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"PRODUCTION OF SORPTION-SPECTROSCOPIC DETECTION METHODS USING ORGANIC REAGENT RHENIUM IONNINE BISMUTOL-2"

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Abstract:
The degrees and optimal conditions of immobilization of the bismutol – 2 Reagent to various types of sorbents have been determined. To find the mechanism of immobilization of the bismutol-2 Reagent on the carrier, as well as to determine the optimal conditions for their formation of a complex with the rhenium (III) ion, and metrological properties have been developed. The sorbtsion – spectroscopic method with high sensitivity and selectivity for determining the rhenium (III) ion has been shown. The developed sorption – spectroscopic method was applied to Real objects (industrial waste technological waters and cakes), the results were processed by the method of Mathematical Statistics and data were given on its application in the analysis.

Keywords: Rhenium (III) ions, bismutol-2, analytical reagent, immobilization, sorbtion-spectroscopic detection, buffer reagent, industrial waste technological cakes.

In the world, the need for Rare Metals per year is increasing every year, and in order to meet the need, there is a decrease in the content of ore from which Rare Metals are mined, and a decrease in the reserves of all kinds of minerals, as a solution to this problem, Rare Metals are obtained by recycling ore slags, cakes as secondary products. In the Republic, a new method of extracting rare metals is implemented, including: a number of important measures are being implemented to improve and introduce ions of rare metals into synthetic sorbents and organic reagents, and certain results are achieved[1].

The most stable compounds of rhenium in nature are chalcogenides, the disulfide rhenium metal has been found to be similar in physical and crystal lattice properties to molybdenum and tungsten disulfide. Ўзининг физик-кимёвий хоссалари бўйича рений молибденга энг яқин, ундан кейин платина гуруҳидаги металлар, шунингдек W, Cu, V, Co, Ni ва бошқалар келиши ўрганилган [2].

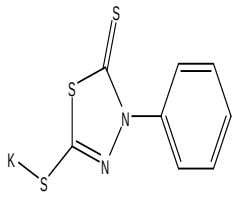
PREPARATION OF WORKING SOLUTIONS FOR RHENIUM ION. The experiment to detect rhenium ion in a permanganate method is based on redox. Rhenium hydride is returned using amalgamated zinc and titrated with potassium permanganate to rhenium perrenate. In this case, the oxidation state of rhenium varies from -1 to +7 as below. To do this, boil with a CO_2 stream to remove oxygen from a solution containing 125 ml of concentrated H_2SO_4 and 500 mg of rhenium ion no more than 15 ml. In a water bath, it is cooled to 5 ^{0}C and 150 ml of H_2SO_4 is placed in this way. In a dry conical flask, 50 ml of 0.1 n potassium permanganate solution is placed through the Jones reducer column with amalgam zinc 50 ml of cooled H_2SO_4 solution (1:19), then the analyzed solution and the rest of H_2SO_4 are placed and the experiment is titrated with 0.05 n permanganate solution $KMnO_4$. Alternatively, an experiment is carried out through a solution of 1.164 g of permanganate corresponding to 1 mg or 0.05 mg of rhenium ion[3].

It was considered using a sorbtion-spectroscopic method to detect various metal ions as a result of organic reagents or their reactions. As an organic reagent, the vismutol - 2 Reagent was considered the most suitable for the rhenium (III) ion, and most of the reagents seen in the experiment were studied at the Department of analytical chemistry of Uzbekistan. It has been studied that these reagents exhibit good Metrological properties, high sensitivity and selective susceptibility. Taking into account all the data on the use of the bismutol-2 Reagent and their valuable chemical, analytical properties in the analysis of the detected metal ionni, we can conclude that the bismutol-2 Reagent is accepted as a promising reagent for the determination of the rhenium (III) ionni. There are a number of methods for determining rhenium (III) ion, therefore, when determining it, we considered the spectrophotometric possibilities of

bismutol-2 reagents, and from this we studied the structure of the bismutol-2 Reagent and were selected for the object, based on preliminary studies, the result was presented in Table 1.

Table 1

The structural formula and designation of the studied reagent.

