

Study of ceramic objects of the settlement of ancient Kazakhstan by methods of neutron tomography, diffraction and Ramon spectroscopy.

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The territory of East Kazakhstan, including Tarbagatai and Zaisan, have been important ethnocultural centers of various tribes and peoples since ancient times. Since 2003, research has been carried out on the Shilikti monuments located in the Zaisan district of the East Kazakhstan region. During this time, four large and one medium and 20 small burial mounds were studied by excavations. East Kazakhstan, despite many years of archaeological research, is a poorly explored region of Kazakhstan. Our task in this work is to add information about the ancient pottery craft.

The special value and uniqueness of such objects requires the use of modern non-destructive testing methods for their research. To determine the mineral phase composition of the studied ceramics, the neutron diffraction method was used, and the features and spatial distribution of phases were studied by the method of neutron radiography and tomography IBR-2 (JINR, Dubna, Russia).

The obtained data on the mineral composition of the studied ceramic materials indicate the production of dishes, mainly from clay with a natural admixture of feldspars, quartz and mica. In addition, diffraction peaks associated with the presence of graphite, anatase and calcite phases were detected. Some fragments contain inclusions of organic impurities, presumably vegetation, manure or bird droppings. The data on neutron tomography made it possible to put forward an assumption about the uniformity of the heat treatment of pottery. She also showed that the outer layer of ceramic is exposed to higher temperatures, and a high attenuation coefficient indicates the presence of hydrogen-containing groups and, accordingly, a low firing temperature.

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