

New method for the determination of accurate gamma-ray intensities for the $^{14}\text{N}(\text{n},\gamma)^{15}\text{N}$ high energy standard

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The $^{14}\text{N}(\text{n},\gamma)^{15}\text{N}$ reaction is a primary source of high energy gamma-rays for use in calibration of detectors for other neutron-capture reactions. The gamma ray intensities of ^{15}N produced by thermal neutron capture and the gamma-ray detection efficiency function have been simultaneously determined from gamma peak areas alone using the basic principle of a new kind of intensity balance calculation. A least square fit was made to a new type of intensity balance calculation, combined with traditional efficiency fitting of radioactive sources. This latter ensures the compatibility with low energy efficiencies while providing an unbiased efficiency function for higher (up to 10 MeV) gamma-ray energies. The calculation is based on the assumption that the ^{15}N decay scheme is complete. From the internal consistency of the resulting intensities, it is believed that they are more accurate than previously published values. The same is true for the derived efficiency function. Effect of the new nitrogen standard intensities on the capture cross sections will also be assessed.