

Study of the elemental composition of a fragment of the Chelyabinsk meteorite

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For analysis to the Laboratory of Neutron Physics named after I.M. Frank of the Joint Institute for Nuclear Research was provided with a fragment of the Chelyabinsk meteorite weighing 133.13 g. The fragment of the meteorite studied by us is a melted sample of an elongated-rounded shape and covered with a black melting crust (thermogenic border) with a thickness of 0.1 to 1 mm. For the first time in Russia, prompt gamma activation analysis (PGAA) was used to determine the elemental composition of a meteorite. PGAA is a unique, non-destructive nuclear analytical method with multi-element capabilities, offering analysis of the main components and some trace elements and the method is based on the registration of prompt (primary) gamma ray that are emitted as a result of radiative capture of thermal neutrons. Using PGAA and XRF methods, the mass fractions of 15 meteorite elements were determined, such as: Na, Mg, Al, Si, K, Ca, Ti, Mn, Fe, Cr, S, Sc, Co, Ni, Cl. The obtained data were compared with the previously obtained results of the study of the Chelyabinsk meteorite. The measurements were carried out on channel 11B of the IBR-2 pulsed reactor, equipped with a mirror curved neutron guide 15 m long.

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