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DEVELOPMENT OF A TECHNOLOGICAL SCHEME FOR EXTRACTING THE RHENIUM (III) ION FROM INDUSTRIAL WASTE USING THE ORGANIC REAGENT BISMUTOL-2

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Abstract:
the selection of new organic reagents for the determination of rhenium (III) ions, the levels and optimal conditions of immobilization to various types of sorbents were determined, finding the mechanism of immobilization of the bismutol-2 Reagent to the carrier, as well as determining the optimal conditions for their formation of a complex with the rhenium (III) ion, and applying the developed.

Keywords: Rhenium (III) ions, bismutol-2, analytical reagent, immobilization, sorbtion-spectroscopic detection,

Processed man-made waste from rare metal enterprises and applied sorbents and organic reagents of different natures. Expensive sorbents have been used to extract rare metals from the technogenic waste content in pure Chol. The solution to this problem is the urgent provision of sorbents from local raw materials.

In acidic solutions Cr (II), Fe (II), Ti(III), V(II), an "amperometric titration" method was used to anise the rhenium (III) ion, and a Pt or graphite microelectrode was used as an indicator electrode at the equivalent point where excess titrant ions are formed from the anode current generated by oxidation. This work presents a method of anicizing the rhenium (III) ion in a concentration interval of 0.2-5 mg/10 ml.

ReO_4^- ($1 \cdot 10^{-5}$, $1 \cdot 10^{-2}$ M) was developed by amperometric titration in the presence of a 5 M sulfate acidic background. It has been studied that the electrode must be carefully cleaned with nitric acid after an anication and that the ReO_4^- anication is not disturbed by nickel, cobalt, chromium (III), while Iron (III), molybdenum (VI), tungsten (VI) are returned to the Chromium (II) valence. Differential titration was used in the experiment to anise metals in excess of two and three.

The cost of electrochemical methods, their speed and usefulness in the analysis and processing of hom ash, which is rhenium metal, are listed. With these results, the relevance of studying the laws of the course of electrode processes in the presence of rhenium and its compounds has been studied.

Determination of the rhenium (VII) Ion was carried out using a TA-2 computerized voltametric analyzer in a two-electrode electrolytic yacht with replaceable cups. A graphite electrode prepared as an indicator electrode was used and studied as a comparison electrode with a saturated chlorocouple electrode. A standard rhenium solution with a concentration of $2.15 \cdot 10^{-2}$ mol/l was prepared by dissolving at 1 M NaOH from pulled samples of rhenium acid.

IR spectroscopic study of immobilized reagent and complex structure

The main change in the analysis of the IR spectrum of the metal ion of the organic reagent bismutol-2 to PPM-1 polyanionite is the following groups, 2246 sm^{-1} belonging to the group of -C≡N, =3424-3436 sm^{-1} belonging to the group of =N-H, 1648-1651 sm^{-1} belonging to the group of –N=C=S, and furthermore chloranghydride between 500-750 sm^{-1}, for alkenes 2927 sm^{-1}, C=S 792 sm^{-1} -C=O 1730 sm^{-1} exhibiting strong valence oscillations was studied in the experiment. It was also demonstrated that the polymer sorbent complex PPM-1 immobilized with rhenium (III) ion exhibits characteristic frequency corresponding to 469-590 sm^{-1} O-Re (result in Figures 1, 2, 3 and Table 1).

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Table 1.
PPM-1 results from the organic reagent bismutol-2 immobilized to the fiber and the IR-spectra of its rhenium (III) ion complex with the ion

fiber	C≡N	>C=N	N–H	NH_2 Cl	–N–N=	C – N	CH_2 –	Ar	C=S	–C=O	O–Me	–CH_2–
PPM–1	2246 sm^{-1} intensive		3436 sm^{-1}		1648 sm^{-1}		2926 sm^{-1}	1090 sm^{-1}	792 sm^{-1}			2927 sm^{-1}
PPM–1+Me			3433 sm^{-1} intensive		1648 sm^{-1} low intensive	1641 sm^{-1} intensive	2928 sm^{-1} low intensive	1094 sm^{-1} intensive			592 sm^{-1}	
PPM–1+Reagent+Me	2245 sm^{-1} intensive		3424 sm^{-1} intensive		1654-1651 sm^{-1} intensive			1092 sm^{-1} intensive	790 sm^{-1} low intensive	1730 sm^{-1} intensive	469-590 sm^{-1}	

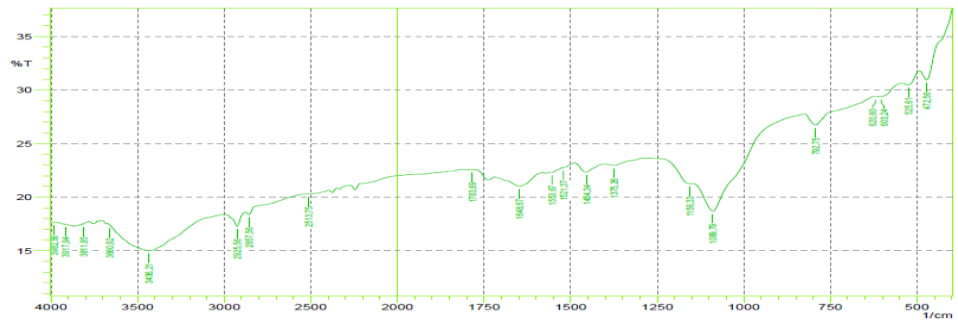

Figure 1. PPM-1 is the IR spectrum of fiber obtained in the experiment.

