

Resonant Absorption Studies with $\text{Eu}^{151}\dagger$

D. A. Shirley, R. B. Frankel, and H. H. Wickman,
Department of Chemistry and Lawrence Radiation Laboratory, Berkeley

Recoil-free absorption experiments were done at various temperatures with Eu^{151} in Eu metal, EuO , and EuS . At 5°K the isomer shifts relative to a Eu_2O_3 source and hyperfine fields are: Eu $[-0.82$ (3) cm/sec, 264 (8) kG], EuO $[-1.09$ (5) cm/sec, 296 (15) kG], EuS $[-1.12$ (5) cm/sec, 328 (15) kG]. The accepted transition temperatures of Eu and EuO are confirmed by the disappearance of hyperfine splitting, which decreases monotonically with temperature in both cases. The larger isomer shift for " Eu^{2+} " salts than that of Eu metal is somewhat unusual and indicates that the electron density is lower in the salts. Divalent Eu^{2+} has only six $4f$ electrons and decreased shielding of the $5s$ electrons would tend to produce this effect. Using source and absorber of Eu_2O_3 the recoil-free fraction was measured from 4 to 300°K . This may be analyzed to yield an effective Debye temperature which increases from 65° at 4°K to 185° at 300°K , thus strongly suggesting the influence of optical branches.

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