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Radiological Hazards Assessment of Cement Dust Emanating from Meftah-Algerian Plant

The radiological significance Meftah cement dust has been investigated using a high-resolution HPGe gamma-spectrometry system. This system was carefully calibrated.
In order to evaluate accurately the detector efficiency, a fully detailed Monte Carlo geometrical model of HPGe detector was developed using MCNPX code. The model is validated via 152Eu resin source, packed in Marinelli beaker. The model was adjusted to consider the dead layer thickness in the Germanium detector hence the best agreement between experiment and the Monte Carlo calculation result was obtained.
The 226Ra, 232Th and 40K activity concentrations for in the cement dust sample is respectively (43±1Bq kg-1), (13±2 Bq kg-1) and (251±2 Bqkg-1). It can be noticed that the specific activity due to 40K was the largest contributor to the total activity.
Additionally the Radium-equivalent activities were calculated for the measured sample to assess the radiation hazards arising from hazards in the working environment resulting exposure to cement dust. All samples showed lower than the limit set in the OECD report (370 Bq kg-1). A comparison of dust activity released to atmosphere with a cement final product shows almost similar values. A further research will be conduct to measure de radon and Thoron exposure from the dust in order to evaluate clearly the radiological significance of the dust in the area close the plant.

Keywords: Natural radioactivity, Cement dust, Gamma Ray spectrometry, MCNPX modeling, Detector Efficiency, Radiological hazards indices.

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