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309

LIFETIME OF THE 264-Kev LEVEL OF Er^{167}

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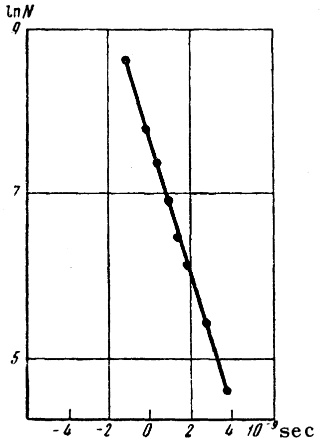
By investigating coincidences between x-rays accompanying K-capture in Tu^{167} and internal conversion electrons for the 57-kev transition, by means of the apparatus described by Berlovich,[1-3] we have determined the lifetime of the 264-kev level of Er^{167}. The figure gives on a semi-logarithmic scale the decay curve of the state under investigation (the delay time is plotted along the horizontal axis) from which the half-life is found to be

$$T_{1/2} = (2.0 \pm 0.5) \cdot 10^{-9} \text{ sec.}$$



Using the findings of Gromov and Dzhelepov,[4] that the 57-kev transition is a mixture of 25% E2 and 75% M1 transitions, and taking into account approximately the conversion in all the shells, starting with the L-shell (the conversion coefficient for the L-shell was computed with the aid of tables[5]), we have obtained for the half-life of radiative decay

$$T_\gamma = T_e(1+\alpha) = 1.4 \cdot 10^{-8} \text{ sec,}$$

which yields for the partial decay periods the values:

$$T_\gamma(E2) = 5.6 \cdot 10^{-8} \text{ sec and} T_\gamma(M1) \approx 1.87 \cdot 10^{-8} \text{ sec.}$$

Comparison with the results calculated by means of Weisskopf's formula,[6] based on the concepts of the single particle model, leads to an acceleration factor F = 310 for the transition of E2 type, and to a retardation factor F = 1/160 for the transition of M1 type.

According to Gromov and Dzhelepov,[4] the first excited level (207-kev) is a $\frac{1}{2}-$ state, while the 264-kev level may have the characteristics $\frac{1}{2}+$, $3/2+$ or $3/2-$; according to Gorodinskii et al.,[7] the most likely characteristic is $3/2-$. The assumption that the strongly deformed Er^{167} nucleus (17 neutrons outside a filled shell) has a rotating band with an angular momentum component $\Omega = \frac{1}{2}$ along the axis of elongation leads to a value of the internal quadrupole moment which is approximately twice as big as the values observed in this region of mass numbers.[8] However, the possibility is not excluded that the discrepancy is connected with the inaccuracy in the relative amounts of E2 and M1 transitions proposed by Gromov and Dzhelepov,[4] and that in actual fact the proportion of transitions of type E2 is considerably smaller.

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310

CHANGE IN THE TEMPERATURE OF ANTIFERROMAGNETIC TRANSFORMATION OF MANGANESE TELLURIDE UNDER PRESSURE

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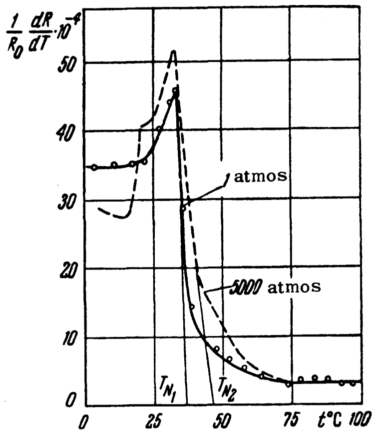
THE effect of the shift of the Curie point of ferromagnetic substances under the influence of hydrostatic compression has been investigated repeatedly. However, up to the present time there has not been a single paper devoted to the experimental investigation of the influence of hydrostatic pressure on the Néel temperature (T_N) of antiferromagnetic substances. By measuring the temperature and pressure coefficients of electrical resistance of manganese telluride we have investigated the influence of hydrostatic compression on the temperature of the antiferromagnetic transformation (T_N = + 37°C)[1,2] of this compound.

Uniform hydrostatic pressure was applied to the sample in a high pressure chamber into the upper part of which four special electric leads were introduced. Transformer oil served as the medium for transmitting the pressure. In order to eliminate the effect of junction resistances at the boundaries of the sample and the metal electrodes supplying the current, a compensation method of measuring electrical resistance by means of probes was employed. Thin constanan wire served for the potential probes, while copper wire was used for the current leads. This enabled us to measure the temperature of the sample by means of a copper-constantan thermocouple without introducing additional electrodes. The cold junction of the thermocouple was at atmospheric pressure and at 0°C. Measurements were carried out over the temperature range of 279 — 363°K and the pressure range of 1 — 5200 kg/cm^2.



It has been established that hydrostatic compression results in a decrease of electrical resistance of manganese telluride. The value of the pressure coefficient R_T^{-1} dR/dP varies as a function of temperature within the range −3.5 to −0.73. At temperatures far removed from the Néel temperature the electrical resistance varies linearly with the pressure. However, close to the temperature of the magnetic transformation the nature of the R(P) curves alters appreciably: a curvature becomes apparent with the R(P) curves being convex downward below T_N and upward above T_N. The figure shows the curve of the dependence on the temperature of the temperature coefficient of electrical resistance measured at atmospheric pressure and of the quantity R_0^{-1} dR/dT calculated for a pressure of 5000 atmos. The calculations were carried out in a manner similar to that used for the determination of the shift of the Curie temperature of ferromagnetic substances.[3]