

## SYNTHESIS AND STUDY OF SORBENTS CONTAINING NITROGEN AND SULFUR BASED ON MELAMIN FORMALDEHYDE RESIN

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### **ABSTRACT**

*In this research, sorbents containing nitrogen and sulfur were synthesized based on melamine-formaldehyde resin. IR-spectroscopy was used for its structural description. The vibrational frequencies of the corresponding bonds in the theoretical data are determined to be consistent with the results obtained from the analysis of the IR spectrum, and an optical microscope image is presented.*

**Key words:** melamine, formaldehyde, thiourea, phosphoric acid, IR spectrum, optical microscope.

## INTRODUCTION

The object of our research is a sorbent compound N and S, synthesized with the participation of melamine formaldehyde (MF) and its thiourea (TC), which has sorption properties. The IR spectrum of the synthesized sorbent and the adsorbed sorbent required for our studies was obtained in the range of 600-4000  $\text{cm}^{-1}$  on a SHIMADZU Fourier transform IR spectrophotometer made in Japan.

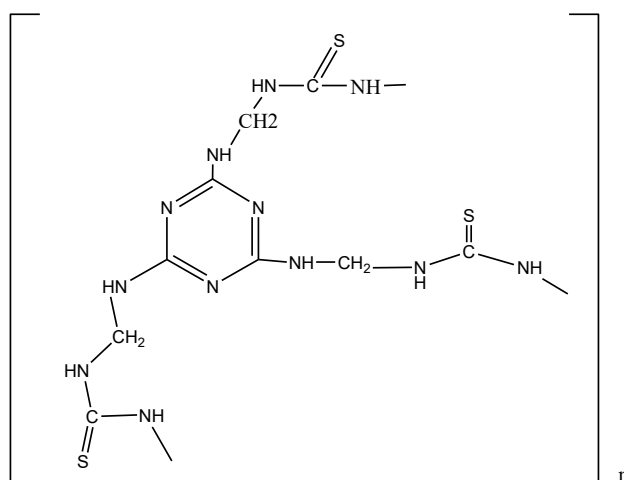
## ADABIYOTLAR TAHLILI VA METODODLOGIYA

Global production of synthetic sorbents has doubled over the past decade [1]. In terms of the volume of sorbents produced, the CIS countries are in second place in the world, and 65 percent of these sorbents are used for the concentration and separation of metals at hydrometallurgical enterprises, to produce purified and desalinated water used in various industries. national economy, as well as for water purification[2]. Also, 15% of the produced complexing sorbents are used in the purification of thermal power plants, nuclear power plants and industrial waste, 9% - in chemical technologies, 6% - in the food and pharmaceutical industries, and the rest are used in other industries. Sorbents make it possible to selectively sorb and effectively separate metals from individual and mixed solutions in various media[3-5]. Therefore, many scientific works are aimed at the synthesis of new sorbents, the study of their physical and chemical properties, and the creation of technologies for their use in sorption processes[6-9].

The main scientific directions in the development of technology for the synthesis of complexing sorbents are based on the synthesis of sorbents based on thiourea, urea thiosemicarbazide, thiophosphates, melamine, gossypol resin, formalin, epichlorohydrin and polyacrylonitrile fibers, which have the property of effectively separating metal ions from the composition of solutions. In addition, scientific research is being conducted on the synthesis of new complexing sorbents by adding monomers with new functional groups to existing ions[10-13].

## EXPERIMENTAL PART

**Synthesis of sorbent based on thiourea and melamine.** 20 ml of 36% NaOH was added to a solution of 8.6 ml of thiourea in a solvent at a temperature of 60°C. 6.3 g of melamine was added to it, heated at 105°C and stirred for 3.5 hours, the resulting product was poured into a ceramic cup and dried in a drying cabinet at 120°C for 8 hours. Thiourea: melamine ratio 1:1. Yield 86%. The resulting product is a white, non-volatile solid.



The structure of the sorbent monomer unit obtained on the basis of melamine, formaldehyde, thiourea

When the product obtained by adding melamine to thiourea in an aqueous medium is exposed to solutions of copper salts, it was observed that the line in the 1500 cm<sup>-1</sup> region shifts to 20, 15, and 10 cm<sup>-1</sup> high frequency regions in the IR spectrum of the complex formed. When bonding through nitrogen and sulfur atoms, the valence vibration frequencies of S = N, S = S bonds increase as a rule, and these shifts are due to the formation of the coordination bond S = S → M+2 – N = C indicates.

We can use EDX-8100 X-ray fluorescence spectral analysis and EMC-30PC UV spectrophotometer to determine the amount of absorbed Cu<sup>2+</sup> ions contained in the copper (II) sulfate solution of our product. [14-15].

## DISCUSSION

In the world, relevant scientific research is being carried out in a number of complex-forming sorbents, including in the following priority directions: identification of factors affecting the sorption process in complex-forming sorbents; synthesis of complex forming stable sorbents; Since it is important to develop environmentally friendly, inexpensive and highly effective drugs in small concentrations, the study of complex-forming sorbents is one of the urgent issues facing chemists today. In particular, as described in this article, sorbents containing nitrogen and sulfur were synthesized based on melamine-formaldehyde resin, and the results were analyzed using the IR spectrum.

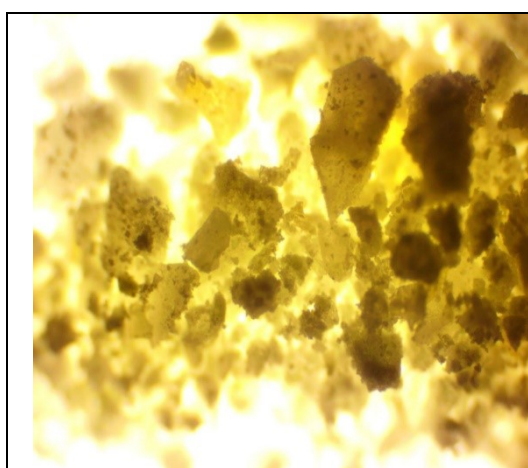


Figure-1. Microscopic image of sorbent

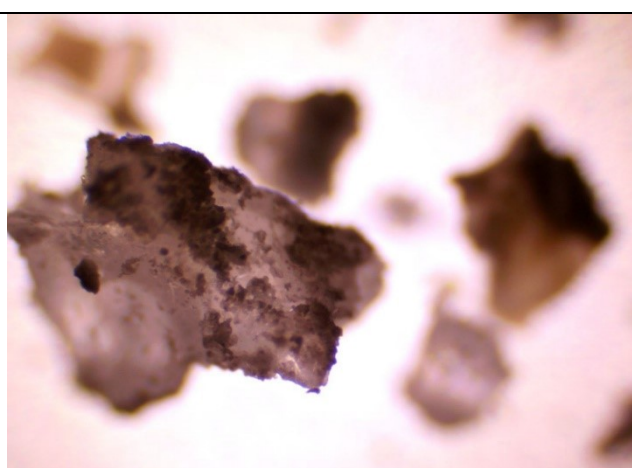


Figure-2. Microscopic image of the sorbent after Cu(II) ion sorption

## CONCLUSION

During the synthesis of the complex-forming sorbent, the effect of the molar ratio of the starting materials on the composition and physico-chemical properties of the synthesized complex-forming sorbent was checked and the optimal conditions were studied.

The sorbent compound containing nitrogen and sulfur based on melamine formaldehyde resin was analyzed based on the results of the IR spectrum. Therefore,

the structure of the synthesized complex-forming sorbent was shown under an optical microscope.

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