where a several-fold increase in sensitivity is realized.

A further independent check on this value was obtained from measurements of the enriched dysprosium isotopes 160-164 which gave a value of 1790 ± 120 *b* for natural dysprosium (neglecting the contributions of Dy-156 and Dy-158). Table I lists these values along with tentative experimental values for the isotopes, and the corresponding Breit-Wigner single-level values calculated from published parameters[2]. Relevant values reported elsewhere in the literature and compiled by McArthy, *et al.*[3], are for Dy-164, i.e., 420 ± 50 *b* and 482 ± 33 *b* by activation, and 406 *b* by a bound-level calculation.[a]

The values were obtained from reactivity measurements of samples under 0.020-inch-thick cadmium in the swimming pool type reactors, RMF, ARMF-I, and ARMF-II, at the MTR site.

TABLE I

Dysprosium Absorption Resonance Integrals (barns)

Isotope	Measured	Calculated	Remarks
Natural	1810 ± 440	1240	RMF & ARMF-I
"	1970 ± 180		ARMF-II
"	1790 ± 120[a]		"
Dy-160	1160 ± 130	none	"
Dy-161	1670 ± 170	1044	"
Dy-162	3320 ± 400	1284	"
Dy-163	1960 ± 180	1236	"
Dy-164	377 ± 34	1269	"

[a]Compiled from measured isotopic values.

The samples were hollow cylinders, 0.86 inches dia., 4.25 inches long and 0.030 inches wall thickness, of Dy_2O_3 dispersed in aluminum in concentrations 1 to 10 per cent by weight. Gold specimens made and measured in a similar manner served as comparison standards.

Final values for the above measurements as well as other measurements on dysprosium and its isotopes will be submitted for publication in the near future when the work is completed.

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[a]Added in proof: "More recently published *ANL Reactor Constants Center Newsletter* No. 10 gives ANL calculated values for Dy-161 of 947.8b; for Dy-162 of 2610.0b; for Dy-163 of 1244.8b; for Dy-164 of 382.1b and for natural dysprosium of 1264.b."

[1] J. J. SCOVILLE, E. FAST, and D. W. KNIGHT, *Trans. Am. Nucl. Soc.* 5, 337-8 (1962).

[2] D. J. HUGHES and R. B. SCHWARTZ, "Neutron Cross Sections," BNL-325, 2nd ed. Brookhaven National Laboratory (1958).

[3] A. E. McARTHY, *et al.*, "Neutron Resonance Integral and Age Data," *ANL Reactor Constants Center Newsletter No. 1*, (1961).

On the Validity of the Constant-Source Assumption for the Cell Problem

One of the most common problems in reactor design is the calculation of the thermal-flux distribution in a fuel element and its associated moderator, i.e., the cell problem. The most accurate method available for this calculation is the two-dimensional, multigroup, integral trans-