Elemental Composition Analysers Based on the Tagged Neutron Method

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Currently, the tagged neutron method (TNM) is actively used to determine the elemental composition of various substances: sinter, coal, iron and phosphate ores. The tagged neutron method consists in irradiation of the substance under study by fast neutrons with an energy of 14 MeV and registration of the induced characteristic gamma radiation. Neutron tagging is carried out by an alpha detector built in a neutron generator.

The results of operation of conveyor analysers of TNM for determination of elemental composition of matter on the conveyor in real time mode without sampling are discussed. The analyser provides the results of the elemental analysis of sinter each 40-60 s without taking the probe. It gives possibility to correct elemental content of the sinter to provide its stability. Large penetrating power of the 14 MeV neutrons provides information of the elemental content of large layer of the substance up to 300 mm.

Interesting results are obtained on stationary TNM analysers that determine the elemental composition of slurry samples required for proper quarrying.

New applications of TNM for the separation of iron ores and the sorting of used refractories using neural networks have also been developed.