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

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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, $\gamma$ ) 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  $\alpha$ -hydroxy isobutyric acid as eluent was used. The presence of Tb-161 and possible radio nuclide impurities was verified by gamma spectrometry on an HPGe detector. The fractions containing Tb-161 were purified from  $\alpha$ -hydroxy isobutyric acid also on the cation exchange resin, using hydrochloric acid as eluent. The presence of stable impurities was verified by ICP-MS method.

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