



Third Laureate Applied Research

Project Title: General designing the production of sterile gel generator $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ based on zirconium molybdate for diagnosis in nuclear medicine

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Abstract:

$^{99\text{m}}\text{Tc}$ (Technetium 99-m) with half life of 6.01 hrs is the most widely used radiopharmaceutical in nuclear medicine which is produced from disintegration of ^{99}Mo (Molybdenum 99) with half life of 66 hrs. More than 90% of nuclear medicine diagnosis and 80% of these methods are carried out by using this radionuclide. Cancerous tumors, imaging from heart, kidney, thyroid, salivary glands, stomach, liver, spleen, bone marrow, lung, and ... are among them. In Iran $^{99\text{m}}\text{Tc}$ is used for 10000 to 14000 patients weekly in 110 nuclear medicine centers and hospitals. Ordinarily, ^{99}Mo is produced in the world in two ways: separation from fission products of uranium 235 and neutron activation of ^{98}Mo . In Iran due to the limitation in the use of uranium 235, the second method was selected. In this method, first, the ^{99}Mo produced by irradiation, at the same time, a survey was conducted on generation methods of $^{99\text{m}}\text{Tc}$ and among the methods used in the world, Gel zirconium was selected.

It is worth mentioning that this project consists of combination of Nuclear field (neutronic calculation, irradiation in reactor, molybdenum radiochemistry, Technetium radiochemistry and radionuclide, design and construction of Gel type generator), chemistry field (recognition of Gel structure, method and process of Gel zirconium molybdate), engineering field (industrial automation and performance) and currently provides the country's requirements in industry