Ceramics of Bolgar: the First Results of Usage of Neutron Activation Analysis

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The work is devoted to the first attempt to use neutron activation analysis (NAA) to determine the chemical composition of archaeological ceramic paste. 15 fragments of medieval vessels from the city of Bolgar, the capital of Volga Bulgaria (now the territory of Tatarstan, Russian Federation) were provided for investigation by the Institute of Archaeology of the Russian academy of sciences. NAA was carried out by the NAA group of the IREN research facility in the Frank Laboratory of neutron physics at the Joint institute for nuclear research.

The analytical study of the chemical composition of the Bolgar ceramics made it possible to obtain such data that were not previously known to researchers of medieval ceramics.

The main conclusion obtained as a result of these studies is that all the studied ceramic samples, including obviously imported, did not have significant differences neither in the main components (silicon, aluminum, iron, magnesium), nor in traces. So, at the first stage of research, it is difficult to indicate the signs by which pottery products similar in external appearance could differ. Differences cannot be traced between the dishes made in different eras, which in general should not be surprising, since the same clay was probably used for production. The coincidence of the elemental composition of clays of different geographical origin (from the Bolgar, the Lower Volga region, and the unknown center) is most surprising. However, the singleness of the comparative material allows us to assume that such coincidences are random. To check them, additional studies will be required on a wider series of samples.

The accumulation of data, new series of analyzes can significantly promote knowledge of the ancient ceramic industry, providing information that cannot be obtained by other methods.