ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 6 , June 2020

Sorption-Photometric Determination of Rhenium Ion Using an Immobilized Organic Reagent

MIRZAKHMEDOVRUSTAMJONMIRHAMIDOVICH, TURDIBAEV ZHAKHONGIR ERALIYEVICH, JUMAEV MANNON NAFASOVICH, SMANOVAZULAYKHOASANALIEVNA

Assistant of the department "Mathematics and natural science disciplines" of the Almalyk branch of the Tashkent State Technical University named after Islam Karimov, Almalyk, Uzbekistan;
Senior lecturer of the department "Mathematics and natural science disciplines" of the Almalyk branch of the Tashkent State Technical University named after Islam Karimov, Almalyk, Uzbekistan;
Assistant of the department "Mathematics and natural science disciplines" of the Almalyk branch of the Tashkent State Technical University named after Islam Karimov, Almalyk, Uzbekistan;
Head of the Department of Analytical Chemistry, Department of Chemistry, National University of Uzbekistan named after MirzoUlugbek

ABSTRACT. The possibility of using bismuthol-2 as a reagent for the absorption of rhenium is shown. The conditions for the formation of a complex of rhenium ions have been optimized.

KEYWORDS: calcium oxide, bismuthol-2, spectrophotometer, rhenium, solution, universal

I. INTRODUCTION

At present, spectrophotometric methods of analysis are one of the most modern physicochemical research methods and are widely used for the detection of rare and rare-earth metals. But the spectrophotometric method will not always be supported. Due to too many operations, the question of the separation of foreign ions in half, and other preparatory work has no solution. That is why new immobilized organic reagents are used. Analytical chemistry is firmly connected with science, technology and industry, and the creation of methods for the isolation and identification of toxic compounds from various biological objects and their decomposition products is one of the main tasks of analytical chemistry. Since rhenium is found in nature without precipitation, its minerals are also very rare. A common single mineral is rhenium, which is called dzhezkazganit-CuReS4, found in copper-molybdenum ores. It is in the Almalyk ore that rhenium is in this mineral state. Rhenium is mainly found in hardened sulfide copper and molybdenum minerals. The rhenium alloy is explained as follows: 2% Re, 50 - 90% W and 30% Fe and Ni (or so) from Cr. Rhenium is mainly included in the dispersed form of the minerals molybdenite and copper sulfide.

II. METHODOLOGY

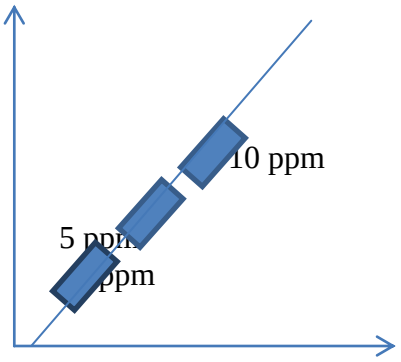
1. General requirements
1.1. Sampling and preparation of samples, analysis based on approved data.
1.2. Carrying out the analysis in two parallel stages.
1.3. Use in technological processes
2. The accuracy of the measurement analysis

This method is based on measuring the length of an electromagnetic wave in an excited state of an atom; an Optima-8300 emission spectrophotometer is used to analyze rhenium; the obtained sample is in a powder state and 0.001 is obtained from this sample; 0.005; 0.01 g / l, that is, it is in the unit of measurement:

- 1 ppm Re - 0.001 g / l
- 5 ppm Re - 0.005 g / l
- 10 ppm Re - 0.01 g / l

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 6 , June 2020

The crucible is filled with potassium permanganate and calcium oxide, then the announced sample is filled, calcium oxide is added again, then it is heated in a muffle furnace for two hours. The sample from the muffle is cooled and placed in a 100 ml flask, filled with distilled water to the mark, then heated for 40 minutes, then the sample is filtered and boiled for another 30 minutes, evaporated in an electric oven until it is reduced to 60 ml, during which various ions precipitate in the form of salt. dissolved in hydrochloric acid and transferred to a 100 ml flask, in which a standard solution is prepared. The analytical method is introduced into the device, then a graph is drawn to measure the standards, the standard number of quantities is taken from a single exact number, and the probe measurement begins when the desired result is achieved. First, standard solutions are measured in 3 tubes, then a sample is measured.



If the analysis process is 9.99 rpm, then the most sensitive, intense point of our view, Rhenium, namely the rhenium line, is determined by the 1st minute of the outgoing process, continued analysis depending on the standard:

197,243
227,545 nm
204,911

During calibration, three standards are used, which, using this method, make it possible to determine the rhenium content in the analyzed sample in the interval shown in Table 1.

