

Production of Radiometals with RFT-30 cyclotron

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1. Introduction

RFT-30 is a 30 MeV cyclotron research facility at Korea Atomic Energy Research Institute in Jeongeup city located to the south east of Seoul. RFT-30 accelerates H- and strips proton using carbon foil, it has four beam lines each dedicated for (i) solid target irradiation, (ii) PET target system, (iii) proton beam research (iv) Xe-124 target system (planned). The facility is well equipped with all the targetry requirements, hot cells, scientific instruments and hot labs.

Radionuclide based pharmaceuticals are playing major role in several medical procedures. Medical community has experienced a rapid growth for radionuclide applications in the field of therapy, diagnosis and/ or therapeutic purposes due to the technological development in cyclotron-based radionuclide production.



Fig. 1. RFT-30 cyclotron

2. Methods and Results

2.1 Production and supply of the radiometals

We have been successful in irradiating targets for producing bulk quantities of Zr-89 and Ge-68. Complete process optimization has been finished for Zr-89 targetry, production, separation and purification. We have started regular supply of high purity Zr-89 (oxalate/ chloride) to hospitals such as Bundang Seoul national hospital, Samsung Seoul hospital etc. based research groups in Korea since February - 2018. Process optimization for Ge-68 production has been achieved and we are working on purification of Ge-68. And furthermore, the electroplating associated with nickel target was optimized for Cu-64 and Co-57 [1,2].

Simultaneous efforts are made towards electrodeposition of Zn-70 for the production of Cu-67 respectively.



Fig. 2. Target bath for radiometals

2.2 Activities

One of the major activities at Cyclotron Application and Research Facility (CARF) is research and development in the field of production of cyclotron-based radionuclides and its applications. We at CARF are routinely involved in performing preliminary studies and process development required for the bulk production of high purity radionuclides for medical applications. As a part of this activity the major R & D efforts are dedicated towards targetry, production, separation/ purification, applications and achieving the efficient technologies for cyclotron based emerging radiometals (viz. Zr-89, Ge-68, Cu-64/67, Sc-44/47, Co-55/57, etc.) production, ensuring its sustainable supply for research and medical purposes.

3. Conclusions

An overview of the efforts made by the researchers at CARF towards developing and optimizing production of radiometals using RFT-30 cyclotron is the sole purposes of this presentation. Methods from target production, irradiation conditions, target processing, separation and purification of radionuclides of interest, recovery of enriched target material would be discussed in brief.

REFERENCES

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