DETERMINATION OF ASH CONTENT OF NIGERIAN COALS USING DUAL ENERGY GAMMA-RAY TRANSMISSION MEASUREMENT

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ABSTRACT

An experimental facility which utilizes gamma transmission technique was used for determination of ash content of coal. The facility is based on attenuation of low energy γ-rays which depend on the mean atomic number of the ash component of coal. The system was calibrated using in-house standards consisting of pure graphite powder doped with different concentrations of incombustible elements. The calibration coefficients determined from the variation of ash content of the laboratory standards with relative intensity values for low and high energy γ-rays were used for the quantification of ash content of coal samples obtained from different locations in Nigeria namely; Inyi, Okaba, Ogboyoga, Okpara, Owukpa and Lafia-obi with the obtained values of 8.1±0.6, 8.7±0.5, 9.1±0.4, 10.5±0.7, 10.5±0.3 and 15.1±01 wt. % respectively. This result compares reasonably well with that of chemical assay of the samples. With proper control of sources of experimental error, the facility shows great promise for accurate determination of the ash content of raw and washed coal samples and favorably lends itself for adaptation to industrial on-line quality control of coal streams.

Keywords: Coal ash, gamma transmission, calibration, on-line quality control

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