

18[S].—M. E. ROSE, *Internal Conversion Coefficients*, Interscience Publishers, Inc., New York, 1958, xxii + 173 p., 31 cm. Price \$6.25.

When a nucleus is in an excited state for which the excitation energy is insufficient for the emission of nuclear particles, the de-excitation will proceed predominantly by either one of two competing mechanisms. Either a  $\gamma$ -ray will be emitted or the nuclear excitation will be transferred to one of the orbital electrons resulting in the ejection from the atom of this electron. The latter process is referred to as internal conversion. If  $N_e$  is the number of conversion electrons emitted per second and  $N_\gamma$  is the number of photons emitted per second, the internal conversion coefficient  $\alpha$  is defined as

$$\alpha = N_e/N_\gamma.$$

This book gives a comprehensive account of a ten-year program devoted to the calculation of internal conversion coefficients. It contains a ten-page introduction which gives a precise and thorough account of the physical and numerical approximations made in the course of the calculations of the tables. These in turn constitute the bulk of the work, 164 pages.

The conversion coefficients are strongly dependent on  $k$ , where  $kmc^2$  is the transition energy,  $Z$  the atomic number,  $L$  the angular momentum change, and on  $\Delta\pi$ , the parity change. The tables list values of  $\alpha_L$  and  $\beta_L$ , ( $L = 1, 2, 3, 4, 5$ ), the coefficients for  $2^L$  electric pole and  $2^L$  magnetic pole conversions, respectively, for  $k = 0.05(0.05)0.2(0.2)1.0(0.5)2.0$  and  $Z = 25(1)95$ .

Also included in the tables are values of certain radial matrix elements  $R_k(m)$  and  $R_k(e)$  for the  $K$  shell. These are uncorrected for screening and for finite nuclear size.

The author lists the sources of error in determination of the radial wave functions, which are a fundamental set of intermediate quantities in the calculation of the tables, and expresses the view that all of these errors are small and amount at most to 1–3 per cent. He expresses the view that the irreducible minimum error involved in any calculation of internal conversion coefficients, aside from nuclear structure effects, is just smaller than the experimental error in the best measurements now available.

The author states that, "interpolation in the tables will be necessary only in the energy variable  $k$ . For this purpose interpolation on a  $\log \alpha$  or  $\log \beta$  versus  $\log k$  is advisable since the plots of the conversion coefficients on a log-log scale show very little curvature."

A. H. T.

19[S].—C. H. WESTCOTT, *Effective Cross Section Values for Well-Moderated Thermal Reactor Spectra*, Report AECL No. 670, 1958, 27 p., 27 cm. Available from Scientific Document Distribution Office, Atomic Energy of Canada Limited, Chalk River, Ontario, Canada. Price \$1.00.

This report is concerned with the determination of an effective neutron absorption cross section, which cross section is recommended for calculations involving reaction rates. The effective cross section is defined in terms of a neutron density distribution per unit velocity. The neutron spectrum assumed consists of a Maxwellian distribution at a temperature  $T^\circ\text{K}$  plus an admixture of a  $1/E$  distribution