ATOMIC ABSORPTION DETERMINATION OF THE TRACE QUANTITY OF GOLD WITH THE PRECONCENTRATION BY POLYURETHANE FOAM

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Key words: gold, preconcentration, AAS, polyurethane foam, copper alloy, determination

The new atomic absorption method of the determination of $10^{-4}$-$10^{-5}$ % gold in a metallic copper has been worked out. A copper sample 1-5 g is dissolved in 40-50 ml of the mixture of the nitric and hydrochloric acids, than gold is sorbed as HAuCl₄ by polyurethane foam. Copper does not prevent gold sorption. Further, gold is desorbed with 5 ml of an acetone in the dynamic conditions; acetone solutions are evaporated and dissolved by water. Gold is determinated in the deduced solutions by atomic absorption. Also polyurethane foam with gold can be dissolved in a mixture of the hydrogen peroxide and nitric acid after UF processing. Standard deviation is not bigger than 3-5% (n=5, P=0,95). Duration of an analysis is 50-60 min.

DETERMINATION OF ACIDITY CONSTANTS OF ACID-BASE INDICATORS BY SECOND DERIVATIVE SPECTROPHOTOMETRY

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Key words: Dissociation constants, weak organic acids, second derivative spectrophotometry

A method for calculation of acid-base dissociation constants of monoprotic weak organic acids whose acid and base species have overlapping spectra from absorptiometric and pH measurements is described. It has been shown that the second derivative spectrophotometry can effectively be used for determining the dissociation constants, when dissociation constants obtained for methyl orange and bromothymol blue were compared to the values given in the literature.

MODERN METHODS OF TITANIUM ANALYSIS FOR THE CONTENT OF GAS FORMING IMPURITIES

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We have developed methods of detecting carbon, oxygen, nitrogen and hydrogen in titanium sponge and titanium powders of various chemical and fraction composition, have them certified and introduced into Ukrainian State Standards, international standards and other regulatory documents. An algorithm of performing these methods provides for application of modern analytic equipment combined with classic analysis stages and sample preparation.

The reliable prompt detection of oxygen and nitrogen in titanium products considerably depends on conditions of sample preparation. High adsorption property of metal surface, particularly at analysis of finely dispersed products makes the analytical task more complicated.

The principle of carbon detection method is intense heating of the sample in oxygen flow at inductive furnace active zone. Content of analytic form, i.e. of carbon dioxide is measured with IR detector.

We have discovered optimal parameters of hydrogen detection in titanium sponge, finely dispersed metal titanium, its hydrides and semi-hydrides with an application of gas chromatography method. We consider it prospective to apply the method of induction heating in inert gas flow that enables one to provide high sensitivity of detection with proper metrology characteristics of the analysis.

We have developed and fabricated standard samples of titanium composition with certified oxygen, nitrogen and carbon content, and have them approved.

EFFECT OF MATRIX AT THE ATOMIC EMISSION SPECTRAL ANALYSIS OF IV GROUP OF PERIODIC SYSTEM ELEMENTS OXIDES

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The silicon (SiO₂), titanium (TiO₂) and zirconium (ZrO₂) dioxides, including modified of different reactants, find broad application in analytical practice. The hydrated SiO₂ often use as silica gel, aerosil and their modified analogs, TiO₂ with crystalline structure of anatase or rutile used as dye marker. At the TiO₂ synthesis for acceleration of crystallization and modifying surface process utilized some of oxides: P₂O₅, SiO₂, Sb₂O₃, ZnO, MgO, Al₂O₃, ZrO₂ on (> n 10⁻³ mass. %) concentration. As known a refractory ZrO₂ that used on ceramic industry have gains indispensable chemical inertness at oxidizing atmosphere with 1500-2000°C temperatures after modification of its cubic structure by the additions of oxides CaO, MgO, Y₂O₃.

An accurate and simple method of atomic emission spectral (AES) determination of 17 elements in industrial and nature waters with low contents of salts after its preconcentration on amorphous SiO₂ are proposed. Matrix effect that takes place and are stipulated by increasing weight of analytes and size of SiO₂ particles was eliminate by dilution of concentrates with high purity graphite. In result the exhaust-and-forced method of an emission spectral analysis of structures on the basis of SiO₂ and also some of natural and high purity industrial waters was offered at determination 17 trace elements. The method detection limit for marked waters are 2-10 ppm.

To elimination of crystalline structure effect of pigmental titanium dioxide (TiO₂) on the calibration curves position have been used a method of full burning parsed is model in a high-temperature electric arc at their preliminary dilution (1:5) by graphite. Detection limits of impurity — 1 10⁻⁴-1 10⁻³ mass. %.

The methods of AES determination some of impurities (n 10⁻³ up to 10⁻¹ mass.%) and also stabilizing components CaO and MgO in high purity ZrO₂ are proposed.