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Shielding design and analysis of the lead and hot cells used to produce radioisotope

Abouzar Kiyani [1*], Reza Pourimani [1], Ali Bahrami-Samani [2], Seyed-Milad Miremad[2]

[1]Department of Physics, Faculty of Science, Arak University, Iran.

[2]Nuclear Science and Technology Research Institute (NSTRI).

[*]Department of Physics, Faculty of Science, Arak University, 3848177584, Arak, Iran.
Email: Aboo_kiyani @ gmail.com

Abstract

Lead and hot cell equipment are needed to perform radiochemical processes to extract the desired radioisotope from the hot target. The proper design and shielding of this equipment are important to reduce the radiation exposure of employees. In this article, based on the gamma rays emitted from the hot target used in the molybdenum-99 production process, the calculations related to the design of a suitable shield for a chamber with specific dimensions made of Barite Concrete to make a hot cell or made of Lead to make a lead cell, has been done. The simulation results with MCNP6.2 Monte Carlo code show that the shield thickness to limit the dose rate to 10 μSv/h, for making hot cell or lead cells equals 90 cm and 24 cm, respectively.

Keywords: Shielding, MCNP6 code, hot cell, lead cell, molybdenum-99.

For full article, refer to the Persian section.