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Suparna Sodaye1*, K. Sudarshan1, D. Banerjee2, R. Tripathi1, P. Maheshwari1,
D. Dutta1, R. Guin2, R. Palit3, and P.K.Pujari1
1 Radiochemistry Division, Bhabha Atomic Research Centre, Mumbai, India
2 Radiochemistry laboratory, VECC, 1/AF, Bidhan Nagar, Kolkata, India
3 Tata Institute of Fundamental Research, Homi Bhabha Road, Colaba, Mumbai, India

Study of chemical properties of heavier actinides is challenging due to their short-half lives and production in minute quantities. One of the major factors in producing these actinides in larger quantities is the large fission cross section when compared to the evaporation leading to the formation of actinides. The studies of these actinides make its necessary to have a mass separator or adopt suitable chemical procedures to minimize the unwanted activity.
With the objective of producing and separating berkelium isotopes to ascertain the decay scheme of 244Bk, uranium metal targets of thickness ˜30 mg/cm2 were irradiated with 63.5 MeV 11B beam at the BARC-TIFR pelletron facility. The energy was optimized using HICOL code to get maximum cross section for 244Bk. However, even at this energy, the fission cross section is 500 times more than the evaporation. The solvent extraction procedures were optimized to remove major fission product activity and the bulk uranium from the sample [1]. The sample was assayed by gamma-spectrometry using an 30% HPGe and a clover containing 4 segments. The reported gamma-lines of 244Bk are 217.6 ⊠ 0.3 keV and 891.5 ⊠ 1.0 keV [2]. These were identified in the ⊠-spectra and their decay profiles were followed. The measured half life from the above gamma-lines was 5.56 ⊠ 1.16 h. The only reported value of half life of 244Bk is 4.35 ⊠ 0.15 h [3]. Treating each of the segments of the clover as separate detectors, the coincidence spectra were built from the list mode data with a gate on 217.4 keV on other 3 segments of the detector. The gamma-line at 1243.5 ⊠ 1.5 keV was found to be in coincidence with 217.4 keV. There is also a signature of another gamma-line at 2401 ⊠ 2 keV. These gamma-lines have not been reported earlier. The details will be discussed.

References

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Primary author: SODAYE, s

Presenter: SODAYE, s

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