

PECULIARITIES OF ATOMIC ABSORPTION DETERMINATION OF CATIONS OF TOXIC ELEMENTS IN NATURAL WATERS

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Natural water is the main component of the environment and the most important component that is essential for the life of organisms. It is one of the main factors that affect human and animal health and plant life. Considering the global environmental crisis and military actions on the territory of Ukraine, control over the quality of natural water is an important part of modern science and society.

The quality of natural waters is a set of physical, chemical, and biological characteristics that correspond to the needs of their usage, such as the presence or absence of certain impurities in the water (mineral salts of different compositions, heavy metals, alkalis, acids, organic substances, etc.) [1].

Heavy metal cations have the greatest impact on the quality of natural water, as they cannot be destructed but can only be redistributed among individual components of natural ecosystems and accumulate in soils and waters. Their main danger is that when they enter a living organism, they are not excreted but accumulate in the excretory systems and various organs and organ systems, which contributes to metabolic disorders and generally leads to complications in the body's functioning. The atomic absorption spectroscopy method is often used to monitor their content in natural water.

The aim of this research is to study the peculiarities of the atomic absorption determination of toxic element cations in natural waters.

Atomic absorption analysis (AAA) with flame or electrothermal atomization of the sample is the leading method for determining the content of toxic elements. It is based on the absorption of ultraviolet or visible radiation by gas atoms. The method is used to measure the concentrations of chemical elements in samples of various origins and compositions. To perform the measurement, the sample is put into a flame to convert it to a gaseous state. A lamp with a hollow cathode of the metal under study is used as a radiation source. The wavelength interval between the spectral line produced by the radiation source and the absorption line of the same element in the flame is very narrow, so the presence of other elements has practically no effect on the analysis results. The AAA method is widely used for the determination of moving forms of metals (Mn, Cr, Cu, Zn, Ni, Pb, Cd, Co).

Meanwhile, to study the content of a toxic elemental ion, selective adsorbents are used to concentrate metal ions before determining their content [2]. The adsorbents are mostly silicas modified with complex functional groups. Such adsorbents can be obtained by immobilizing organosilicon compounds on an inorganic surface [3].

In summary, the use of atomic absorption analysis in combination with preliminary concentration with modified sorbents will allow for the quantitative determination of metal ions. It will further serve as a basis for improving and developing new methods for their extraction from natural waters.

References:

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