

Systematic comparison of ISOLDE-SC yields with calculated in-target production rates

S. Lukić¹, F. Gevaert¹, A. Kelić¹, M. V. Ricciardi¹, K.-H. Schmidt¹, O. Yordanov¹

¹ GSI, Planckstr. 1, 64291 Darmstadt, Germany

Recently, a series of dedicated inverse-kinematics experiments performed at GSI, Darmstadt, has brought an important progress in our understanding of proton and heavy-ion induced reactions at relativistic energies [1]. The nuclear reaction code ABRABLA that has been developed and benchmarked against the results of these experiments has been used to calculate nuclide production cross sections at different energies and with different targets and beams [2,3]. These calculations are used to estimate nuclide production rates by protons in thick targets, taking into account the energy loss and the attenuation of the proton beam in the target, as well as the low-energy fission induced by the secondary neutrons. The results are compared to the yields of isotopes of various elements obtained from different targets at CERN-ISOLDE with 600 MeV protons [4], and the overall extraction efficiencies are deduced. The dependence of these extraction efficiencies on the nuclide half-life is found to follow a simple pattern in many different cases. A simple function is proposed to parameterize this behavior in a way that quantifies the essential properties of the extraction efficiency for the element and the target – ion-source system in question.

- [1] <http://www-w2k.gsi.de/charms/data.htm>
- [2] J.-J. Gaimard and K.-H. Schmidt, Nucl. Phys. A 531 (1991) 709
- [3] J. Benlliure et al., Nucl. Phys. A 628 (1998) 458
- [4] H.-J. Kluge, *Isolde users guide*, CERN, Geneva, 1986,
web: <http://isolde.cern.ch>