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OPTIMISATION OF [C-11]HCN PRODUCTION BY AUTOMATED ON-LINE [C-11]HCN PRODUCTION SYSTEM FROM [C-11]CO₂. H.Nakanishi, *R.Iwata, *T.Ido, and M.Iwanaga. Shimadzu Co., Kyoto. *Tohoku University, Sendai.

[C-11]HCN is well known to be an important precursor for the synthesis of various [C-11] radiopharmaceuticals and several methods for its production have been reported.

We have developed an automated on-line [C-11]HCN production system by use of [C-11]CO₂ as a starting materials. In this method, we can produce [C-11]HCN continuously with another [C-11] compound without exchange of target.

The procedure of this method is as follows:

- (1) Reduction of [C-11]CO₂ with H₂ on Ni catalyst at 400°C ([C-11]CH₄ formation).
 - (2) Addition of excess NH₃.
 - (3) Passing [C-11]CH₄ and NH₃ through Pt catalyst at ~950°C ([C-11]HCN formation).
- This method is now widely used for practical production of [C-11]HCN, but its optimal condition have not been fully known.

By using this system, we investigated the effects of NH₃ concentration, contact time with Pt catalyst, reaction temperature and presence of H₂O to the yield of [C-11]HCN production. In results, under these optimal conditions (NH₃:5%, flow rate: 200ml/min, an excess amount of Pt wire at about 920°C, using metallic sodium to minimize the presence of H₂O), [C-11]HCN was obtained with a high radiochemical yield of 99%.

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L - C -11-METHIONINE SYNTHESIS SYSTEM. T.Ogata, S.Iida, I.Suzukawa and T.Yamada. The Japan Steel Works, Ltd., Muroran.

C-11-methionine has attracted much attention in nuclear medicine owing to its diagnostic usefulness for pancreatic disease. Recently it has been also applied to the study of brain protein synthesis or lung cancer. We tried to construct a C-11-methionine synthesis system and tested its performance. The system is composed of reaction unit and injection unit to high performance liquid chromatography (HPLC). C-11-methyl iodide which was produced using an appropriate synthesis apparatus was trapped in a reaction vessel which contained L - homocysteine thiolactone hydrochloride in acetone or ethanol at low temperature. At the completion of trapping of C-11-methyl iodide 0.5M NaOH was added and the reaction vessel was heated around 80°C for several minutes. Reaction mixture was neutralized with 0.5N HCl and transported to HPLC injection unit with a mini peristaltic pump. Injection of reaction mixture to HPLC was automated by an optical sensor device and an auto 6 - way valve. The system was controlled by a micro-computer system.

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AUTOMATED SYNTHESIS OF ¹⁸F-5-FLUORO-2'-DEOXYURIDINE. M.Monma, K.Ishiwata, R.Iwata and T.Ido. Cyclotron and Radioisotope Center Tohoku University, Sendai.

¹⁸F-5-fluoro-2'-deoxyuridine (¹⁸FdUrd) can be used as a useful diagnostic agent for tumor detection, especially in the brain and lung, by positron emission tomography. Automated synthesis system has been developed for its routine medical use. ¹⁸FdUrd was synthesized by the method of Shiue et al with some modifications. The synthetic procedure used for the automation consists of the reaction of ¹⁸F₂ with 3',5'-di-O-acetyl-2'-deoxyuridine, hydrolysis of the ¹⁸F-adduct and purification of ¹⁸FdUrd by column chromatography on ion exchange resin and alumina. The computer control system of fully automated synthesis of ¹⁸FdUrd was applied to the present system, and it automatically controls the whole procedure. The synthesis system was also designed to provide a sterile and pyrogen-free ¹⁸FdUrd solution without reducing convenience. Thus, the system allows to provide 20-30 mCi of ¹⁸FdUrd with radiochemical purity of over 99% within 60 min after the irradiation, and it had been applied to the production of ¹⁸F-5-fluorouracil by the same program.

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DEVELOPMENT OF AN AUTOMATIC ¹⁸F₂-RECOVERY-AND ¹⁸FDG-SYNTHESIS SYSTEM. Y.Adachi, Y.Nishihara, K.Hiroishi, H.Suzuki (Sumitomo Heavy Industries Ltd.), N.Zaima (Tokyo Nuclear Service Ltd.) and T.Irie (NIRS).

¹⁸F₂ is an important precursor for the synthesis of ¹⁸FDG - a useful positron labeled compound - as well as other similar compounds. The authors have developed an automatic system for ¹⁸F₂ recovery and ¹⁸FDG synthesis, as a part of "CYPRIS", which is a compact cyclotron for medical use.

In this system, all processes from the production of ¹⁸F₂ in a target substance to the synthesis of ¹⁸FDG are controlled automatically by microcomputer realizing stable synthesis of ¹⁸FDG without radiation exposure risk to the operator. Both the conventional synthetic method and another method using ¹⁸F-acetylthiofluoride (CH₃COO¹⁸F) as the precursor can be used in this system, and a comparison of the two methods is discussed here.