

Calculation of Production and Decay of Radioisotopes for Future Irradiation Experiments and Ion Beam Facilities

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The design of future radioactive ion beam (RIB) facilities requires the forecast of radio isotope inventory after irradiation. At CERN ISOLDE we developed a software tool that estimates the production and activation of materials for ISOLDE radioactive waste management. The tool can also be used in the design of new RIB facilities, licensing procedures, irradiation experiments and the estimation of production yields.

We implemented an iterative algorithm that uses isotope productions from different cross section libraries and from different simulations codes (Silberberg, Fluka, MCNP). It uses a database with branching ratios and decay probabilities to calculate the production and remaining isotopes during irradiation and decay. The iterative calculation algorithm contains chosen simplifications of the physics processes to keep the calculation time short. The result gives an order of magnitude, which is sufficient for the desired goal.

The user interface is meant to be simple and the results are presented in a visual way. The software delivers quick and easy to understand estimations of the isotope production, isotope inventory, target activation and safety levels.

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