

BASIC METHODS FOR RESEARCHING ARCHAEOLOGICAL OBJECTS FROM PRECIOUS METAL AND THEIR POSSIBILITIES IN SOLVING THE PROBLEM OF ANCIENT SOURCE BASE

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Finds from precious metals on the territory of the European part of Russia are most widely presented in the materials of the Andronovo and Scythian-Sarmatian archaeological cultures, in the monuments of the Northern Black Sea region. One of the fundamental problems in the study of the oldest archaeological finds from precious metals found in this area is the problem of the source base. If Pb-Pb isotope analysis works well to solve the problem of silver sources, then to search for sources of ancient gold, it is necessary to rely on data on the content of trace impurities.

There are several methods for studying the chemical composition of gold, the most often used in archaeological practice is the XRF method. With its help, the collections of archaeological gold objects of the 4th century B.C. – II-III centuries A.D. were investigated, data on the nomenclature of the main elements contained in ancient gold were obtained. This method made it possible to determine a number of elements contained in gold, which may be signs of specific ore occurrences (for example: Zaikov et al., 2012). However, this method is often unable to provide a nomenclature of a number of elements that indicate other types of gold ore formations.

Such possibilities are provided by other research methods, among them – classical neutron activation analysis (NAA) and prompt gamma activation analysis (PGAA). We analyzed two samples (foil of the 4th century B.C.), irradiation of both samples within the framework of NAA and PGAA was carried out at the IBR-2 reactor. One of the samples was additionally studied by the NAA method at the stationary WWR-K reactor at the Institute of Nuclear Physics, Almaty, Kazakhstan.

As a result of the experiment, the mass fractions of 10 elements were determined in the first sample, 10 by means of NAA, 4 by PGAA and 3 by XRF. In the second sample, the mass fractions of 8 elements were determined, 6 using NAA, 4 – PGAA.

Literature

Zaikov V.V., Tairov A.D., Zaikova E.V., Kotlyarov V.A., Yablonsky L.T. Noble metals in ores and ancient gold products of the South Urals. Yekaterinburg, 2012. P. 232.