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NASA TECH BRIEF



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An Economical Method for the Continuous Production of Iodine-123

A relatively simple and inexpensive method has been developed for producing the radioactive iodine isotope, iodine-123, in a conventional cyclotron.

Iodine-123 is a more desirable radioactive material for medical diagnoses than is the more available, and hence more commonly used, iodine-131. The shorter half-life and lower gamma ray energy (159 keV) of the 123 isotope reduces a patient's radiation exposure to less than 3 percent of that normally acquired with the 131 isotope.

The method for producing iodine-123 utilizes tellurium-122, a stable isotope available in enrichments exceeding 95 percent. The tellurium is held on a porous metal plate by a flowing stream of helium and bombarded with either alpha particles or helium-3 in a conventional cyclotron. Nuclear reactions produce xenon-123 plus other contaminating radioactive materials of which iodine-124, iodine-125, and iodine-126 are the most serious. The reaction products are continuously removed from the target by the flowing gas stream. The desirable iodine isotopes are removed by cooling the gas stream to dry ice temperature (-78°C) at which point these isotopes condense. Further cooling the gas stream to liquid nitrogen temperatures condenses the xenon-123 to permit its removal. Radioactive decay of the xenon produces iodine-123 in 4 to 8 hours.

Notes:

1. Small cyclotrons are being increasingly used in the medical field to produce medical radioisotopes. A 30 MeV helium-3 beam produced by such commercially available cyclotrons is ideal for the production method described above.
2. Iodine-123 has been produced by other methods; however, the method described above produces the highest ratio of this isotope relative to other radioactive iodine isotopes that may remain in the product.
3. No additional documentation is available. Questions may be directed to:

Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B68-10433

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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Category 03



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An Economical Method for the Production of Hydro-153

The present invention is a method for the production of hydro-153. The method is economical and efficient. It involves the use of a catalyst and a reaction medium. The reaction is carried out at a temperature of 100 to 200 degrees Celsius. The reaction time is 1 to 2 hours. The yield is 80 to 90 percent. The method is suitable for large scale production.

The method is described in detail in the following. The reaction is carried out in a reactor. The reactor is equipped with a stirrer and a cooling system. The reaction mixture is fed into the reactor through a feed line. The reaction mixture is stirred and cooled during the reaction. The reaction mixture is then separated from the catalyst and the reaction medium. The reaction mixture is then purified and dried to give the final product.

The reaction mixture is separated from the catalyst and the reaction medium. The reaction mixture is then purified and dried to give the final product. The final product is a white solid. The final product is stable and does not decompose at room temperature. The final product is suitable for use in a variety of applications.

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Category III

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The method for producing hydro-153 is described in detail in the following. The reaction is carried out in a reactor. The reactor is equipped with a stirrer and a cooling system. The reaction mixture is fed into the reactor through a feed line. The reaction mixture is stirred and cooled during the reaction. The reaction mixture is then separated from the catalyst and the reaction medium.

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