



Contribution ID: 204

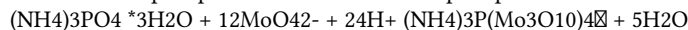
Type: Poster

A New Way for Separation of ^{99m}Tc from Cyclotron Irradiated ^{100}Mo Foil

Thursday, 15 May 2014 17:30 (1h 15m)

^{99m}Tc is at present, without any doubt, the most extensively used radiotracer in nuclear medicine imaging [1]. Usually, the operation period of research reactors used for the production of ^{99}Mo is about 40-50 years. Most reactors used in the preparation ^{99}Mo have already reached this age, or will reach in the near future. There is a growing interest in exploring cyclotron production of ^{99m}Tc using $^{100}\text{Mo}(p,2n)^{99m}\text{Tc}$ reaction, a method first proposed by Beaver and Hupf nearly 40 years ago [2]. There is a real necessity to develop separation technologies suitable for use in novel modes of ^{99m}Tc production. Separation of technetium from irradiated molybdenum may be carried out using either "wet" or "dry" chemical processes. "Wet" separation techniques require dissolving of the metallic target under oxidative conditions and then separation of pertechnetate can be achieved using one of many strategies, e.g. liquid-liquid extraction [3], ion-exchange chromatography [4], aqueous biphasic extraction chromatography using ABEC resin [5] and electrochemistry [6].

The aim of our studies is to investigate the possibility of separating microquantities pertechnetate from macroquantities molybdate anions. These studies have been carried out using a natural molybdenum powder. Molybdenum forms heteropolyacids such as ammonium molybdenum phosphate (AMP) precipitating as a characteristic yellow solid. In the first step metallic molybdenum target is dissolved in 3,5 M HNO_3 . Next, triammonium phosphate is added and Mo is precipitated from the solution according to the reaction:



We have optimized four parameters of the process: NH_4NO_3 and $(\text{NH}_4)_3\text{PO}_4 \cdot 3\text{H}_2\text{O}$ concentrations, temperature and the time of precipitation. From performed studies it can be concluded that the proposed process is promising and allows fast separation of macroamounts of Mo from the solution without co-precipitation of ^{99m}Tc . After optimization of the precipitation conditions, the lowest concentration of MoO_4^{2-} was only 0.37 mg ml⁻¹. The final solution may be required additional purification by separation of $^{99m}\text{TcO}_4^-$ by ABEC resin, extraction by HDEHP or by nano-ZrO₂.

Acknowledgments: This work was carried out as part of the Applied Research Project PBS1/A9/2/2012, p.t. „Alternative methods of ^{99m}Tc production" supported by The National Centre for Research and Development, Poland.

- [1]. Arano Y.: *Annl Nucl Med*, 16:79–93 (2002).
- [2]. Beaver J, Hupf H.: *J Nucl Med* 12, 739–41(1971).
- [3]. Dallali N., Ghanbari M., Yamini Y., Fateh B., Agrawal Y. K.: *Indian. J. Chem. Sect. A*, 46A, 1615–1617 (2007).
- [4]. Chattopadhyay S., Das S.S., Das M. K., Goomer N. C.: *Appl Radiat Isot.*, 66, 12, 1814-7 (2008).
- [5]. Rogers R. D., Bond A.H., Griffin S.T., Horwitz E.P.: *Solvent Extr. Ion Exch.*, 14: 919–946 (1996).
- [6]. Chakravarty R., Dash A., Venkatesh M.: *Nucl.Med.Biol.*, 37, 21–28 (2010).

Primary authors: Prof. BILEWICZ, Aleksander (Institute of Nuclear Chemistry and Technology); Ms GUMIELA, Magdalena (Institute of Nuclear Chemistry and Technology)

Co-author: Dr GNIAZDOWSKA, Ewa (Institute of Nuclear Chemistry and Technology)

Presenter: Ms GUMIELA, Magdalena (Institute of Nuclear Chemistry and Technology)

Session Classification: Poster Session - Production and Application of Radionuclides

Track Classification: Production and Application of Radionuclides