Producing Medical Isotopes with Dry-Phase Reactor

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Overview

Medical isotopes like molybdenum-99 are used for imaging patients and treating disease. Today, most radioisotopes are produced in nuclear reactors outside of the United States that employ highly enriched uranium (HEU). This is a security concern because HEU can be made into nuclear weapons.

An alternative approach is to use low enriched uranium (LEU), which does not pose direct terrorist risks. In these systems, ions are injected into a gas chamber to generate neutrons that strike LEU material held in a nearby aqueous solution vessel, creating a chain reaction of isotope-producing collisions.

But safety remains a concern. Lots of fission energy is transferred to the water in these systems and maintaining stable power levels is difficult. Also, bubbles can form and explode, and gases must be recombined in a complex separate system.

The Invention

UW–Madison researchers have developed an improved method for generating medical isotopes using a dry-phase granular uranium compound, such as uranium salt or oxide.

In the process, the dry granular uranium is exposed to radiation that produces medical isotopes by nuclear reaction. The irradiated uranium then is dissolved in a solvent and the desired isotopes are extracted using standard aqueous separation techniques. The granular uranium material can be dried and reused.

Applications

- Production of medical isotopes

Key Benefits

- Avoids the problems of aqueous solutions
- No risk of explosion in the production vessel
- No pH control
- Temperature stable
- May operate critically or subcritically
- Can operate at higher temperatures
- More efficient cooling
- Simplifies uranium handling
- Mechanically simpler and less expensive

Tech Fields

- Medical Imaging : Other diagnostic imaging

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846