Production of Terbium-161 at HF-ADNeF

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Terbium-161 is a highly promising theranostic isotope, with a potent combination of β- and Auger electron emission. Production is typically via neutron activation in research reactors, meaning the UK has no domestic production capabilities for ^{161}Tb. At the University of Birmingham, the High-Flux Accelerator-Driven Neutron Facility (HF-ADNeF) can produce neutron fluxes on the order of 10^{12} n/cm^2/s, making it an ideal location to investigate the production of neutron-rich medical radioisotopes, such as ^{161}Tb. In this work, a detailed simulation of HF-ADNeF has been designed using the radiation transport code, OpenMC. This has been used to predict achievable ^{161}Tb activities and to explore combinations of moderator and reflector geometries, optimising both production yield and radionuclidic purity. In addition, the simulation produces facility-specific neutron energy spectra, enabling experimental spectrum-averaged cross-section measurements to be made.