Total Internal Conversion Coefficient of the 260.9 keV 
\(7^+ \rightarrow 3^-\) Transition in \(^{198m}\text{Tl}\).

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Summary. — The 1.87 hours 543.7 keV \(7^+\) isomeric state in \(^{198}\text{Tl}\) is produced via \(^{197}\text{Au}(\alpha, 3n)^{198m}\text{Tl} \left(E_\alpha = 35 \text{ MeV}\right)\) reaction. The total conversion coefficient of 260.9 keV \(7^+ \rightarrow 3^-\) is determined for the first time by the intensity balance method. The value of \(\sigma_T\) (260.9 keV) is found to be \(40.1 \pm 8.6\) which is in good agreement with the theoretical value of Hager and Seltzer for pure \(M4\) transition. The gamma transition probability of the 260.9 keV \(M4\) is calculated using the present value of \(\sigma_T\) and compared with the single-particle estimate.

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1. – Introduction.

Raman et al. \(^1\) had reported that the experimental values of the conversion coefficients characterizing high multipole transitions \(E3\) and \(M4\) were systematically lower than the theoretical values predicted by Hager and Sel-

To clarify the experimental situation, we have taken up a systematic study of the measurement of the high multipole transitions in different regions of the periodic table. As a part of this programme, the measurement of the total conversion coefficient of the 260.9 keV transition (7+ → 3−) in the decay of 198mTl is undertaken in the present study.

The decay of 198mTl has been studied by many investigators (8-9) and its decay scheme is well established. A partial decay scheme (5) of 198mTl is shown in fig. 1. The 1.87 h 7+ isomeric state in 198Tl decays through electron capture (56 %) to 199Hg, while the remaining fraction decays through gamma emission to the ground state of 198Tl (T1/2 = 5.3 h). The 543.7 keV (7+) isomeric state in 198Tl decays through 260.9 keV transition to the 3− state at 282.8 keV. The 282.8 keV decays through a gamma cascade (23.1–259.5) keV to the ground state of 198Tl.

There is no previous measurement on the total conversion coefficient of the 260.9 keV transition. JUNG and ANDERSON (7) have determined the K/L, L/M and M/N ratios of this transition from the conversion electron measurement. These results have established that the 260.9 keV is a pure M4 transition. The K and L conversion coefficients of (8) 260.9 keV transition are, however, calculated by using the relative conversion electron and gamma intensities of 260.9 keV and 282.8 keV transitions and assuming the 282.2 keV transition

Fig. 1. – Partial decay scheme of 198mTl.