

**SYNTHESIS AND X-RAY ANALYSIS OF COMPLEX COMPOUNDS WITH
DIFFERENT PROPORTIONS BASED ON Cu(II) SUCCINATE AND
DIETHANOLAMINE**

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Abstract

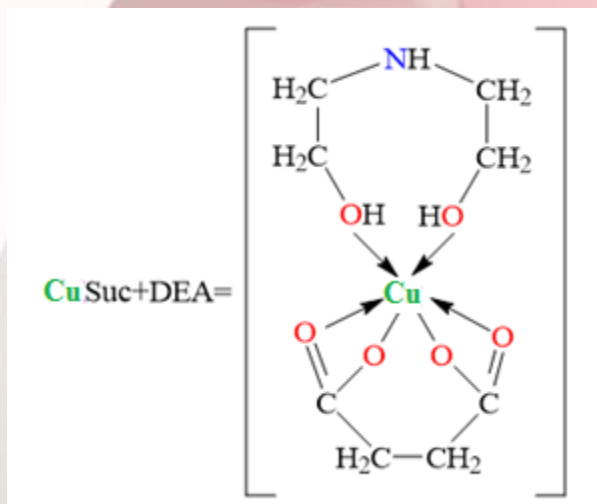
This article presents methods of synthesis of complex compounds based on copper succinate and diethanolamine in different proportions. In order to determine the novelty and individuality of the synthesized compounds, but also the composition of the starting ligands and their complex compounds was analyzed.

Keywords: copper(II) succinate, diethanolamine, complex compound, X-ray phase analysis

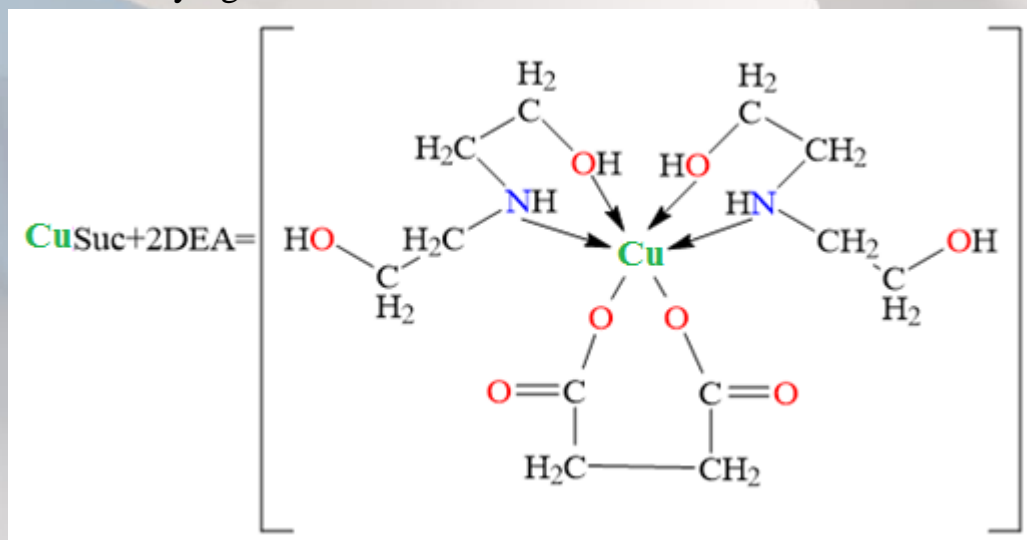
In the world, in the chemical industry, for the purposeful synthesis of complex compounds based on aliphatic dibasic carboxylic acids (including succinic acid), the development of highly effective mechanisms for obtaining catalysts, plant growth substances, bactericidal and fungicidal preparations against various microorganisms, various conditions, it is necessary to increase the selectivity of the reaction. In order to obtain complex compounds of intermediate metals, it is important to synthesize multifunctional polydentate ligands containing a wide range of terminal substituents and new complex compounds based on them [1].