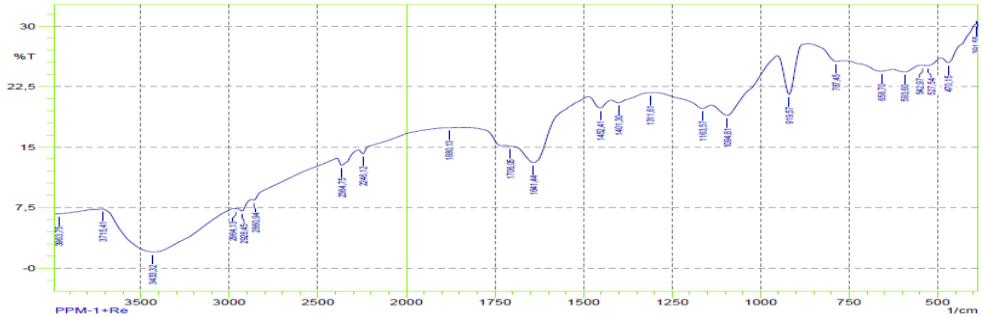

Figure 2. PPM-1 fiber with rhenium (III) ion dressing complexinig IR spectrum obtained in the experiment.

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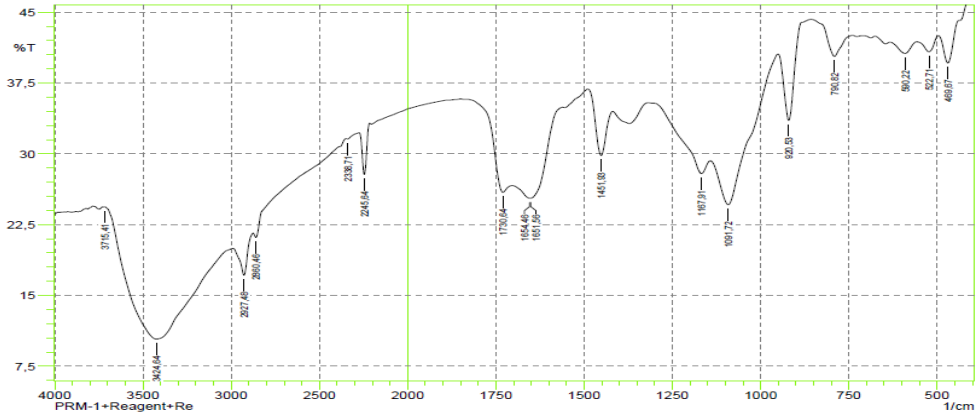

Figure 3. Immobilized PPM-1 is a complexinig IR-spectrum that binds the rhenium (III) ion to the fiber using the bismutol-2 Reagent.

The rhenium (III) ion complex identified using IR spectroscopy did not show holates belonging to the-on functional guru, and we witnessed that the main link went through the guruhas listed above.

The main technological scheme for obtaining rhenium

To determine the charge of the complex, the solutions being analyzed were transferred from colonks filled with cationite PPM-1.

Identification methodologies: a) a column with a diameter of 1.0 cm was filled with 1.0 g of cationite PPM-1 and washed 5 times before with a solution of 10.0 ml of 0.10 M hydrochloric acid, and then with 30.0 ml of distilled water from the column. Under the optimal conditions found, 2.0 ml of 0.1% reagent solution per 50.0 ml of measuring flask, 1.0 ml (20 mkg/ml) rhenium (III) solution, 10.0 ml universal buffer and distilled water were filled to the line. 10.0 ml of cationite of the prepared complex was transferred from PPM-1. After passing cationite PPM-1, Ham continued to color the complex.

b) a column with a diameter of 1.0 cm was filled with 1.0 g of anionita PPM-1 and washed 5 times before with a solution of 10.0 ml of 0.10 M NaOH, and then with 30.0 ml of distilled water from the column. 10.0 ml of cationite of the prepared complex was transferred from PPM-1.

From the results of determining the charge and composition of the complex, the reaction of complex formation can be expressed as follows:

$$HR+Me^{3+}\rightarrow[MeR_3]^{-}+3H^{+}$$

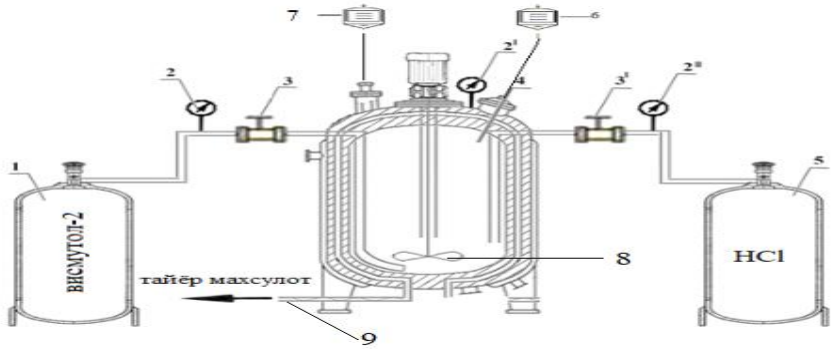

Figure 4. Technological scheme of immobilization of bismutol - 2 Reagent in PPM – 1 fiber
1-Reactor (solution capacity of bismutol–2 (or 5-mercapto-3-phenyl-1,3,4 thiadiazoltion-2 potassium)); 2. raschodomer measuring the amount of bismutol-2; 2^1. raschodomer measuring the capacity of distilled water; 2^2. 0.1 M HCl acid capacity meter raschodomer; 3 - bismutol–2 reactor valve; 3^1 - 0.1 M HCl acid solution reactor valve; 4 - PPM-1 fiber capacity valve; 5. 0.1 M HCl acid solution capacity; 6 - distilled water capacity; 7 - coating universal buffer solution capacity; 8 - mixer; 9-finished product.

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