

THE USE OF THE CYCLOTRON OF THE RUĐER BOŠKOVIĆ INSTITUTE
IN APPLIED RESEARCH

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The cyclotron of the Ruđer Bošković Institute has been engaged for several years in the field of irradiations for applied fields. For the time being the main interest from the side of the users has been in

- a) Radioisotope production for medical purposes
- b) Neutron production for radiobiological and dosimetric purposes.

The production of cyclotron radioisotopes for diagnostic purposes represents a sizable part of the very dynamic market of radioisotopes used in medicine. It is sufficient to mention that the growth of that market is of the order of 20% per year in western Europe and that the estimated expense on radioisotopes in F.R. Germany for 1976 is 1 DM per capita (62.5 million DM). A similar trend of interest has been perceptible in Yugoslavia also. Therefore we are trying to provide some of the short lived radioisotopes to hospitals in our vicinity. So far the cyclotron of the Institute Ruđer Bošković has developed the commercial production of two medical radioisotopes - Ga 67 and Rb 81/Kr 81m.

The Ga 67 is produced bombarding a Zn target with 14 MeV deuterons. The present target design allows the use of deuteron beams of $\sim 250 \mu\text{A}$ without damage to the target.

The Rb 81 is produced bombarding an NaBr target with 30 MeV α particles. An NaBr target which withstands currents up to $30 \mu\text{A}$ has been developed. The yield of Rb 81 has been measured to be in agreement with the literature value of $\sim 2 \text{ mCi}/\mu\text{Ah}$.¹⁾ The production of Ga 67 has continued the rapid increase of the last years and stands now at $\sim 2 \text{ Ci/year}$.

The year 1976 has been the first year of production of Rb 81/Kr 81m generators used for lung ventilation studies.²⁾ The experimental production has been in the current year $\sim 200 \text{ mCi}$. The developments in the technique of production, and the market interest indicate that this quantity is to be significantly increased in 1977.

A facility for the production of a high intensity neutron beam has been developed using the internal deuteron beam on an Aluminium target.

The neutron facility has been tested for a 10x10 cm field 2 meters far from the target. Dose rates of 5 rad/min have been achieved. So far the facility has been used for irradiations of cell cultures and the study of dosimetric techniques. The use of the facility for animal irradiation is planned.

References

1. L.G. Colombetti, L.W. Mayron, E. Keplan, W.E. Barnes, A.M. Friedman and J.E. Gindler, Journal of Nuclear Medicine 15 (1974) 868