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Photometric Determination of Cobalt (Ii) With 4-Sulfo β-Nitroso α-Naphthol

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ABSTRACT

At the moment development of science and technology sets important tasks for the science of analytical chemistry. Toxic compounds from various biological and industrial facilities and the development of methods for the separation and detection of their decomposition products one of the main tasks of analytical chemistry.

Photometric detection, one of the most modern physical and chemical methods for the detection of heavy metals, is widely used today and the new organic reagents are being used to address these issues.

Photometric determination of micro quantities of elements using organic reagents is one of the new developing methods. Photometric method is fast in nature and does not require expensive equipment with fast and cheap selective action.

KEYWORDS: *4-sulfo ß-nitrose a-naphthol, soil, photometric, cobalt (II), complex, buffer connection.*

The rapid development of industry, technology, nuclear power industry, the growth of steel production, as well as the development of agriculture, medicine, and pharmaceuticals make it possible to increase the sensitivity of analytical methods to 10^3-10^5 % and more. Sometimes, in the production and use of extremely pure substances, it is necessary to determine ultramicro levels of certain elements in the substance. Solve such problems. Development of chemical and physical cheap, fast methods for cleaning is an urgent problem. Currently, one of the most modern equipment for the determination of heavy metals is physico-chemical methods photometric detection methods are widely used and new organic reagents are used to solve this problem Photometric determination of trace amounts of elements using organic reagents is one of the newly developing methods. The photometric method has a test nature, is quick and cheap, selective and does not require expensive equipment. Experience part. Materials and methods. Concentration photoelectrocolorimeter KFK-3, spectrophotometer"UV-1800" IK-400-4000cm 1 "Nicolet Instrument Corporation" (SShA) was used. To measure solution pH, pH-meter "METTLER TOLEDO" and universal ionomer EV-130 devices was used. The structure of 4 sulfo-β-nitroso-α -naphtol used in the work:

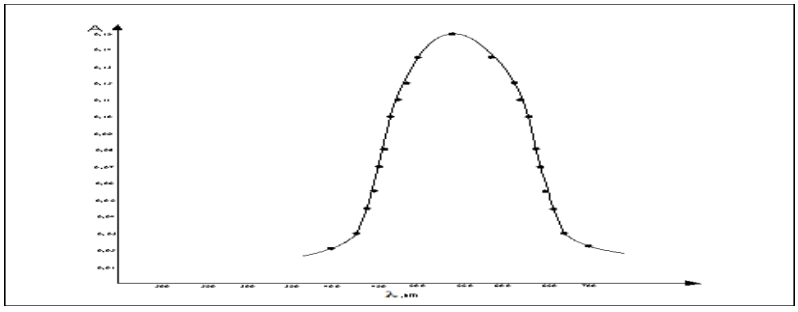
a) Initially, a standard solution of cobalt (I) was prepared as a working solution. For this Co_2O_3*6N $_2$O (a.u.t.) brand salt was used. The calculated amount of salt (2.4693 g) was weighed on an analytical balance and placed in a 500 ml volumetric flask. A 1 mg/ml solution was prepared by dissolving it in distilled water. Working solutions were prepared by diluting an aliquot of 1 mg/ml standard solution before each work.Analysis of results Spectrophotometric determinations are performed under optimal conditions that ensure complete formation of the analytical form in solution and no or minimal deviation from the Bouguer-Lambert-Behr law. The most important of them are:

optimal value of pH, sufficient amount of reagent, analytical (photometric) reaction the darkest conditions for selectivity and light absorption are chosen. In order to choose the optimal value of pH, the effect of pHon the intensity of the color of the solution at a certain wavelength was studied when the concentrations of the tested substance and reagent were unchanged. In this case, when the reagent is colorless, the absorbance is calculated based on the area where it is the largest. In colored solutions, the darkest condition corresponds to the largest difference between the absorbances of the analytical form and the starting reagents. Small changes in pH have a practical effect on the absorbance of the solution when the absorbance is at its maximum under the coldest conditions. The pH value of the photometrically analyzed solution is from the appropriate buffer solutions or sufficient quantities keeps it uniform using acids or alkalis.The amount of analytical reagent to be added should be sufficient to convert all of the analyte within a given concentration range into analytical form. Adding more reagent does not increase the yield of the reaction product and does not increase the light absorption of the solution.In spectrophotometric analysis, the solution must remain completely soluble in all ranges of tested concentrations. If this condition is not met, it is necessary to use lower concentrations or to use protective substances that destroy the formation of a solid phase. Sometimes it is necessary to change the entire spectrophotometric analysis scheme.

