

TOPAS Simulations for Estimating 48V Yields of Natural Titanium Foil Irradiation

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Natural titanium foils can be used in the production of several medical isotopes, including β^+ emitter vanadium-48. Due to its 16 day half-life, vanadium-48 has potential application in long-term monitoring and longitudinal studies. While foils are often irradiated via solid target system, medical cyclotrons lacking these systems often have components that can be manipulated for this purpose, such as placing thin foils in a beamstop. In this work, we simulate the irradiation of natural titanium foils via TOPAS, a Geant4-based Monte Carlo program, calculate the theoretical yield using cross section data from the literature, and compare the results to the experimental yield of 12 μm foils bombarded in a beamstop with 18 MeV protons via compact medical cyclotron IBA 18/9 Cyclone. TOPAS results produced a 10% difference compared to experimental results and a 54% difference compared to theoretical calculations, indicating that factors such as foil angle may have lowered experimental yields.

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No, this is an entirely new submission.

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