Contribution ID: **1083** Type: **Poster**

Separation of terbium-161 from gadolinium target irradiated in nuclear reactor

Thursday, May 19, 2022 6:09 PM (18 minutes)

Terbium-161 is one of the perspective radionuclides with a potential use in nuclear medicine thanks to its ideal energy of beta radiation ($E_{\beta max}$ = 593 keV) and half-life (6,9 d). In addition, terbium-161 emits a significant amount of conversion and Auger electrons, which increases its potential therapeutic efficacy. Terbium-161 can be prepared as no carrier added by neutron irradiation of highly enriched gadolinium-160 target in a nuclear reactor, through indirect production route Gd-160 (n,γ) Gd-161 $\rightarrow$ Tb-161. After irradiation, it is necessary to separate terbium from the target. For this purpose, the cation exchange chromatography is commonly used.

In this work, several irradiations of highly enriched Gd-160 target in the form of oxide or nitrate were performed in the nuclear reactor LVR 15 (CV Řež). For separation of Tb-161 from target, cation exchange chromatography (Dowex 50W×8 (H+), 100-200 mesh) with variously concentrated α-hydroxyisobutyric acid as eluent was used. The presence of Tb-161 and possible radionuclide impurities was verified by gamma spectrometry on an HPGe detector. The fractions containing Tb-161 were purified from α-hydroxyisobutyric acid also on the cation exchange resin, using hydrochloric acid as eluent. The presence of stable impurities was verified by ICP-MS method.

This work was supported by the project "Efficient Low-Energy Electron Cancer Therapy with Terbium-161" granted by the Norway and Technology Agency of the Czech Republic within the KAPPA Programme (grant No.: TO01000074).

Primary author: SKÁLOVÁ, Marie (Department of Nuclear Chemistry, Faculty of Nuclear Sciences and Physical Engineering, CTU Prague)

Co-authors: PALUŠÁK, Martin (Department of Nuclear Chemistry, Faculty of Nuclear Sciences and Physical Engineering, CTU Prague); SUCHÁNKOVÁ, Petra (Department of Nuclear Chemistry, Faculty of Nuclear Sciences and Physical Engineering, CTU Prague); VLK, Martin (Department of Nuclear Chemistry, Faculty of Nuclear Sciences and Physical Engineering, CTU Prague); ŠOLTÉS, Jaroslav (Centrum výzkumu Řež s.r.o.); VINŠ, Miroslav (Centrum výzkumu Řež s.r.o.); HASSFJELL, Sindre (Institute for energy technology); MULLER, Jiri (Institute for energy technology); KOZEMPEL, Ján (Department of Nuclear Chemistry, Faculty of Nuclear Sciences and Physical Engineering, CTU Prague)

Presenter: SKÁLOVÁ, Marie (Department of Nuclear Chemistry, Faculty of Nuclear Sciences and Physical Engineering, CTU Prague)

Session Classification: Radiopharmaceuticals

Track Classification: Radiopharmaceutical Chemistry, Labelled Compounds