Table 1

λ, нм	400	420	430	450	470	490	500	530
Ā	0,022	0,030	0,046	0,055	0,100	0,126	0,137	0,150

λ ,нм	**575**	595	610	625	635	670	
Ā	**0,155**	0,131	0,110	0,041	0,066	0,027	



Dependence of the optical density of the complex of cobalt Yun 4- sulfo-β-nitroso-α -naphthol on the tyolkin length

The results of the experiment show that the optical density value of the complex compound is up to 120 minutes almost does not change and then starts to decrease very slowly[9]. This time interval is sufficient to perform the analysis can be concluded. Dependence of the optical density of the colored complex of cobalt(1) with 4 sulfo- β -nitroso-α-naphthol reagents on the amount of added reagent (TS 2+ =50 μg/ml, 2 =3.0 cm, 2m=575 nm, pH =9.20, n=3)

$T_{мин}$	3	5	10	20	30	50	60	90
Ā	0,162	0,162	0,162	0,162	0,162	0,162	0,162	0,162

$T_{мин}$	**120**	160	180	200	240	260		
Ā	**0,160**	0,160	0,161	0,155	0,150	0,140		

Figure 3. Graph of dependence of the optical density of the complex compound on the amount of added reagent. From the obtained results, it can be seen that 2.0 ml of the optimal volume of the reagent, i.e. 2.0 ml of 0.05% aqueous solution of 4-sulfo- β-nitroso-a-naphthol is sufficient [10-11].

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Complex Compound Optical Density Additive Cobalt (ÍÍ) depending on the amount (Subject to the Bouguer-Lambert-Behr law)

V_R, мл	0,5	1	1,5	**2**	2,5	3	3,5
Ā	0,098	0,145	0,200	**0,240**	0,237	0,235	0,234

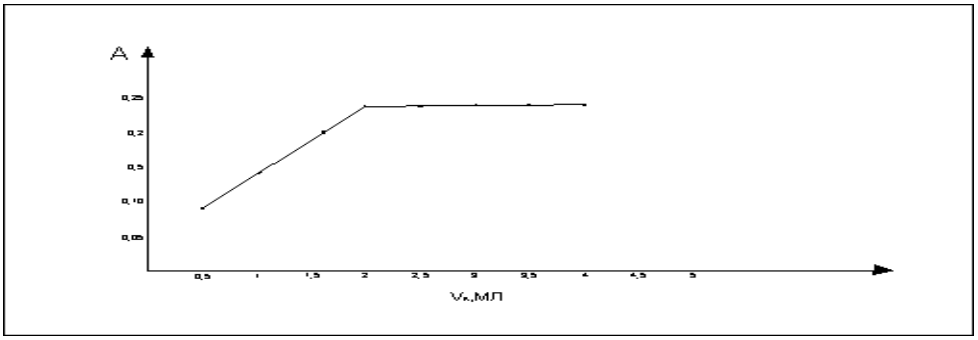
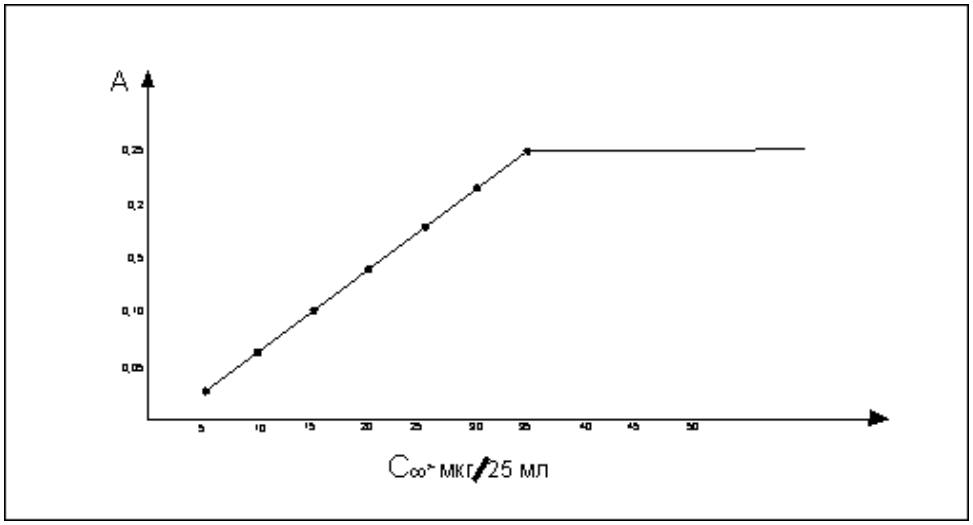


Figure 4. Optical density depends on the amount of cobalt (II) added dependence graph. As can be seen from the obtained results, the region of obedience to Bouguer-Lambert-Behr law was observed in the range of 5-35 μg/25 ml in 25 ml solution. At higher concentrations, there was a deviation from the linear relationship.

T/p	**Аликвот қисм, мл**	**Аликвотдаги Co(II) нинг миқдори, мкг**	**Ā**
1	**0,5**	**5,0**	**0,026**
2	1,0	10,0	0,068
3	1,5	15,0	0,112
4	2,0	20,0	0,140
5	2,5	25,0	0,185
6	3,0	30,0	0,225
7	**3,5**	**35,0**	**0,250**
8	4,0	40,0	0,252
9	4,5	45,0	0,253
10	5,0	50,0	0,255
11	5,5	55,0	0,255



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