

عنوان مقاله:

Computational investigation of ۱ up to ۳ kCi Co-۶۰ source production at external irradiation boxes of TRR core using MCNPX code

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نویسندگان:

Zohreh Gholamzadeh - *Safety and Nuclear Research Reactor School, Nuclear Science and Technology Research Institute, Tehran, Iran*

Amir Pourrostan - *Safety and Nuclear Research Reactor School, Nuclear Science and Technology Research Institute, Tehran, Iran*

Reza Ebrahimzadeh - *Safety and Nuclear Research Reactor School, Nuclear Science and Technology Research Institute, Tehran, Iran*

Zeinab Naghshnejad - *Safety and Nuclear Research Reactor School, Nuclear Science and Technology Research Institute, Tehran, Iran*

خلاصه مقاله:

In many human diseases and health cases, therapy of blood transfusion becomes necessary. In spite of the necessity, there are some risks associated with blood used in blood transfusion process. The TA-GVHD (transfusion-associated graft-versus-host-disease) is a problem when a blood transfusion occurs. The blood irradiation with gamma rays in blood bags can eliminate this risk. It should be mentioned that Co-۶۰ sources are widely used for such blood irradiators. The present work investigates Co-۶۰ production yield inside the external irradiation boxes of Tehran Research Reactor (TRR) using MCNPX code. ۱۰-rod and ۴-rod Co-۵۹ assemblies were modeled at different external irradiation boxes to investigate their negative reactivity impact on TRR core as well Co-۶۰ buildup rate during ۳ years operation of the nuclear core at ۴ MW power. The obtained results from MCNPX code showed a ۴-rod assembly in linear form could obtain the highest specific activity (Ci.g-۱) inside the external irradiation box faced to the core center. The computational results showed about ۸ kCi of Co-۶۰ is produced at the optimized irradiation position after ۳ years TRR operation at ۴ MW power.

کلمات کلیدی:

Gamma blood irradiator, Co-۶۰ production yield, TRR, MCNPX code

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