In the recent years, many of the instrumental analytical techniques have been used in the investigation of archaeological materials. The present paper reports the results of chemical, physical, mineralogical and petrographical methods used for the elemental and technological characterization of a group ancient İznik ceramics (sherds and kiln wasters) obtained from the sites of İznik kiln excavation.

For the technological properties of samples thin section analysis were carried out using scanning electron microscopy (SEM) with back-scattered electron detector and polarizing microscope. SEM method distinguishes ceramic phases depending on the atomic number contrast and polarizing microscopes supports the mineral composition (also obtained by X-ray diffraction method) and crystal, glassy and pore phases. The bulk chemical compositions of slip and body paste were determined semi-quantitatively using energy depressive X-ray spectrometer attached to SEM. The Physical properties of firing process were investigated with the measurements obtained by the mercury porosimeter.

The results showed that main mineral contents of all samples were quartz, and additionally, calcium-aluminum silicate and its hydrated form. Besides, some samples contained rutile, biotite and epidote minerals. The fritted lead oxide inclusion in the white paste was particular for İznik production. The slip layer contained finer quartz grain and aggregates and less glassy phase. Inorganic oxides used as dye stuff revealed different colors depending on the glaze formula. The porosity of ceramics originated from the voids largely. Distribution of pore sizes varied within a very large range. The relatively small bulk density indicated high firing temperature in particular samples. The approximate glaze formula of red-bodied ceramics implied that the firing temperature varies between 800-1100°C whereas the firing temperature of white-bodied ceramics showed consistency between 950-1050°C.

MICROWAVE-ASSISTED PROCESSES IN ANALYTICAL CHEMISTRY

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Keywords: microwave heating, microwave-enhanced processes, trace analysis, sample preparation

The actual problem of today chemistry is a search of methods to affect chemical reactions. A solution of the problem is especially important for analytical chemistry, in part, for stimulating of processes and operations, preceeded a measurement of analytical signal.

The effective way to speed up physical and chemical interactions in homogenious and heterogeneous systems is the use of microwaves. In the paper the mechanism of interaction of microwaves with the substance and their effect on chemical processes is analysed. To summarize the results obtained, an approach including a comparison of some parameters of the reactions under thermal and microwave heating (time; recovery or yield; composition and structure of reaction products; activation energy) was used. Within the framework of this approach a number of reactions (hydrolysis of organic and inorganic compounds, complexation of metal ions with organic reagents in solutions and in a sorbent phase, oxidation of organic substances by mineral acids) was studied, and a predominant role of kinetic factors was demonstrated.

A kinetics of chemical reaction in a closed vessel heated by microwaves and the dynamic method of the determination of activation energy are discussed, as well as analytical applications of microwaves for the labilization of inert compounds under complexation and for synthesis of organic reagents.
A special attention is devoted to microwave-assisted sample preparation for elemental analysis. Analytical operations including drying, ashing, preconcentration, decomposition and extraction are compared with traditional techniques. Reduction of pretreatment time, simplicity of combination with instrumental techniques, possibility of automation, and a variety of analytical operations and processes, accelerated by microwaves, promote a creation of modern analytical schemes for the determination of traces. The schemes, based on microwave pretreatment (including decomposition of samples and sorption extraction of trace elements) are considered. The procedures have been developed for the analysis of biological and environmental samples (including speciation), geological samples, containing noble metals, and technological materials, including high purity substances. Results obtained, as well as main principles, features and advantages of microwave-assisted sample preparation coupled with atomic spectroscopy, in part, ETAAS and ICP-AES, are discussed.

**DETERMINATION OF METALS IN URINE AFTER PRECONCENTRATION AND MATRIX SEPARATION USING DETATA SORBENT BY ATOMIC ABSORPTION SPECTROMETRY**

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**Key word:** urine, metals determination, preconcentration, matrix separation, atomic absorption analysis.

Electrothermal atomic absorption spectroscopy (ETAAS) is widely applicable for determination of heavy metals in biological samples [1-3]. From the other side the correct determination of Cd and Pb in urine using ETAAS is a difficult problem due to a severe and variable matrix interference. Concentration of Cd and Pb in urine is too low [4] to use a sample dilution in order to decrease the matrix interference.

One of the well known ways to reduce of matrix interference and background is a separation of analyte from matrix with accompanying preconcentration [5]. Different solid sorbent materials are used for these purposes. One of them is DETATA (aminocarboxilic sorbent based on styrene divinylbenzene copolymer) [6]. The aim of this work is to investigate an efficiency of preconcentration and separation of Cd and Pb from urine matrix using DETATA sorbent.

Flow injection unit "BPI-M" (Kimavtomatika, Russia) was used for off-line Cd and Pb preconcentration and separation from urine matrix. Atomic absorption spectrometers Shimadzu AA-6800 and Pye Unicam-929 with graphite furnace were used for Cd and Pb determination. Effect of elution time, sample and eluate flow rate through the column and sorbent layer length on metals recovery in urine samples were investigated.

The urine samples were analyzed directly (after filtration only) or after sample pretreatment (acid digestion). A good agreement of results were obtained both for pretreated and for non-pretreated samples. This makes possible to avoid the longtime, complicated and threatened with contamination procedure of urine sample digestion.

Recovery of Cd and Pb determination in Seronorm\textsuperscript{TM} Trace Element Urine Batch no. 101021 is closed to 100 \%.