

The Third Place Applied Research

Scientific Committee: Chemical Technologies

Research Work Title

Production and Development of a $^{68}\text{Ge}/^{68}\text{Ga}$ Generator with Enhanced Activity of Gallium-68 based on $\text{SnO}_2/\text{TiO}_2$ Adsorbent for Application in Nuclear Medicine Centers



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Organization: Pars Isotope Company

Abstract:

Gallium-68, with a half-life of 68 minutes, is obtained from a generator containing Germanium-68, which has a half-life of 271 days ($^{68}\text{Ge}/^{68}\text{Ga}$ generator). This radionuclide element and its generator have received significant attention over the past decade, and are widely used for diagnostic purposes in nuclear medicine. For more than half a century, Technetium-99 (with a half-life of 6 hours), derived from the $^{99}\text{Tc}/^{99}\text{Mo}$ generator (with a half-life of 66 hours), has been the main radioisotope used in SPECT imaging for diagnostic purposes. Given the various advantages such as the shorter half-life of Gallium-68 (compared to Technetium-99m) and the longer half-life of the $^{68}\text{Ge}/^{68}\text{Ga}$ generator (compared to the $^{99}\text{Tc}/^{99}\text{Mo}$ generator), along with its application in PET scan, the radiopharmaceutical industry worldwide has focused on the use of Gallium-68 and the development of the $^{68}\text{Ge}/^{68}\text{Ga}$ generator. Investigation of scientific documents shows that, for various scientific and economic reasons, producing generators with the highest possible output of Gallium-68 is one of the main and valuable goals of commercial companies and scientific communities. In this project, by synthesizing a $\text{SnO}_2\text{-TiO}_2$ matrix resin with a unique formula, a $^{68}\text{Ge}/^{68}\text{Ga}$ generator was designed and produced for the first time in Iran. Furthermore, modifications of this generator led to enhanced capacity for loading Germanium and, consequently, improved performance of the $^{68}\text{Ge}/^{68}\text{Ga}$ generator (named Pars-GalluGen generator). This generator has an output activity of over 70 mCi, making it the strongest $^{68}\text{Ge}/^{68}\text{Ga}$ generator in the world and complies with all the specifications of the European Pharmacopoeia for use. It is noteworthy that this generator is currently being produced at the Atomic Energy Organization of Iran (Pars Isotope Company), and it not only meets all the needs of the country's nuclear medicine centers but is also being exported to other countries.

