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Radiochemical separation of no-carrier-added 97Ru and 95Tc produced by 12C-induced reaction on natural yttrium target

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Due to favourable nuclear and chemical properties, the radionuclides, 97Ru; 2.83 d, -rays: 215.70 keV (85.62 %) and 324.49 keV (10.79 %) and 95Tc; 20.0 h, -rays: 765.789 keV (93.8 %), have been found promising for the investigation of delayed physico-chemical and biological processes. Various 97Ru/95Tc-labelled complexes have also been proposed for this purpose. Production of high purity radionuclides is therefore important. So far they have been produced either by light charged particle induced reactions or by neutron activation method. This paper illustrates simultaneous production of 97Ru and 95Tc in a heavy ion induced reaction and their subsequent separation from the bulk by ion exchange technique. A natural yttrium foil was irradiated by 75 MeV 12C6+ ions for 3.5 h. Thick target yields of 514 and 338 kBq/A-h were achieved for 97Ru and 95Tc respectively at the end of bombardment. The target was dissolved in 0.1 M HCl, spiked with 88Y (106.6 d), evaporated to dryness, and residue was taken into 0.01 M HCl. The nca 97Ru and 95Tc was then radiochemically separated from bulk yttrium by liquid-liquid extraction (LLX) using liquid anion exchanger trioctylamine (TOA) and liquid cation exchanger di-(2-ethylhexyl)phosphoric acid (HDEHP) dissolved in cyclohexane from HCl solution. More than 98% nca 95Tc was extracted into TOA phase possibly forming anionic species leaving nca 97Ru and yttrium in aqueous phase. Quantitative separation of 97Ru was achieved while bulk yttrium was extracted quantitatively into HDEHP (1-10%) from 0.1 M HCl. The technique offers efficient chemical separation of the products (97Ru and 95Tc) resulting very high separation factors (˜106).

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