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DETERMINATION OF COMPOSITION AND OF APARENT STABILITY CONSTANT OF COMPLEX COMPOUND OF Cu(II) WITH 4-MORPHOLYNTHIOSEMICARBAZIDE

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Chemistry of coordination compounds of 3-d metals with thiosemicarbazides and thiosemicarbazones has developed intensively lately. This is a result of the increasing interest of chemists and physicians towards bioinorganic chemistry, an important part of which is preparation of efficient medicinal substances by using different organic ligands and biometals and determination of their therapeutic properties in cells.

The work deals with synthesis of 4-morpholynthiosemicarbazide, determination of composition and of apparent stability constant of complex formed between mentioned ligand and Cu (II) ions in homogeneous solutions. The structure of the mentioned substanse was established with NMR (C^{13} şi H^{1}) and X-ray difraction.

The thermodynamics of formation of compounds of copper(II) with 4-morpholynthiosemicarbazide in homogenious medium was studied. In the examined system the optimal value of pH for the formation of complexes was found to be pH = 5,5-6. It was established that the maximum of absorption of the complex compound is at λ = 670 nm (fig. 1).

On the basis of the experimental data, using Ostromislensky-Job spectrophotometric method it has been established that in the formed compound the ratio of the components is Cu(II) : 4-morpholynthiosemicarbazide = 1:2 at the both temperatures used.

The stability constants of the coordination compounds has been calculated at t = 20 °C and t = 36,6 °C at pH = 5, using Benesi - Hildebrand graphic method (fig.2).

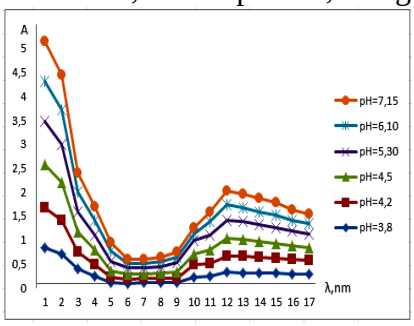

Fig.1. Electronic spectrum of complex of Cu(II) with 4-morpholynthiosemicarbazide.

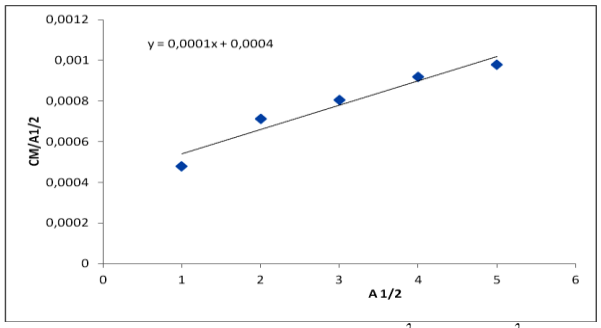

Fig.2. The dependence $C_M/\sqrt{A}^{\lambda} = f(\sqrt{A}^{\lambda})$ at t = 20 °C, pH = 5.

Bennesi-Hildebrand method is based on utilzation of equation (1) and on the basis of the linear form of equation (1) – ecuation (2):

$$\beta = \frac{[ML]}{(c_M - [ML])^2} \qquad (1)$$

$$\frac{C_M}{\sqrt{A^{\lambda}}} = \frac{\sqrt{A}^{\lambda}}{\varepsilon^{\lambda}} + \frac{1}{\sqrt{\varepsilon^{\lambda} \cdot \beta}} \qquad (2)$$

there is plotted the graphical dependence $C_M / \sqrt{A}^{\lambda} = f(\sqrt{A}^{\lambda})$ from which extinction coefficient ε and stability constant β are determined. It has been established that the values of stability constants are: $\lg \overline{\beta} = 2{,}84$ (t= 20 °C); $\lg \overline{\beta} = 2{,}19$ (t= 36,6 °C).