HYBRID METHOD FOR DETERMINATION OF MICROQUANTITIES OF ANION FORMS OF V(V), MO(VI), W(VI) AND CR(VI) AFTER PRECONCENTRATION ON SILICA, CHEMICALLY MODIFIED WITH POLYHEXAMETHYLENEGUANIDINE CHLORIDE

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Polyhexamethyleneguanidine chloride (PHMG) is widely used as purifying and disinfectant agent for drinking water, because it has good adsorption properties concerning toxic metal-containing anions and cations. At immobilization PHMG on silica its adsorptive properties are remaining. Due to this, it was interesting to make chemical binding PHMG on silica and investigate its adsorptive peculiarities.

Chemical binding of PHMG on silica conducted by the way its interaction with aminopropilsilica, preliminarily activated by cyanuric chloride.

Concentration of PHMG on silica surface was determined by spectrophotometric analysis with the use of bromphenol blue (λ = 600 nm) and derivatographic analysis.

During investigations it was defined that silica chemically modified with PHMG shows adsorptive activity concerning such metal-containing anions as MoO₄²⁻, WO₄²⁻, Cr₂O₇²⁻ and VO₃⁻ in acidic and neutral medium. It was found that the synthesized adsorbent quantitatively removes molybdate ions in neutral, vanadate ions — in slightly acid (pH = 4-6.8), tungstate and chromate ions in strongly acidic (pH = 1.5-2) medium. Chemical binding PHMG on silica surface allowed to obtain adsorbent, which quantitatively remove metal anions of VI group in the very wide concentration interval from 1.10⁻³ to 5 mmol/g, and ions V(V) — in micro quantities (in limit from 1.10⁻⁶ to 8.10⁻⁵ mmol/g). All investigated metal containing anions maximum absorb by silica with chemically immobilized PHMG during 2-5 minutes, except chromate ions.

Thus, synthesized chemically modified silica combines the best properties of inorganic and polymeric adsorbents. As modified silica it shows good kinetic characteristics, does not swell and has high adsorptive capacity at a level appropriate to polymeric adsorbents.

Found opportunity of quantitative solidphase extraction of investigated metal-containing anions allowed to develop methods quantitative sorption-X-ray fluorescence of Mo(VI), W(VI) and V(V) and sorption-photometric determination with brompyrogalol red of Mo(VI), W(VI), Cr(VI) and V(V) anion forms after their removing and preconcentration on silica chemically modified by polyhexamethyleneguanidine chloride.