Contribution ID: **39** Type: **not specified**

Thorium-229 Generator Production of Actinium-225 at Oak Ridge National Laboratory

Thorium-229 Generator Production of Actinium-225 at Oak Ridge National Laboratory
Shelley Van Cleve, Paul Benny, Thomas Dyke, Jay Kehn, Kayla Phillips, Rose Boll
Oak Ridge National Laboratory, Oak Ridge, TN 37831
Background and Objective: Oak Ridge National Laboratory (ORNL) is a major producer of 225Ac and supplies research and clinical trials for the treatment of various forms of cancer with this promising radioisotope. Actinium-225 (t1/2 = 10 days) has nuclear properties well suited for use in targeted alpha therapy, emitting four α-particles in a decay cascade via short half-life daughters. It can also be used as a generator for 213Bi (t1/2 = 45.6 min.). ORNL has been producing and shipping 225Ac for research and clinical applications since 1997. During the first year of production, a total of 135 mCi was shipped. Since then, production levels have steadily increased, and in 2018, ORNL produced ~800 mCi of 225Ac in 13 processing campaigns. From 1997 through the end of calendar year 2018, ORNL conducted 145 production campaigns and provided 11.2 Ci in over 1,200 shipments. ORNL's objective is to continually improve quality and quantity of product to meet the increasing demand for 225Ac using the limited amount of high-purity 229Th currently available.
Separation and Purification: The chemical separation process consists of anion exchange separation using hydrochloric and nitric acids followed by cation exchange separation for the final purification. Gamma spectroscopy is used for quality control analysis of the final product before shipping, and mass spectroscopy data is used to evaluate chemical purity.
Results: Various processing schedules have been used for the production of the 225Ac, depending on the needs of the scientific community, staffing, and funding. This presentation will review various production sequences and present ways to optimize production from ORNL's current 229Th cow. ORNL's goal is to continue to produce high-quality 225Ac for use in research and clinical trials.
Research supported by the U.S. Department of Energy (DOE) Office of Science, Office of Nuclear Physics, under contract DE-AC05-00R22725 with UT-Battelle, LLC.

Funding Agency

DOE Isotope Program

Email Address

bollra@ornl.gov, eov@ornl.gov

Presentation Type

Poster

Primary author: Ms VAN CLEVE, Shelley (Oak Ridge National Laboratory)

Co-authors: Mr KEHN, Jay (ORNL); Ms PHILLIPS, Kayla (ORNL); Dr BENNY, Paul (ORNL); Dr BOLL, Rose (ORNL); Mr DYKE, Thomas (ORNL)

Presenters: Dr BOLL, Rose (ORNL); Ms VAN CLEVE, Shelley (Oak Ridge National Laboratory)