Method of Producing Halogen Radioisotopes

Published date: Sept. 20, 2013

Technology description

The Problem:
Radioisotopes, particularly halogen radioisotopes, have been used extensively in nuclear medicine. The utility of radioiodine in nuclear medicine is dependent on the availability of reliable techniques to incorporate radiohalogen atoms into organic compounds. Current techniques have disadvantages because they do not work well on small scales. Consequently there are many difficulties in synthesizing desired radiohalogenated compounds such as the rate of formation, separation of the radiolabeled product from the organic starting material, and side reactions such as solvent attack on the organic starting material. Yields of only 2–10% are not uncommon in such conventional synthetic procedures. While no-carrier-added reagents are very important because the quantity of radiopharmaceutical compound can be kept below picogram levels which minimizes body loads and aids in the differentiation of receptor-sites, the reaction rate problem makes them difficult to prepare.

The Technology Solution:
University of Tennessee researchers have developed a method for halogenating and radiohalogenating organic chemical compounds. The method uses simple Sep-Pak filtrations to prepare high specific activity, no-carrier-added, radioiodinated agents. The new process results in higher radiochemical purity (generally > 98%) and yield (generally > 60%), and enables the introduction of the halogen label at any time during the synthesis of the molecule and at any position in the molecule. In addition, researchers have used this method to develop a new boron-based precursor to radiohalogenated materials that has the advantage of being water soluble and extremely stable to air and moisture.

Application area

Production of halogenated and radiohalogenated organic compounds for use in cancer therapy, nuclear medical imaging, and construction of radioiodination kits.

Advantages

Convenient, rapid, and efficient preparation and procedure
Results in higher radiochemical product purity and yield

Can halogenate any organic chemical compound via this method
Halogen can be attached at any step in the synthesis of a final molecule, or on the final molecule itself
Enables precise introduction of the halogen label at any position in the molecule

Institution

University of Tennessee

Inventors

George Kabalka
Professor
Chemistry