DETERMINATION OF RADON DIFFUSION COEFFICIENT AND RADON

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Body of Abstract: Emanation of radon (\(^{222}\)Rn) and \(^{222}\)Rn-radioactive inert gas is associated with the presence of radium and its ultimate precursor uranium in the ground. Although these elements occur in virtually all types of rocks and soils, their concentrations vary with specific sites and geological materials. As an inert gas, radon can move freely through the soil from its source; the distances are determined by factors such as rate of diffusion, effective permeability of the soil and by its own half-life.

Measurements have been made of radon (\(^{222}\)Rn), release from diverse quaternary samples collected from different sediment deposits in the Errachidia and Beni-Mellal areas (Morocco). Radon diffusion coefficient as one of some important parameters of radon transport in the soil has been measured using Solid State Nuclear Track Detectors (SSNTD) method. Radon-\(^{222}\)Rn-activity, uranium content and radon exhalation rate have been determined in the studied samples. Uranium concentrations were found to vary from 0.14 to 9.52 ppm whereas the radon exhalation rate varied from 0.003 to 0.145 Bq m\(^{-2}\) h\(^{-1}\). A positive correlation has been found between radon exhalation rate and uranium content in the studied samples. The average radon diffusion coefficients were found to vary from \((1.26 \pm 0.09) \times 10^{-6} \text{ m}^2 \text{ s}^{-1}\) to \((4.3 \pm 0.36) \times 10^{-6} \text{ m}^2 \text{ s}^{-1}\). Furthermore, the correlation between \(^{222}\)Rn diffusion coefficient and porosity are also discussed. The diffusion of \(^{222}\)Rn in geological samples has been investigated for different purposes and by several methods, but the “container plastic technique” using solid state nuclear track detectors provides a simple method to measure the actual radon exhalation and \(^{222}\)Rn diffusion coefficient in the laboratory.