

BOOK OF ABSTRACTS

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SILICA WITH IMMOBILIZED PROPYLTHIOETHYLEAMINE AS AN ADSORBENT FOR SELECTIVE DETERMINATION OF GOLD, PALLADIUM AND SILVER	251
O.P. Konoplitska, V. Zaitsev and G.M. Zaitseva	
STRUCTURAL AND ADSORPTION CHARACTERISTICS OF TITANATE NANOTUBE	252
Z.M. Wang, M. Wei, H.S. Zhou, H. Takagi and H. Hatori	
SYNTHESIS OF TITANIA-BRIDGED GRAPHENE-LAYERED MATERIALS	253
Y.J. Liu, M. Aizawa, Z.M. Wang, H. Hatori and T. Hirotsu	
SYNTHESIS AND CHARACTERIZATION OF CARBON NANOTUBE MEMBRANES	254
E. Vermisoglou, G. Pilatos, G. Romanos, N. Boukos and N. Kanellopoulos	
OPTIMIZATION OF SYNTHESIS PROCEDURES FOR STRUCTURED PSA ADSORBENTS	255
A. Mosca, J. Hedlund, F. Ridha and P. Webley	
ADSORPTION TO DETERMINING THE FRACTION OF OPEN CARBON NANOTUBES IN SAMPLES	256
S. Agnihotri and J. Mota	
EQUILIBRIA FOR ADSORPTION OF VALUABLE METALS ON CROSS-LINKED CHITOSAN FIBER AND HIGHLY POROUS CHITOSAN BEAD	257
H. Nakamura, Miyasaka and H. Yoshida	
STUDY ON ADSORPTION EQUILIBRIUM OF H₂/N₂/CH₄/CO₂ MIXTURE ON ACTIVATED CARBON	258
J. Wu, L. Zhou, W. Su, Y. Sun and Y.P. Zhou	
FLOW-THROUGH PORE STRUCTURE CHARACTERIZATION OF SILICA MONOLITHS BY MERCURY INTRUSION AND RETRACTION; TRANSMISSION ELECTRON MICROSCOPY; HYDRODYNAMIC CHROMATOGRAPHY AND HYDRODYNAMIC PERMEABILITY	259
R. Skudas, B.A. Grimes, D. Lubda and K.K. Unger	
Liquid phase adsorption	
REMOVAL OF METHYLENE BLUE DYE FROM ITS AQUEOUS SOLUTION BY FRUIT SHELL OF AEGLE MERMEOSE AS ALTERNATIVE LOW COST ADSORBENT	260
T.K. Sen, A.A.B. Omar, S. Mishra, R. Patel and R. Dev Jain	
ADSORPTION OF PLASMID DNA ON POROUS PARTICELS AND MONOLITHS	261
T. Tarmann and A. Jungbauer	
BLANK CORRECTION IN DYNAMIC COLUMN BREAKTHROUGH EXPERIMENTS	262
A. Rajendran and S. Farooq	
THE ROLE OF WATER AND SURFACE ACIDITY ON THE REACTIVE ADSORPTION OF AMMONIA ON MODIFIED ACTIVATED CARBONS	263
T. Bandosz and L.M. Le Leuch	
REMOVAL OF ARSENIC (V) ONTO CHITOSAN: FROM SORPTION MECHANISM EXPLANATION TO DYNAMIC WATER TREATMENT PROCESS	264
C. Gerente, Y. Andres, G. Mc Kay and P. Le Cloirec	
ADSORPTION OF A BASIC DYE FROM AQUEOUS SOLUTION ONTO A NATURAL ZEOLITE FIXED BED: SIMULATION AND OPERATION	265
B. Zarenezhad	
SINGLE AND BINARY ADSORPTIONS OF HEAVY METALS ON PALM KERNEL SHELL ACTIVATED CARBON	266
T. Choong, M. Muhammad, T.G. Chuah, R. Yunus, S. Abdul Rashid and D. Darmadi	
BIOSORPTION OF CD(II), CR(VI), PB(II) ON AZADIRACHTA INDICA LEAF POWDER	267
A. Sarma and K.G. Bhattacharyya	

SILICA WITH IMMOBILIZED PROPYLTHIOETHYLEAMINE AS AN ADSORBENT FOR SELECTIVE DETERMINATION OF GOLD, PALLADIUM AND SILVER

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Noble metals, particularly palladium, gold and silver, find an extensive use in the electrical industry, medical and jeweller industry. All these metals are very important elements for utilization and particularly from secondary sources since Ukraine has no deposits. One form possible sources is wastewater from non-ferrous metals industry.

The direct application of flame atomic absorption spectrometry to the detection of noble metals in complex matrices such as wastewater, geological and environmental samples is limited by numerous interferences, both mutual and those from associated base metals. For instance, base elements, i.e. zinc, copper, nickel and other, interfere on the signals atomic absorption determination of precious metals. Therefore, low concentrations of noble metals a separation/pre-concentration procedure prior to detection is required. For this purpose solvent extraction and solid phase extraction techniques (SPE) have been widely used. SPE has found increasing application for preconcentration of noble metals.

In the present study, silica with covalently immobilized propylthioethyleamine (SN-SiO₂) was used as SPE for selective pre-concentration of trace amount of palladium from wastewater, silver from solution of electrical contact and gold in acid-treated integral microcircuit. A pre-concentration method is based on adsorption of Pd²⁺, Au³⁺ and Ag⁺ on modified silica due to complex formation with immobilized organic ligand, followed by eluted and further determination by atomic-absorption technique.

In this study, various parameters, i.e. pH, time of stirring, volume of sample, chooses eluents and adsorption isotherm of silica gel has been studied. The influence of interfering elements in analyzed solutions on Pd, Au and Ag determination was investigated by using the development method. The results showed that up to 100 µg ml⁻¹Pb²⁺, 1000µg ml⁻¹Cu²⁺ did not interfere with the palladium, silver and gold signal. The results obtained are demonstrated that SN-SiO₂ can be used for selective pre-concentration of mentioned noble metals from very complex solutions. The method has been successfully applied to the analysis with detection limit 0.02 µg ml⁻¹, 0.01 µg ml⁻¹ and 0.05 µg ml⁻¹ of Ag, Au and Pd respectively.