The synthesis of complex compounds of Cu(II) succinates with DEA was carried out in the following ways: A saturated solution of the ligand and salt solutions were mixed to synthesize a 1:1 molar ratio complex of copper (II) succinate with DEA. The resulting reaction mixture

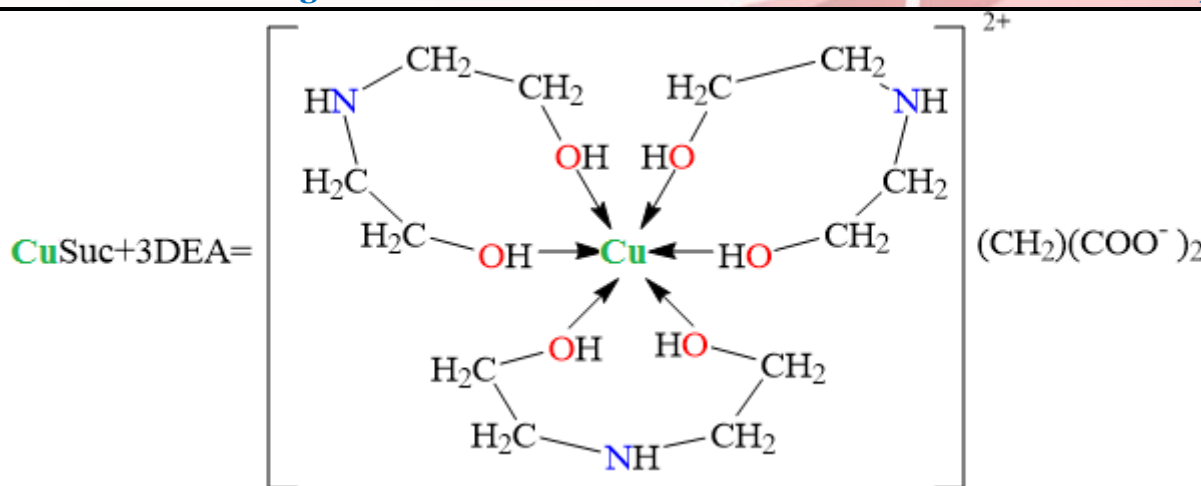
was stirred on a magnetic stirrer for 0.5 h. An equal volume of highly concentrated ethyl alcohol was added to the hot mixture and allowed to stand for precipitation. After 24 h, the precipitate was filtered off under vacuum in a Buchner funnel. The resulting precipitate was washed several times with cold distilled water and dried in a drying cabinet until it reached a constant mass.



To synthesize a metallocomplex compound of copper (II) ion with DEA in a 1:2 mol ratio, copper (II) succinate solution was added dropwise to the aqueous solution of DEA. The resulting solution was heated for another 0.5 hours in a 60 C water bath with ultrasonic waves. The reaction mixture was then allowed to stand for 4 days and the resulting crystals were isolated. The obtained crystals were first washed with cooled ethyl alcohol, then with cold water, and dried in a drying cabinet to a constant mass.



0.01 mol copper succinate dissolved in 15 ml of water. In another glass, 0.03 mol DEA it was dissolved in 20 ml of water by heating in a hot water bath (at a temperature of 50-60 C). Then copper succinate drop by drop over the solution, DEA of a hot solution was added and the mixture was evaporated for 4 h until the volume was reduced by a factor of 1.5. The resulting solution was left for 2 days. The resulting powdery substance was dissolved in distilled water and left for 72 h to recrystallize.



X-ray phase analysis was carried out in order to determine whether the synthesized compounds are in a crystalline or amorphous state, and to determine the different phases in the mixture of crystalline substances, to prove the individuality of each of the formed substances. Due to its simplicity and versatility, the analysis of substances in powder form is widely used in practice today.

Based on the obtained results, the initial reagents are qualitatively homogeneous, but the complex compounds synthesized in different ratios were compared and their differences were determined. X-ray phase analysis was used not only to determine the novelty and individuality of the synthesized compounds, but also to analyze the composition of the starting ligands and their complex compounds [2].

Figure 1 shows X-ray images of DEA, copper succinate and complex compounds based on them in different ratios. The analysis of the obtained data showed that the synthesized complexes have an individuality that cannot be found in the crystallographic database. The presence of many peaks in the radiographs indicates the complex crystal structure of the obtained compounds.

The results of X-ray phase analysis (interplanar distances and intensity) are presented in Table 1, and it was found that the peaks of complex compounds have high intensity.

