ISSN 1028-6861

ЖУРНАЛУ 85 ЛЕТ

# ЗАВОДСКАЯ ЛАБОРАТОРИЯ

## ДИАГНОСТИКА МАТЕРИАЛОВ

3
2017 Том

# ЗАВОДСКАЯ ЛАБОРАТОРИЯ
## ДИАГНОСТИКА МАТЕРИАЛОВ

ЕЖЕМЕСЯЧНЫЙ НАУЧНО-ТЕХНИЧЕСКИЙ ЖУРНАЛ ПО АНАЛИТИЧЕСКОЙ ХИМИИ, ФИЗИЧЕСКИМ, МАТЕМАТИЧЕСКИМ И МЕХАНИЧЕСКИМ МЕТОДАМ ИССЛЕДОВАНИЯ, А ТАКЖЕ СЕРТИФИКАЦИИ МАТЕРИАЛОВ

№3 ТОМ 83 2017

**Основан в январе 1932 г.**


## СОДЕРЖАНИЕ




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Журнал включен в список изданий, рекомендованных ВАК при защите докторских диссертаций.





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# ABSTRACTS

UDC 621.795

### Application of Atomic-Emission Spectrometry with a Glow Discharge to Quantitative Deep Profile Analysis of Steel 12H18N10T after Technological Impact of Argon Plasma Streams

*Plikhunov V. V., Grigorovich K. V., Petrov L. M., Arsenkin A. M., Sprygin G. S., Khimyuk Ya. Ya., Demin K. Yu., and Semionov V. D.*

Properties of the surface layer of corrosion resistant Cr – Ni – Ti steel formed under the technological impact of argon plasma are considered. Methods of atomic emission spectrometry with glow discharge, x-ray microanalysis and Auger spectroscopy are used to demonstrate that the impact of argon plasma promotes redistribution of the elemental composition in the surface layer of the alloy, most notably in the nanoscale surface region.

**Keywords:** surface layer; atomic emission spectrometry; x-ray microanalysis; technological impact; hardness; layer-by-layer chemical analysis; Auger electron spectroscopy.

UDC 543.544.5.068.7:543.51

### Simultaneous Determination of 17 Synthetic Dyes in Food by High Performance Liquid Chromatography/Quadrupole-Time-of-Flight Mass Spectrometry of High Resolution

*Amelin V. G. and Bolshakov D. S.*

A simple method of sample preparation, rapid screening and determination of 17 dyes (E labeled food additives) in food products using HPLC/quadrupole-TOF mass spectrometry of high resolution is developed. Sample preparation of solid samples consists in solid-liquid extraction with acetonitrile, 2-fold dilution of the extract in deionized water, filtration, and chromatographic run. As for beverage the procedure consists in centrifugation, 10-fold dilution, filtering, and chromatographic run, respectively. The detection limits range 0.1 – 300 ng/g. A scheme of screening and determination of synthetic dyes in food which includes dye identification by the exact ion mass ($m/z$), retention time, coincidence of isotopic distribution mSigma and determination of the dye (if present) by the standard addition method (spiked test). The relative standard deviation of the results of the analysis did not exceed 0.1. Duration of the analysis is 0.5 – 1 h.

**Keywords:** synthetic dyes; food products; high performance liquid chromatography; time-of-flight mass spectrometry of high-resolution.

UDC 543.42.062:546.72.2

### Dimercaptoquinoline as Analytical Reagents for Extraction-Photometric Determination of Iron (III)

*Kuliev K. A.*

Physico-chemical methods are used to study complex formation of iron (II, III)with dimercaptopropanes (2,6-dimercaptopropane, 2,6-dimercapto-4-methylphenol, 2,6-dimercapto-4-ethylphenol and 2,6-dimercapto-4-*tert*-butylphenol) and hydrophobic amines (heterocyclic diamines 1,10-phenanthroline, 2,2′-dipyridyl and 4,7-diphenyl-1,10-phenanthroline. Optimum conditions for formation and extraction of mixed ligand complex compounds and ratio of the components in the complexes are specified. Mixed ligand complexes (MLC) are formed in weakly acidic media ($pH_{opt}$ = = 5.2 – 7.5), maximum in MLC spectrum of the light absorption being observed at $\lambda$ = 552 – 586 nm, molar absorption coefficient $\varepsilon = (3.08 – 4.40) \times 10^4$. Photometric methods of iron determination developed for the vatiety of objects exhibit good reproducibility and low detection limits.

**Keywords:** iron; heterocyclic diamines; extraction-photometric method; determination.

UDC 543.553.4

### Determination of Lactic Acid in Veterinary Products and Blood Plasma by Amperometry

*Dubova N. M., Slepchenko G. B., Maksimchuk I. O., Boychenko S. S., Oreshina A. A., and Shchukina T. I.*

A possibility of applying amperometry for determination of lactic acid (LA) based on the inhibition of the molybdenum (VI) recovery and amperometric titration with registration of the diffusion current of lactic acid recovery on a platinum electrode is demonstrated first-ever. We evaluated the impact of different organic acids and other factors on the current value and specidied working conditions of the amperometric determination of LA. Proceeding from the results thus obtained we developed the methodology of lactic acid determination in in veterinary preparations and blood serum. The determinable concentrations range within $3 \times 10^{-5} \cdot 1 \times 10^{-1}$ mol/dm$^3$ ($S_r$ no more than 15 %). Correctness of method is confirmed in spiked test.

**Keywords:** lactic acid; amperometry; method of determination; veterinary products; blood plasma.

UDC 620.179.14

### Dependence of the Magnetic Permeability of Steels on their Chemical Composition and Purity

*Sandovsky V. A.*

A method of measuring magnetic permeability of the materials in the alternating electromagnetic fields is used to study the properties of different steels. It is shown that the magnetic permeability depends on the purity and chemical composition