Structure formulas	Brutto formula	Quantum-chemical formula in the Gaussian program	Naming by systematic nomenclature	Total: 9.7342
	$C_8H_5S_3N_2K$		5-mercapto-3-phenyl-1,3,4-thiadiazolution-2 potassium	Charges N 0.528 [N(1)] C 0.140 [C(2)] **S 0.294 [S(3)]** C 0.085 [C(4)] **N -0.363 [N(5)]** C 0.106 [C(6)] **S -0.350 [S(7)] K 0.361 [K(8)] S -0.503 [S(9)]** C -0.126 [C(10)] C -0.031 [C(11)]

From Table 1, we conclude that the organic reagent bismutol-2 was selected for the higher ability to use it in experiment as a reagent, taking into account its analytical properties. Bismutol-2 was selected for higher sorption capacity for organic reagent, and the 5-mercapto-3-phenyl-1,3,4-tiadiazolution-2 organic riagenti (bismutol-2) was immobilized into PAN GMDA, PPM-1, PPA-1 [H+] sorbents, selected to prepare immobilized carriers. Based on the results obtained, the results in optimal conditions for each immobilized fiber are presented in Table 2.

Table 2

Optimal carrier selection (I=1, t=25±5^{0}C)

Fiber	Up to a immobilization (bismutol-2)	From a immobilized after (bismutol-2)	Δ A
ППА-1 [H^+] ППМ-1 ПАН ГМДА	0,35	0,12 0,090 0,190	0,23 0,26 0,160

As you can see from the table, the best immobilized fiber is PPM-1, so this fiber was used in later works.

Immobilization methodology: 10 ml of 0.1% bismutol-2 Reagent was added to 100.0 ml measuring cups, 0.2000 g of fiber was inserted and mixed using a glass rod for 5-8 minutes, then the fiber was washed with distilled water and the amount of reagent sitting on the fiber was measured. The results suggest that the immobilization of bismutol-2 Reagent in fiber is expressed by the following formula.

$P\text{-}NH_2 + HC1 \rightarrow P\text{-}^+NH_3C1^-$

$P\text{-}^+NH_3C1^- + N\text{–}S\text{–}R \rightarrow P\text{-}^+NH_3 - N\text{–}S\text{–}R$

Бунда, $P\text{-}NH_2$- polymer carrier

Ar–N–S–R– bismutol–2 Reagent

To study the optimal conditions of complex dressing of the rhenium (III) ion with the reagent bismutol-2. In the complex dressing of the rhenium ion with the reagent, the intensity of the wavelength of the complex using the specrophotometer IV-ViS, pH, buffer mixture composition, organic solvent composition, concentration of the organic reagent, was studied through the injection procedure. The mechanism of the analytical reaction of the rhenium ion with the reagent bismutol-2 was studied, and the results are presented in Figure 1 and Table 3.

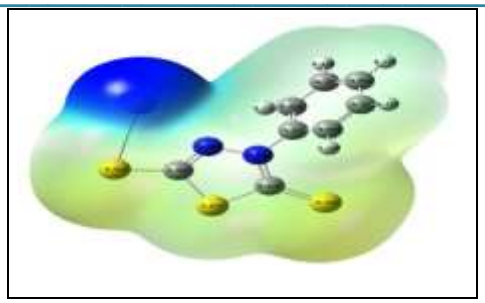


Figure 1. Formula of the structure of the reagent in quantum-chemical methods in the Gaussian program bismutol-2 Reagent

Table 3
Quantum-chemical calculation work in the bismuth-2 Reagent Gaussian program

Gaussian Calculation Summary			
Calculation Method		RB3LYP	
Basis Set		6-311+G(D,P)	
Electronic Energy		-2212.109198	Hartree
		-60194.58601835 eV	
		-1388119.775758 kkal/mol	Positive space
RMS Gradient Norm		0.000009	Hartree/Bohr
Dipole Moment	12.441049	Debye	

Reagent's quantum-chemical calculation work was carried out in the Gaussian program using a base set of 6-311+G(D,P) in the RB3LYP method:

The results showed that the wavelength of the complex of bismutol-2 organic reagent with rhenium (III) ion λ_k=450 nm has a maximum optimal optical density. According to the results of the calculation, the probability of binding a metal atom to the reagent was studied in chemical methods (result fig) [3].

