INVESTIGATING THE TRANSITION OF RN GAS THROUGH CAPILLARY TUBING OF DIFFERENT MATERIALS

Rachel Gallegos[1] , Samuel Baker[2] , Ravi Gampa[2] , Jerry A. Nolen[2] , David A. Rotsch[2]
1 – Nuclear Engineering, Texas A&M University, College Station, TX. USA
2 – Physics Division, Argonne National Laboratory, Lemont, IL. USA

MOTIVATION

Isotope production has been on the rise in hopes to provide new ways to offer medial treatment. Patients ill of cancer and/or tumors are treated with radiation such as x-rays, gamma rays, and charged particles. Chemotherapy is a medication treatment taken by the mouth or given through infusion into a vein. This treatment is rough to the body as it is designed to destroy the cancer cells, but throughout the process other cells are unintentionally targeted. This is later the cause of other illnesses and side effects in the body. Due to the harmfulness of such treatments, the aim is to discover new medical isotopes and procedures that could help reduce the unfavorable side effects to such detrimental treatments.

INTRODUCTION/BACKGROUND

Isotope production has been on the rise in hopes to provide new ways to offer medial treatment. Astatine-211 has the potential of being used for targeted alpha therapy, but it would be hard to distribute due to having a short 7.21 hour half-life. Instead, Radon-211, which has a 14.6 hour half-life, would allow enough time to produce the isotope and deliver to a wider community.

Left picture:
Chamber with alpha detector inside and weak alpha source for testing

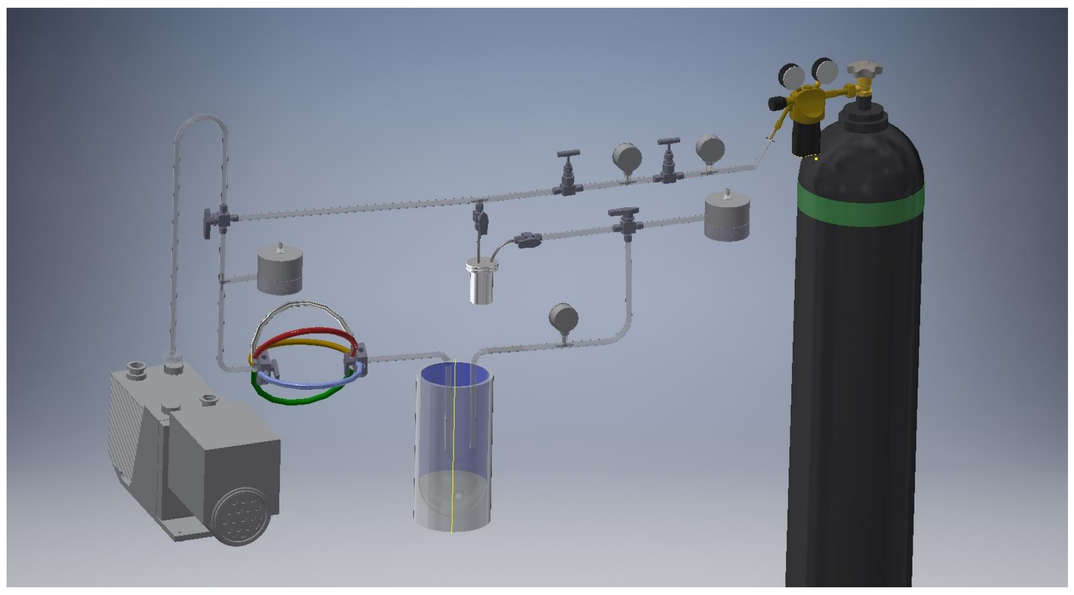
Right:
Drawings of proposed apparatus and a picture of existing components.

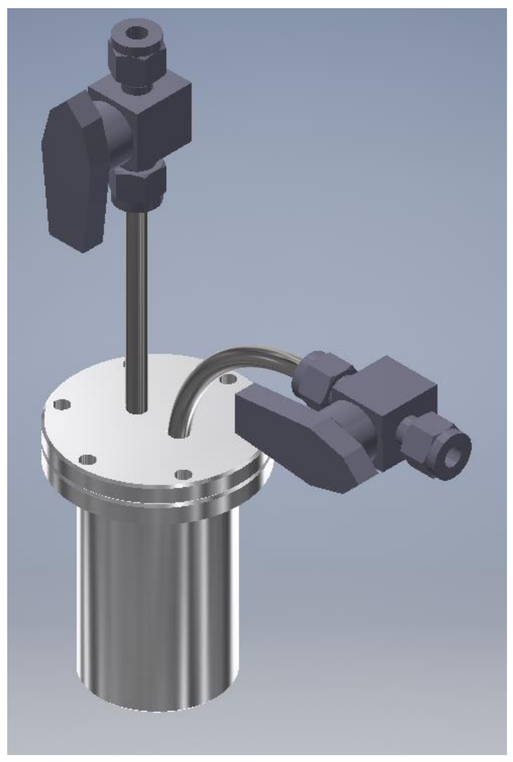
In a well-constructed system Rn-211 could be produced via the bombardment of Li-6 beams on a Bi-209 target ($^{209}Bi(^{6}Li,4n)^{211}Rn$), the Rn-211 captured, and shipped to end users. During the shipping period the Rn-211 would decay to the desired At-211 and thus be ready for formulation upon receipt. However, Rn gas is a noble gas and requires investigation to determine an appropriate system for release, transfer, and trapping of the Rn followed by release of the At-211 daughter.

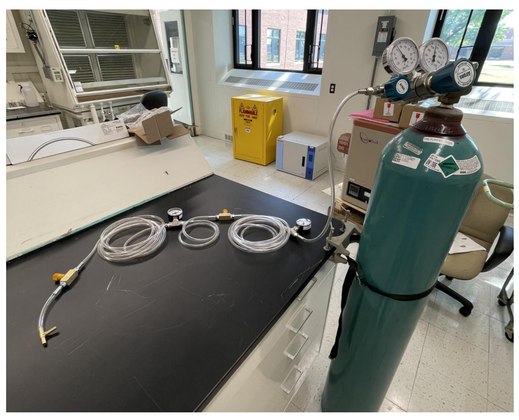
FUTURE DIRECTIONS

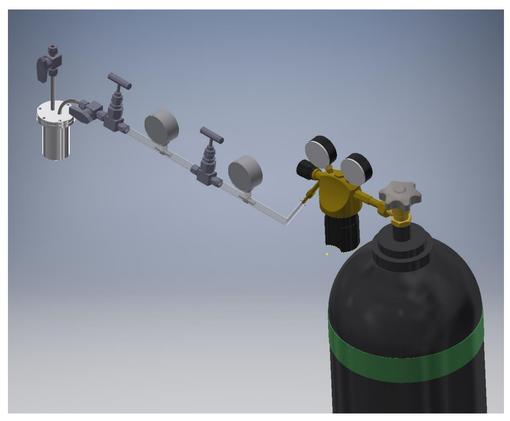
There will be four experiments performed to discover what type of tubing material will perform the best at transferring Rn-211 to a trap. In the experiments below a more readily available Rn isotope, Rn-222, will be used.

- Experiment 1: Selecting the alpha detectors that work the best and determining how efficient the detectors are
- Experiment 2: Ensuring that the system is sealed properly once built
- Experiment 3: Release the noble gas and determine the best tubing
- Experiment 4: Separate the Rn-222 with a dewar









CONCLUSION

- The alpha detectors that worked best for the system were selected.
- The beginning of the system has been constructed. There are still parts of the system that must be surveyed, and other parts are in the machine shop being altered for this project specifically.

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