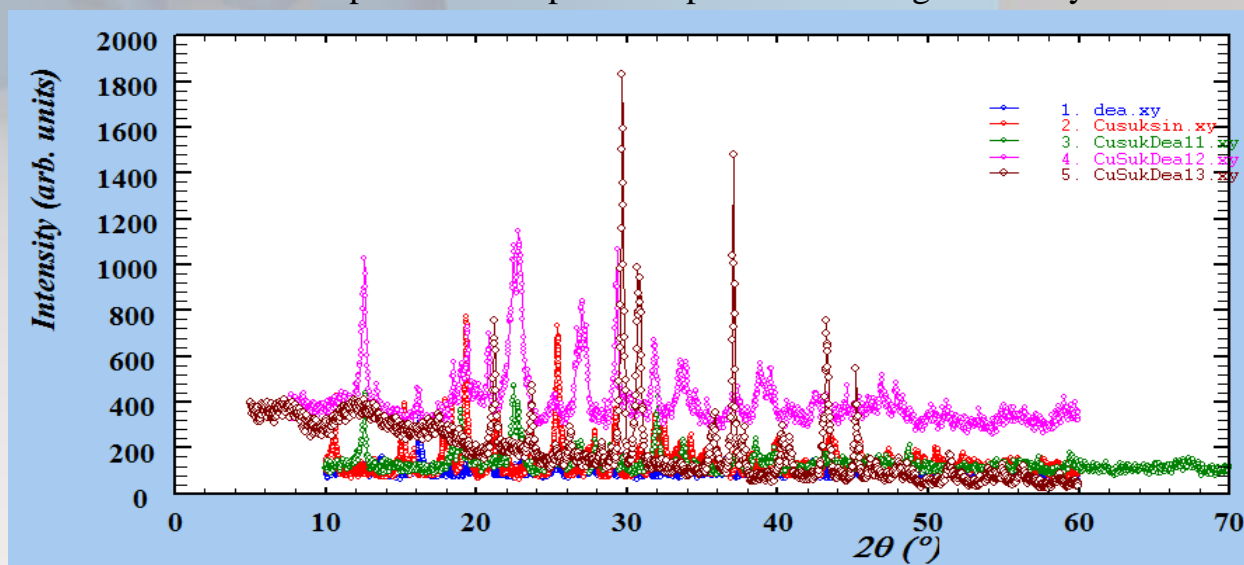


Fig. 1 Radiographs: DEA (1), Su(II) succinate (2), [CuC₄H₄O₄·DEA] (3), [CuC₄H₄O₄·2DEA] (4) and [CuC₄H₄O₄·3DEA] (5)

Table 1 Radiographic data

No	DEA		Su(II) succinate		[CuC ₄ H ₄ O ₄ ·DEA]		[CuC ₄ H ₄ O ₄ ·2DEA]		[CuC ₄ H ₄ O ₄ ·3DEA]	
	2θ	I (%)	2θ	I (%)	2θ	I (%)	2θ	I (%)	2θ	I (%)
1	12.05	95	10.40	47	12.23	98	12.19	98	21.07	37
2	19.48	60	15.16	49	19.45	94	19.18	46	29.97	100
3	21.09	56	18.04	50	22.87	100	21.42	45	30.96	47
4	22.21	100	19.15	100	32.19	89	22.24	100	37.25	85
5	27.17	62	25.80	98			27.13	61	43.79	38
6	29.52	96					29.92	98	45.41	31

As a result of comparing the X-ray data of the complexes, when copper succinate was reacted with the DEA ligand in different proportions, the compoundsThe data obtained in the analysis of x-rays showed that the synthesized complexes have unique properties that cannot be found in the crystallographic database.

References

1. Saelim, T., Chainok, K., Kielar, F., Wannarit, N. Crystal structure of a novel one-dimensional zigzag chain-like cobalt(II) coordination polymer constructed from 4,4'-bipyridine and 2-hydroxybenzoate ligands.//Acta Crystallographica Section E. 2020, vol. 76, nr. 8, pp. 1302-1306. ISSN: 2056-9890. DOI: 10.1107/S2056989020009482.
2. MohammadAkbar Al Aminul, Huq Mirza Malai, Haniti S. A. Hamid Nuzuhath, Aminath Paul V.Bernhardt «Synthesis, characterization and X-ray crystal structures of thiolate sulfur-bridged dimeric copper(II) complexes of the 2-aminoacetophenone Schiff base of S-methyldithiocarbazate» Polyhedron Volume 47, Issue 1, 26 October 2012, Pages 79-86.