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Measurement of Radioactivity of ^{238}U , ^{226}Ra , ^{232}Th and ^{40}K in Soil of Different Geological Origins in Northern India

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ABSTRACT

Radioactivity of the nuclides ^{238}U , ^{226}Ra , ^{232}Th and ^{40}K was measured in soil by γ -ray spectrometry using HPGe detector. A criterion was set in order to analyse soil samples from plain, semi-hilly and hilly areas in northern India. More than three γ -ray energy peaks were used for the determination of ^{226}Ra and ^{232}Th activity concentrations to obtain more accurate results. Some of these peaks have interfering energies, which was caused by the limited resolution of the detector, but they were resolved theoretically and used in the analysis because of their significance in reducing the random error to its minimum level. Relationships between the measured radionuclides have been discussed elaborately. Radionuclides ^{238}U and ^{226}Ra were found in disequilibrium with ratio of specific activities ($^{238}\text{U}/^{226}\text{Ra}$) less than unity for most of the samples. In some cases this disequilibrium may be significant enough to modify the γ -ray dose factors.

KEYWORDS

Soil, Natural Radionuclides, Disequilibrium, Dose

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References

- [1] M. Tufail, N. Akhtar and N. Waqas, " Measurement of Terrestrial Radiation for Assessment of Gamma Dose from Cultivated and Barren Saline Soils of Faisalabad of Pakistan," *Radiation Measurement*, Vol. 41, No. 4, 2006, pp. 443-451. doi:10.1016/j.radmeas.2005.10.007
- [2] UNSCEAR, " United Nations Scientific Committee on the Effects of Atomic Radiation. Sources and Effects of Ionizing Radiations," United Nations, New York, 2000.
- [3] M. Sohrabi, " Recent Radiological Studies of High Level Natural Radiation Areas of Rasmar," *Proceeding of the International Conference on High Levels of Natural Radiation*, Rasmar, IAEA, Vienna, 1993.
- [4] C. M. Sunta, " A Review of the Studies of High Background Areas of the S-W Coast of India," *Proceeding of the International Conference on High Levels of Natural Radiation*, Rasmar, IAEA, Vienna, 1993.
- [5] H. Zhu, H. Huang, J. Song , J. Li, J. Zhang, J. Huang, Y. Zha and Y. Guo, " Gamma Radiation Levels Around the Highest Background Area in Poland," *Proceeding of the International Conference on High Levels of Natural Radiation*, Rasmar, IAEA, Vienna, 1993.
- [6] M. J. Anagnostakis, E. P. Hinis, D. J. Karangelos, N. P. Petropoulos, P. K. Rouni, S. E. Simopoulos and Z. S. Zunic, " Determination of Depleted Uranium in Environmental Samples by Gamma-Spectroscopic Techniques," *Archive of Oncology*, Vol. 9, 2001, pp. 231-236.
- [7] A. S. Murray and M. J. Aitken, " Analysis of Low-Level Natural Radioactivity in Small Mineral Samples for Use in Thermoluminescence Dating, Using High Resolution Gamma Spectrometry," *Applied*

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- [8] Z. Papp, Z. Dezso and S. Daroczy, " Measurement of the Radioactivity of ^{238}U , ^{232}Th , ^{226}Ra , ^{137}Cs and ^{40}K in Soil Using Direct Ge(Li) γ -Ray Spectrometry," *Journal of Radioanalytical and Nuclear Chemistry*, Vol. 222, No. 1-2, 1997, pp. 171-176. doi:10.1007/BF02034265

- [9] A. Navas, J. Soto and J. Machin, " ^{238}U , ^{226}Ra , ^{210}Pb , ^{232}Th and ^{40}K Activities in Soil Profiles of the Flysch Sector (Central Spanish Pyrenees)," *Applied Radiation and Isotopes*, Vol. 57, No. 4, 2002, pp. 579-589. doi:10.1016/S0969-8043(02)00131-8

- [10] M. Dowdall and J. O' Dea, " $^{226}\text{Ra}/^{238}\text{U}$ Disequilibrium in an Upland Organic Soil Exhibiting Elevated Natural Radioactivity," *Journal of Environmental Radioactivity*, Vol. 59, No. 1, 2002, pp. 91-104. doi:10.1016/S0265-931X(01)00038-8