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MOLYBDENUM-99 PRODUCTION TECHNOLOGY DEVELOPMENT**

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Prototype testing of a $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ generator using (n,γ) ^{99}Mo

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ABSTRACT

A prototype $^{99\text{m}}\text{Tc}$ generator has been studied using a patented microporous (MPCM) resin. The experimental data suggests that the resin is porous in nature and eluate contacted with the resin showed no toxic effects. It was observed that surface charge conditioned MPCM resin showed high sorption capacity (>60% w/w) for irradiated Mo, while simultaneously providing the selective elution of pertechnetate ($^{99\text{m}}\text{Tc}$) from low activity prototype columns. For columns with higher activity, an additive with saline was required to facilitate $^{99\text{m}}\text{Tc}$ release from the column. A guard column with alumina as an adsorbent was used to keep ^{99}Mo in the eluent < 1 μCi of ^{99}Mo per mCi of $^{99\text{m}}\text{Tc}$. The radionuclidic purity of the $^{99\text{m}}\text{Tc}$ was more than 99.99%. The breakthrough of ^{99}Mo and the pH of the eluent that pass through the alumina guard column were within the USP and EUP limits. The labeled compound data suggests that eluent obtained from higher activity columns requires further chemical treatment to facilitate kit chemistry. Radiochemical purity of the eluate has consistently tested at greater than 95%. The potential of this MPCM resin based prototype $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ generator and future path forward for a generator with higher activity using (n,γ) ^{99}Mo , will be discussed. Perma-Fix along with POLATOM and three other institutes in Poland carried out portions of this study under the STRATEGMED program.