Extraction properties of ^{99m}Tc from irradiated High-density MoO_3 Pellets solution

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^{99m}Tc, a daughter nuclide of ^{99}Mo, is commonly used as a radiopharmaceutical in the field of nuclear medicine. In case of Japan, all of ^{99}Mo are imported from foreign countries. Therefore, R&D for domestic production has been being carried out in the JMTR. And the (n, γ) method was selected from viewpoints of safety, nuclear proliferation resistance and waste management. In this study, experiments of ^{99}Mo/^{99m}Tc production were carried out for the purpose to enhance recovery yields of ^{99m}Tc and the experimental results were evaluated.

The high-density MoO_3 pellets were fabricated by the Plasma Sintering Method, and were irradiated in the Hydraulic conveyer (HYD) which is the neutron irradiation equipment positioned at the reactor core of the Kyoto University Reactor (KUR). The irradiated MoO_3 pellets were transferred from the KUR to the JMTR Hot Laboratory and were dissolved with 6M-NaOH solution in the Lead Cell. The solvent extraction method with MEK was used to extract ^{99m}Tc from ^{99}Mo/^{99m}Tc solution.

In the experiments, dissolution, separation, extraction and concentration techniques were evaluated to enhance recovery yields of ^{99m}Tc. The maximum recovery yields as high as 80% was achieved. The impurities in ^{99m}Tc solution were also evaluated and were efficiently low. And it is concluded that this method would be suitable for the radiopharmaceutical production.

In future, the solvent extraction demonstration tests will be carried out with MoO_3 pellets irradiated in JMTR.