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The production and isolation of Cu-64 after production by the bombardment of a natural Zn target

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The production possibility of different copper radionuclides has been investigated by several groups[1-7]. Szelecsényi et al.[8] measured new cross-section data for the $^{66}\text{Zn}(p,2p\text{n})^{64}\text{Cu}$ and $^{68}\text{Zn}(p,x)^{64}\text{Cu}$ nuclear processes from their respective threshold energies up to 100 MeV and concluded that both processes are suitable for the routine production of ^{64}Cu . A ^{66}Zn target and a ^{68}Zn target can be used, respectively, in the energy windows $70 \rightarrow 35$ MeV and $37 \rightarrow 10$ MeV for the production of ^{64}Cu . At iThemba LABS a natZn target is bombarded with the 66 MeV proton beam for the routine production of ^{64}Cu (and ^{67}Ga).

Various methods have been published for the separation of Cu from Zn[1,9-11]. An improved method is presented for the selective purification of Cu radionuclides (specifically ^{64}Cu) from gram amounts of zinc using an ion exchange column containing 5.0 mL XAD-8 which had been impregnated with dithizone (diphenylthiocarbazon). ^{64}Cu was recovered from the ^{67}Ga waste solution which contained ca 8 g Zn. The waste solution was evaporated to dryness and the salts dissolved in 0.05 M HCl (ca pH 2) and passed through the ion exchange column, which had been equilibrated with 0.05 M HCl, Zn was eluted with 0.05 M HCl. Particular attention was paid to the development of optimal elution profiles using respectively 10 M HNO_3 , 3 M HNO_3 and 5 M HCl -1% H_2O_2 .

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Author: Prof. VAN DER WALT, Tjaart Nicolaas (Nico) (Cape Peninsula University of Technology)

Co-authors: Dr VAN DER MEULEN, Nicholas (iThemba LABS); Mr DOLLEY, Stuart (Cape Peninsula University of Technology / iThemba LABS)

Presenter: Prof. VAN DER WALT, Tjaart Nicolaas (Nico) (Cape Peninsula University of Technology)

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