Contribution ID: **39** Type: **Poster**

64Cu and 67Cu Production and Purification Research at the Radiation Science and Engineering Center at the Pennsylvania State University

Wednesday, 19 September 2012 18:00 (1h 50m)

The United States faces a shortage of medical isotopes for clinical use and for research and development of new therapeutic and diagnostic procedures. The Society of Nuclear Medicine and the National Cancer Institute in the USA have noted that 64Cu and 67Cu isotopes are in short supply. The isotope 67Cu (t1/2 = 61.83 h) emits a beta particle useful for cancer treatment and has several gamma-ray emissions appropriate for medical imaging. As a positron-emitter (17.9%) and a β−emitter (39.0%), 64Cu (t1/2 = 12.7 h) is used for positron emission tomography scans and to study copper behavior in the body for the diagnosis of metabolic diseases. The small amounts of 64Cu and 67Cu currently available are produced via charged particle reactions, but existing accelerators are in high demand for other applications. To expand the production capabilities for these two isotopes, the Radiation Science and Engineering Center at the Pennsylvania State University is investigating reactor-based production methods via the (n,p) reactions and . These reactions require neutrons with energies above 1 MeV, which are available in the central thimble of the Penn State Breazeale Nuclear Reactor at a flux of 1.6x1013 n/cm2/s. To reduce the production of unwanted radioisotopes, 99% isotopically enriched 64Zn and 94% enriched 67Zn are used. 64Zn and 68Zn can activate in measureable quantities to radioactive 65Zn (t1/2 = 243.8d) and 69Zn (t1/2 = 13.76 h) due to thermal neutrons; both types of targets can be shielded to reduce these activation products. Post-irradiation, quartz-encapsulated zinc oxide targets are dissolved in acid, followed by purification via one or more ion exchange methods. Although the cross-sections for these (n,p) reactions are low, our development of a reactor-based transmutation production method for 64Cu and 67Cu offers several advantages: large amounts of sample may be irradiated simultaneously and the product is carrier-free, making it highly isotopically and chemically pure. Experimental details and some results for this reactor-based alternative 64Cu and 67Cu production and purification method will be presented.

Primary author: Dr JOHNSEN, Amanda (Pennsylvania State University, USA)

Co-authors: Mr HEIDRICH, Brenden (Pennsylvania State University); Mr DURRANT, Chad (Pennsylvania State University); Prof. UNLU, Kenan (The Pennsylvania State University, USA)

Presenter: Prof. UNLU, Kenan (The Pennsylvania State University, USA)

Session Classification: Poster Session

Track Classification: Nuclear Chemistry, Radionuclide Production, High-Power Targetry