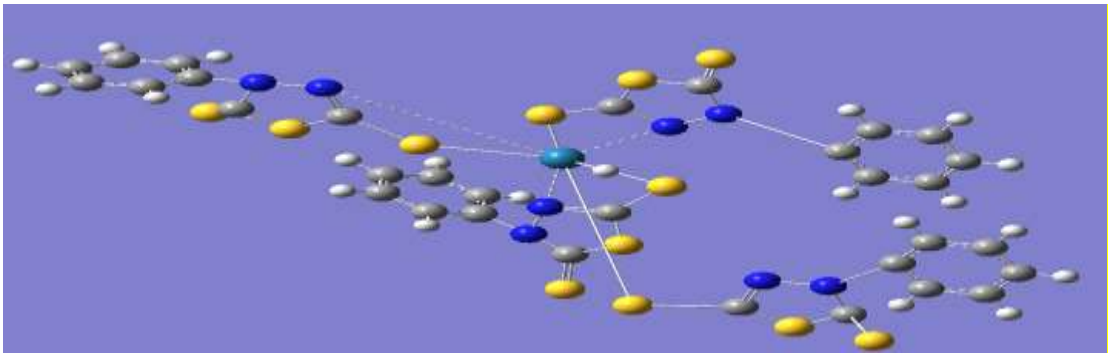


Figure 2. Gauss Wiew determined the rhenium ion using methods in a state that is approximated to nitrogen, sulfur atoms

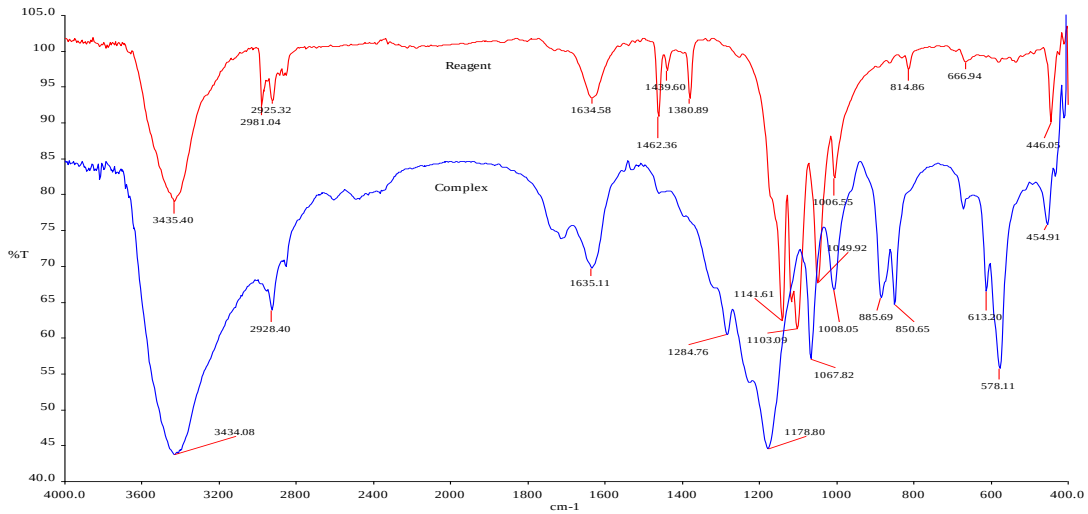


Figure 3. IR spectrum of rhenium (III) ion complex of bismutol-2 Reagent

Studies of the structure of the complex ik-spectral study and the chemistry of complex dressing have shown that bismutol - 2 Reagent:

O-Me -, CH_2–, =N-N=,-C=S, - S–, Ar,–C≡the area of the N Group is 454.9 cm–1, 578.11 cm–1, 613.20 cm–1, 850.65 cm–1, 885.69 cm–1, 1178 cm–1, 1635 cm-1, the intensity of complex formation in the socks was determined to be high, and the same reagent was used in subsequent work.

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