

THE DEVICE FOR DETERMINATION OF EFFECTIVE ATOMIC NUMBER MATERIALS

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The increase of effectiveness of the concentration production of mineral resources under existing condition of continuous ores(minerals) quality loss requires development and perfection of effective physical methods. The determination of effective atomic number (Z_{eff}) of the investigated material is one of such methods. Direct determination of Z_{eff} is of great importance in the exploration geophysics, mining, ore, coal and minerals monitoring. The main disadvantages of available equipments for Z_{eff} determination are the complexity and high cost.

The special gas-discharge proportional counters with a high escape peak were proposed and tested. The pulse-height spectrum at the output of such detectors includes information about the intensity of coherent and incoherent radiation, scattered by the sample. The proportion of intensities of the main peak and escape peak allows to find the analytical signal that is connected with the relation $I_{\text{coh}}/I_{\text{incoh}}$. This signal is a complicated function of Z_{eff} and scattering angle θ . The dependence of analytical signal from Z_{eff} under different terms was calculated.

Experimental testing of the proposed device, that includes Kr proportional counter and X-ray tube with Y anode, was carried out. The effectiveness of that device is determined thereby incoherently by scattered $K\alpha$ yttrium line missed the escape peak. It was discovered that the analytical signal is lowered four times at changing Z_{eff} from 6 till 17. This confirms applicability of the proposed device for separation coals, ferrous and polymetallic ores from barren measures.