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Insights on electron capture probabilities in the decay of Gd-153 from the triple-to-double coincidence ratio (TDCR) method of liquid scintillation counting DENIS BERGERON, National Institute of Standards and Technology, SEAN COLLINS, National Physical Laboratory, JEFFREY CESSNA, RYAN FITZGERALD, LIZBETH LAUREANO-PEREZ, LETICIA PIBIDA, National Institute of Standards and Technology, ROBERT SHEARMAN, National Physical Laboratory, BRIAN ZIMMERMAN, National Institute of Standards and Technology — The decay scheme for Gd-153 has been scrutinized by researchers for decades, with little consensus on the electron capture transition probabilities feeding the several excited states and, arguably, the ground state of Eu-153. Absolute activity determinations based on liquid scintillation counting are often challenging for electron capture nuclides, with uncertainties on decay data propagating to significant uncertainties on counting efficiencies. Activity standards for electron capture nuclides are thus mostly based on coincidence counting techniques. We analyze experimental data acquired with the triple-to-double coincidence ratio method using activities determined by live-timed anticoincidence counting and demonstrate that the derived efficiency curves disfavor electron capture to the ground state. This result is in accord with a re-balancing of the decay scheme based on new absolute gamma-ray emission intensities.

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