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POSSIBILITIES AND METHODS OF ANALYTICAL CHEMISTRY IN DETERMINING TRACE AMOUNTS OF ORGANIC COMPOUNDS

Today, the methods for quantitative and qualitative determination of numerous chemical compounds are at the pinnacle of effectiveness to solve crimes, to work with trace evidence, or just to maintain the quality of water. The object of this study is to analyse new and efficient methods of isolation of substances such as advanced solid-phase and liquid-liquid extraction. These methods make it possible to determine trace amounts of some dangerous organic compounds with the detection limit of less than nanogram per gram of the analyzed substance.

Currently, chemists commonly use the methods called chromatography and mass spectrometry to define trace amounts of chemical compounds. This process is almost fully automated, so it is highly relevant to separate the analyte from interfering components. For this purpose, the method called extraction is used. The first type of extraction is a solid-phase extraction. Different selective cartridges for certain connection groups are applied. Using this type of extraction, chemists usually detect drugs in human blood or on the physical evidence as well as identify medicines. The most important thing in this method is the “filler” of these cartridges through which an analyte passes. The second type of extraction method is a liquid-liquid extraction. This technique is used mostly to determine some medicines and complex organic compounds, such as vitamins, proteins, amino acids, etc.

New promising methods based on the aforementioned techniques are being invented. Today, scientists use magnetic nanoparticles for a magnetic solid-phase extraction in preparing biological, environmental, and food

samples. It is an especially noteworthy method, because it “opens doors” for green, non-toxic chemistry as well as for a widely used ionic liquids extraction. For these purposes, a new extremely accurate method with nanoparticles of gold as special “tags” is used [1]. Scientists from the USA and the Netherlands put forward a method of road-side testing to carry out spot-testing for the presence of drugs in the drivers’ blood [2]. Remarkable advances have been made in the method which uses molecularly imprinted polymer because of its sensitivity and selectivity.

As a result of numerous experiments analyzed, sufficient data have been obtained on the application of these methods. Unfortunately, the application of all these methods is very wide, including the determination of drugs in drivers’ blood and in the bodies of people who died from drug overdoses; the detection of illicit compounds and medicines in wastewater [3]; the identification of the composition of unknown mixtures seized by the Customs Office.

Based on the data which has been obtained with analysis of new and efficient methods of isolation of substances such as advanced solid-phase and liquid-liquid extraction, it is possible to indicate the relevance of this topic. In Belarus, particularly in Minsk, monitoring and control of drinking water quality is quite topical, because not all districts of the city use artesian wells as a source of clean water. Thus, the development of this research can improve not only the quality of water, but also the standard of our life.

References

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