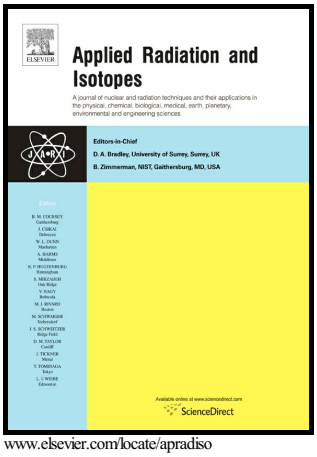


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# Physical and Geometrical Parameters Controlling Measurements of Radon Emanation and Exhalation from Soil

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## Abstract

The influence of physical and geometrical parameters, such as grain size, volume of the emanation container and mass of the sample, on the emanation coefficient and exhalation rates of radon (with and without consideration of back diffusion effect and effective volume of the emanation container) released from soil have been investigated. Moreover, a method for assessing the flux of radon migrate through soil layers was proposed. This method is based on measurement of the cumulative radon concentration transmitted through five layers of soil. The transmission factor results from the decay of $^{222}$Rn over a period of 60 day required for it to migrate through these layers was also determined. The soil samples were collected from Al-Marj city located in northeastern Libya. Radon measurements were carried out by using a closed emanation container based on CR-39 nuclear track detectors (NTDs). The results showed that the radon emanation coefficient clearly increases with grain size, container volume and sample weight. The exhalation rates also increase with grain size and sample weight, but the container volume parameter shows an opposite trend. The radon flux and its transmission factor are significantly decreased throughout that uniform soil when the increase in soil depth retarded exhalation. This study shows that various physical and geometrical parameters were demonstrated to be greatly affected on the emanation coefficient and exhalation rates of radon released from soil.