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The Study of Equilibrium factor between Radon-222 and its Daughters in Bangkok Atmosphere by Gamma-ray Spectrometry

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To study the Equilibrium between radon-222 and its daughters in Bangkok atmosphere by Gamma-ray spectrometry, air sample were collected on 48 activated charcoal canister and 360 glass fiber filters by using a high volume jet-air sampler during December 2007 to November 2008.The Spectra of gamma-ray were measured by using a HPGe (Hyper Pure Germanium Detector). In the condition of secular equilibrium obtaining between Radon-222 and its decay products, radon-222 on activated charcoal canister and its daughters on glass fiber filters collected in the same time interval were calculated. The equilibrium factor (F) in the open air had a value of 0.38 at the minimum ,and 0.75 at the maximum. The average value of equilibrium factor (F) was 0.56 ± 0.12. Based on the results, F had variations with a maximum value in the night to the early morning and decreased in the afternoon. In addition, F was higher in the winter than in the summer. This finding corresponds with the properties of the Earth atmosphere. The equilibrium factor (F) also depended on the concentration of dust in the atmosphere. People living in Bangkok were exposed to average value of 30 Bq/m3 of Radon-222 in the atmosphere. The equilibrium factor (0.56 ± 0.12) and the average value of Radon-222 showed that people were exposed to alpha energy from radon-222 and its daughters decay at 0.005 WL(Working Level) which is lower than the safety standard at 0.02 WL.

Keywords: Radon, Radon daughters , equilibrium factor, Gamma –ray spectrum analysis ,Bangkok ,Thailand