Table 1.The amount of rhenium

№	Fixed element	Mass fraction,%
1	Re	0,00005 – 0,01000

2.1. Re = 227,545 allowable differences should not exceed the following values.

Table 2.The most sensitive-intense rhenium point

Element	Wavelength
Rhenium	197,243 227,545 204,911

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 6 , June 2020

Table 3.The composition of the rhenium solution

Solution	Concentration, mg / l						
	Re	Mo	Fe	NO_3^-	SO_4^{2-}	Cl^-	pH
Sedimentary rock - quantity	3,2	1,2	7,8	50000	68500	20,5	6,5
Concentration in solution, results	0,4	22,4	980,5	420	27200	250,5	1,3

As can be seen from the results of table. 3, the content in the sample obtained for analysis significantly exceeds the concentration in the case of precipitation of predominantly rhenium, and the concentration of the compound is mainly triraidi of many compounds obtained by nitrate-ion ligation.

III. EXPERIMENTAL RESULTS

Preparation of working solution for the determination of rhenium

1. To prepare a working solution of 0.01% bismuth-2 reagents, weigh 0.01 g of bismuth-2 reagent on an analytical balance, transfer it to a 100 ml volumetric flask and make up to the mark with water. The prepared solution was diluted and used for further work. To prepare a standard 1 mg / ml solution of Re^{7+} ion, 0.732 g of ammonium perrenate salt was weighed, placed in a 100 ml flask and adjusted to the mark with distilled water. This solution was used in subsequent studies [1,2].

2. For the preparation of a $1{,}0 \cdot 10^{-1}$ M solution of hydrochloric acid, concentrated hydrochloric acid was used by the dilution method.

3. Buffer solutions are formed by adding 0.04 M acid (H_3BO_3, H_3PO_4, CH_3COOH) and 0.2 M NaOH solution to prepare a universal buffer mixture with different pH (1-12). Other buffer solutions were prepared as in the literature [3,4].

4. To prepare the fibers, 0.2 g of fibers synthesized at the Department of Polymer Chemistry were extracted. The fibers are first washed in an alcohol solution (90%) and then with a 0.1 M hydrochloric acid solution. Washed with distilled water until neutral. Keep wet in a petri dish.

The effect of buffer solution on the level of immobilization

To study the effect of the buffer solution on immobilization, a buffer was selected based on the difference in optical densities by introducing various buffer solutions from 5 ml, mixing with a glass rod for 6 minutes by introducing a 0.05% aqueous solution of ammonium perrenate salt in 50 ml of solution Li reagent, 2 ml of 0.1% Li in a glass rod. The results are presented in table 4.

Table 4 - The effect of pH on immobilization

Buffersolution	pH	1	2	3	4	5	6	7	8	9	10	11	12
	$R_{\%}$												
Universal	Re+Me	18	31	40	44	76	78	76	67	62	55	-	-

As can be seen from the table and figure, a good result can be obtained in the pH range 5-6 for the bismuthol-2 reagent. In subsequent studies, a buffer with pH = 5.6 was used.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 6 , June 2020

REFERENCES

[1] Sinyakova G.S. The study of complexation in the system Re^{VII} – H_3O^+ –$SO_4 2^-$–H_2O // Journal of Inorganic Chemistry. 2013.Vol. 24. No. 10. P. 2677-2683.

[1] Zagorodnaya A. N., Abisheva Z. S. idr. Combined sorption-extraction-electrolysis technology for producing ammonium perrenate from uranium-containing solutions // Non-ferrous metals. 2010. No. 8. P. 59–62.

[1] Korovin S.S., Bukin V.I., Fedorov P.I., ReznikA.M .; under the editorship of Korovina S.S., M. Rare and scattered elements. Chemistry and technology: a textbook for high schools: in 3 books. / MISiS, 2003. Book. 3.440 s

[1] V.I. Babaev, U. A. Kerimov, N. S. Osmanov. Synthesis and study of rhenium (IV) complexes with certain amino acids // Zh. Chemistryandchemicaltechnology. 2011.V. 54. Issue. 1, p. 33-36.

AUTHOR'S BIOGRAPHY

Mirzaxmedov Rustamjon Mirxamidovich, Assistant of the department "Mining" of the Almalyk branch of the Tashkent State Technical University named after Islam Karimov, Almalyk, Uzbekistan

Turdibayev Zhaxongir Eraliyevich,Senior lecturer of the department "Mathematics and natural science disciplines" of the Almalyk branch of the Tashkent State Technical University named after Islam Karimov, Almalyk, Uzbekistan;

Jumaev Mannon Nafasovich, Assistant of the department "Mathematics and natural science disciplines" of the Almalyk branch of the Tashkent State Technical University named after Islam Karimov, Almalyk, Uzbekistan**;**

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 6 , June 2020

Smanova Zulayho Asanaliyevna, Head of the Department of Analytical Chemistry, Faculty of Chemistry MirzoUlugbek National University of Uzbekistan