

عنوان مقاله:

Monte-Carlo Calculation of Radon Absorbed Dose in Optical Fiber as a Novel Method in Dosimetry and Radon Measurement

محل انتشار:

مجله فیزیک پزشکی ایران, دوره 10, شماره 1 (سال: 1392)

تعداد صفحات اصل مقاله: 6

نویسندگان:

Mohsen Mirhabibi - *Department of Physics, Payame Noor University, Tehran, Iran*

Ali Negarestani - *Department of Physics, Kerman Graduate University of Industrial and Advanced Technology, Kerman, Iran*

Mohammad Reza Rezaie - *Department of Physics, Kerman Graduate University of Industrial and Advanced Technology, Kerman, Iran*

Mohamad Bolorizadeh - *Department of Physics, Kerman Graduate University of Industrial and Advanced Technology, Kerman, Iran*

خلاصه مقاله:

Introduction Radon is a colorless and tasteless gas which exists in most soils. It is a substance that poses a potential risk for lung cancer in case a person is exposed to high levels over long periods of time. The Environmental Protection Agency (EPA) estimates that 90% of lung cancers per year are caused by radon. The aim of this paper is to estimate the absorbed doses of ^{222}Rn by MCNPX simulation in single-mode optical fiber (SMF) as a method proposed for dosimetry test. Materials and Methods To calculate the absorbed dose of ^{222}Rn in SMF using MCNPX-2.6 code, the *F6 tally was applied. SMF was simulated by being exposed to radon while being located in the axis of the pipe. Results The absorbed doses due to beta, gamma, and alpha radiations emitted from radon in SMF obtained by Monte Carlo simulations were equal to $5.76311\text{E-}13$, $5.06973\text{E-}15$, and $4.83457\text{E-}14\text{Gy/particle}$, respectively. Therefore, the total absorbed dose for radon in SMF was in the order of $6.29727\text{E-}13\text{ Gy/particle}$. The MCNPX outputs are always normalized to one source particle. Therefore to calculate the absorbed dose in various radon concentrations, this result must be multiplied to the number of source particles in active volume around the SMF. The daily radon absorbed dose in a one-meter of SMF and 1 kBq/m^3 radon concentration is about 0.017 mGy which is in a dose range of TLD dosimeters. Conclusion The results show that the SMF can be regarded as a radon dosimeter and may be used for beta-particles dosimetry.

کلمات کلیدی:

Absorbed Dose, Lung cancer, MCNPX, Radon, Single-Mode Optical Fiber

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/942317>



