Investigation of palladium sorption by humic substances in the context of application for selective extraction of PGM from sulfuric and hydrochloric acid solutions

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This paper presents the results of a study of the sorption of palladium by humic substances from sulfuric and hydrochloric acid solutions. Palladium is a platinum group metal (MPG), the most valuable metal used as catalysts in the chemical industry, in medicine and is an indicator of the country's wealth. Russia is home to one of the largest palladium producers in the world. [1-3] In connection with the above, studies aimed at assessing the sorption capacity of humic substances with PGM in hydrochloric and sulfuric acid solutions in the presence of metals - chalk and nickel are relevant.

It has been established that Pd is sorbed by humic substances (HC) in sulfuric acid solutions and is described by the Langmuir model, which indicates that the sorption centers are equivalent to each other and equal in energy. The maximum sorption capacity of GW to Pd is 5.5±0.4 mg/g R2=0.999. It was found that the degree of palladium extraction is practically not affected by the presence of iron in molar excess: 40, 400 and 1000. It was found that the degree of palladium extraction is practically not affected by the presence of copper, nickel and iron in 40-fold excess, including the presence of platinum in an equivalent amount. It has been established that Pd, Cu, Ni, Fe and micro quantities of Pt pass into the sediment of HC, while the mass fraction of metals (counting only metals) in the sediment is 44% Fe, 22% Cu, 16% Ni, 15% Pd and 1% Pt; and the molar fraction of metals (counting only metals): 51.3% Fe, 21.9% Cu, 17.3% Ni, 9.1% Pd and 0.4% Pt



Figure 1 – Graphical dependencies based on the results of the study: a - The isotherm of the sorption of Pd 0.5g/I with humic substances, liquid volume 10 ml, T = 3980C; b – Langmuir's model.

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