MICROWAVE-ASSISTED SAMPLE PREPARATION AS ECOFRIENDLY TECHNIQUE FOR ROUTINE ANALYSIS

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Millions of analytical operations are carried out in industrial and research laboratories every year. These procedures take much time, energy, harmful reagents and often can affect negatively the environment. Among the ways that allow chemistry to become more ‘green’ is the use of microwaves.

In the presentation the examples of analytical techniques worked out for industrial laboratories and based on microwave-assisted sample preparation coupled with widely applied determination methods, are given.

Results were obtained under routine technological control of various raw materials and relative by-products (carbon-containing As-Sb sulphide ores and technological products, alloy steels, manganese ores and ferrous alloys, silicate cotton and heat-insulating materials, chemicals etc.). Preparation procedures included ashing and/or dissolution (decomposition) of samples. Standard procedures were compared with microwave sample preparation followed by photometric, ETAAS, FAAS or AES-ICP determination. Concentration values, reproducibility, time and reagent consumption for the analysis of products mentioned, are shown for both analytical techniques. In addition, the data on the routine geochemical analysis, including microwave acid decomposition, as well as phase chemical analysis with the use of microwave solvent extraction, are discussed.

Besides higher efficiency and better analytical characteristics, microwave-enhanced procedures were shown to improve environmental quality due to excluding high-boiling acids and drastic decreased consumption of reagents.

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