

Thematic area - Nanocomposites and nanomaterials

Magnetic Nanoparticles and Silica Gel Modified with Alkyl Amines for Recovery and Determination of Platinum and Palladium

Zaporozhets O. A., Volovenko O. B., Lisniak V. V., Zavoira O.

*Faculty of Chemistry, Taras Shevchenko National University of Kyiv
L'va Tolstogo., 12, Kyiv, Ukraine, 01033, E-mail:ovolovenko@ukr.net*

Palladium and Platinum are widely used in industry, especially it belongs to a new generation of catalysts in chemical and automobile trades. Pt and Pd are the basis for development of alloys which are used in dentistry and for anti-cancer drugs. It is known that it can cause allergic reactions and mutations. Therefore determination of its in various items is an important task of modern analytical chemistry.

Modern chemical and physicochemical methods such as neutron-activation analysis, ICP-MS, chromatography and others are used for PGMs determination. However its application is limited by high cost of equipment and high qualification of staff. The development of solid-phase extraction (SPE) using modified sorbents become forward-looking because of its high sensitivity and selectivity, does not consume large volumes of toxic organic solvents and is capable of achieving high enrichment factors. This method is more simple, rapid and more friendly for nature. It is known that magnetic nanoparticles and silica gels modified with different organic reagent are very promising materials for application in the field of analytical nanotechnology and catalysis. They exhibit high surface area and are biodegradable and biocompatible, MNs have superparamagnetic properties. Such nanoparticles can be easily separated from an aqueous solution using a conventional magnet, which dramatically simplifies the process of their fabrication and use. The prospective areas of their application in analytical chemistry include separation, concentration, identification of chemical compounds.

In this study, SG and MNs with anionic-exchange quaternary ammonium salts and 3-aminopropyl surface groups respectively were synthesized and applied in SPE and determination of anionic Pt and Pd complexes $[\text{PtCl}_4]^{2-}$, $[\text{PtCl}_6]^{2-}$ and $[\text{PdCl}_4]^{2-}$ from their aqueous solutions. Pt-QAS-SG and Pd-QAS-SG were used as catalysts in reaction of oxidation of H_2 .

