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BEAM TEST RESULTS OF BIG CYCLOTRON FOR THE PRODUCTION OF I-123. K.Fujii,K.Hoshika, J.Kanakura,S.Yamada and S.Kadota.Sumitomo Heavy Industries,Ltd., Niihama.

In the last meeting of the Japanese Society of Nuclear Medicine,we reported the performance of our new series of cyclotrons dedicated to the production of medically useful radioisotopes,i.e.CYPRIS(18MeV for proton,10MeV for deuteron)for the production of C-11,N-13,O-15 and F-18,and model 480(30MeV for proton)for Ga-67,Kr-81m, In-111 and Tl-201.

This year we accomplished the construction and beam test of the variable energy big cyclotron model 750PV that can deliver 20-70 MeV protons. This cyclotron is used to produce high purity I-123 by the nuclear reaction of(p,5n). At present meeting we would like to report the results.

The performance of this model is shown in the following table,and the main advantages of this machine are the extremely high power(3.5kw)of the extracted beam and the easiness of both operation and maintenance by computerization. This type of machine was already delivered to Nihon Medi-Physics(Chiba Factory)and now is working.

Proton Energy(MeV)	25	30	50	60	70
Extracted beam current	100	100	70	60	50

Besides protons,it is possible to accelerate deuteron,helium 3 and helium 4.

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SHIMADZU COMPACT CYCLOTRON MCY-1750. A.Hirakimoto,I.Konishi,F.Ohtani,H.Fujita, M.Asari. Shimadzu Corporation, Kyoto.

We give an outline of the Shimadzu compact cyclotron MCY-1750, designed for RI production and other applications. Especially, 2 items listed below, we bring into focus.

1. Energy measurements

An approximate value of the ion energy can be easily calculated by magnetic field and radius at the extracted position. A precise value, on the other hand, should be measured by the method of Rutherford Back Scattering (RBS) or Nuclear Reaction Analysis (NRA).

In the present experiment, we adopted the RBS method and identified proton energy 16.9MeV and deuteron energy 8.3 MeV, by bombarding those ions onto a gold foil 2μm in thickness.

2. Operations and Controls

Practically, only a few of skillful operators can control complicated cyclotrons. Overcoming the complexity, we build up full-automatic computer control systems to enable easy operations and reduction of a operator's load.

In addition, both of the manual backup control systems and the data logging systems offer high reliability and maintenability.

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SHIMADZU AUTOMATIC RADIOPHARMACEUTICAL SYNTHESYZER SYSTEM. H.Nakanishi, M.Shinohara,S.Nagamachi and M.Asari. Shimadzu Corporation, Kyoto.

The Shimadzu automatic radiopharmaceutical synthesyzer system consists of RI gas synthesyzer (RIG-CBB), RI gas mixer (RIG-MIX), RI gas inhalation system (RIG-INH), [C-11]CH,I automatic synthesyzer (MeI-CBB) and [F-18]FDG automatic synthesyzer (FDG-CBB). RI gas supply system (RIG-SUP) and Utility pack (UTL-PACK) are also provided as options. High cost-performance and compact size are realized in the system, according to a development of new component elements as follows; an RI sensor, a 3-way cock actuator, a wobbling evaporator, etc. Simple operation and easy maintenance are taken account of the design. The main controller is a multi-task computer, possible to operate different equipments in parallel. Linking with the Shimadzu compact cyclotron (MCY-1750), the system guarantees reliable RI production.

The system has proved reproducable synthesis of labeled compounds and has presented a sufficient radiochemical yield and a high radiochemical purity for PET studies.

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WOBBLING MOTION OF POSITRON CT SCANNER FOR UNIFORM SAMPLING OF LINEAR PROJECTIONS. A. Ohgushi, S. Inoue, K. Hirata, M.Uemura and M.Kumamoto. Hitachi Medical Corp., Chiba.

In many positron computed tomography systems, wobbling scanning motion of the detectors is used for fine sampling of linear projections, but the uniform sampling density distribution is not obtained with the simple circular wobbling motion.

We have developed a new wobbling motion to obtain uniformly sampled projection data. This motion is a composite one of two circular wobbling motions. It is operated with a simple gear mechanism driven by one motor and the positions of projections during a scan are easily calculated. The optimal design parameters of the composite motion are determined by evaluating the sampling uniformity for several combinations of the diameters of the two wobbling motions with the scan periods, 1 and 10 seconds. As an example, the sampling density distributon of linear projections with coefficient of variance 6% in the field of view is obtained for the positron CT systems in which 256 detectors of 6mm wide scintillator are equally spaced on a circle with packing ratio 90%.