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OBTAINING COMPLEX COMPOUNDS OF Mn (II) AND Co (II) BY ADDING VARIOUS ACIDS TO THE POLYESTER MATRIX

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Abstract. Complexes based on manganese double cations and cobalt double cations were obtained as a result of sorption with organic polymers, their formation mechanisms and IR spectra were analyzed. As a result of the analysis, it was proved that the initial substances reacted completely.

Key word: Mn (II) and Co (II) cations, sodium alkali, hydrochloric acid, polyesters.

Enter. Recently, a new direction of obtaining promising complex compounds by changing various polymer materials and metal complexes based on them is actively developing. As a result of modification, not only the structure of the organic matrix, but also the composition of functional groups changes, which makes it possible to obtain sorbents with improved selective and selective properties and use them for concentration, separation and detection [1].

Also, the properties of a number of sorbents synthesized on the basis of epoxide resin and various amino acids have been studied [2]. Polyampholytes are polymeric substances that contain both anionic and cationic groups at the same time, and can absorb cations and anions depending on the pH level of the environment. Under certain conditions, there are forms that form the internal salt of polyampholyte [3]. With all the variety of sorbents used for the concentration of microcomponents, there are a number of general requirements: sorbents should have high adsorption properties, be easily regenerated, non-toxic and mechanically stable [4]. Currently, a number of industrial sectors produce waste streams with various concentrations of heavy metals, and this has a significant impact on any receiving unit of the environment [5]. In this field, extensive scientific research is being carried out on the purification of solutions from various toxic metals using a number of advanced technologies such as enhanced ultrafiltration, adsorption, ion exchange and various membrane separations [6]. Complexation processes between cadmium (II) hexacyanoferrate (II) ($Cd_2[Fe(CN)_6]$) and 3d metal ions M(II) (M = Mn, Co, Ni, Cu, Zn) in thin gelatin layers . Cadmium (II) hexacyanoferrates immobilized in contact with aqueous solutions of d-metal chlorides are studied. It was found that Cd^{2+} ions exchange with M^{2+} ions of the

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specified d-metals to a certain extent. (except Mn(II)) and form dinuclear (d)-metal hexacyanoferrates (II). In no case was the complete exchange of Cd(II) and the formation of $M_2[Fe(CN)_6]$ observed [7]. Metal complexes of certain d and f elements immobilized with hetarylformazans were synthesized [8], a complex multifunctional polymer sorbent based on the polycondensation of urea, formaldehyde, and phosphoric acid was synthesized, as well as Co(II), Cd(II) and Co(II), Cd(II) and Sorption characteristics for Ni(II) were studied [9].

Analysis of results.

For the synthesis of a complex-forming sorbent based on epoxy resin modified with amino acids, 0.7 mol of OABK, 0.7 mol of epoxy resin, and a small amount (0.6 mol) of PEPA as a hardener were added to a glass and intensively mixed at 30°C. As a result, the resulting resin was dried in a drying cabinet at a temperature of 70-80°C for 24 hours. The dried sorbent was first washed several times with 5% NaOH solution, then with 0.1 N HCl solution, and then with distilled water. The obtained product consists of small, porous, pale yellow grains, and the yield of the reaction is 91.5%. A complex-forming ligand based on the polycondensation reaction of ortho-aminobenzoic acid with epoxy resin was synthesized, and the influence of factors such as temperature, ratio of initial components, and duration of the reaction on the polycondensation process was studied in order to determine the optimal conditions of the synthesis process. In order to determine the influence of the structure and properties of the starting materials on the structure and properties of the sorbent and to synthesize an immobilized ligand with high operational properties, the effect of the ratio of starting materials was studied.

As can be seen from the data in Table 1, the duration of the polycondensation reaction at a temperature of 20°C is 3.2 hours, and the exchange capacity of the sorbent is 5.2 mg-eq/g. This indicates that the activity of the active substances is lower at the given temperature.

Table 1.

The effect of temperature on the properties of the sorbent formed based on the polycondensation reaction of ortho-aminobenzoic acid with epoxy resin

№	Reaction temperature, t,°C	Duration of the reaction, t,h	Specific volume of H+-form sorbent dissolved in water, ml/g	SAS by 0.1 N NaOH solution, mg-eq/g
1	20	3,2	4,8	5,2
2	30	2,8	3,66	5,8
3	50	2,2-2,5	2,4	5,45-5,6
4	70	1,9	2	5,1

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IR-spectrum of the complex formation of EASP with Mn (II) and Co (II) ions.

Using IR-spectrum analysis, it was determined that Mn (II) ion forms a coordination compound with amine and deprotonated carboxyl groups of the sorbent (pN=4.2) in the solution medium. IR spectra: n(NH) 3165 cm^{-1}, $\nu_{as}(CH_3)$ 2964 cm^{-1}, $\nu_{as}(CH_2)$ 2939 cm_{-1}, $\nu_s(O\text{-}CH_3)$ 2875 cm^{-1}, $\nu(CH_2)$ 1506 cm^{-1}, $\nu_{as}(CH_2)$ 1458 cm^{-1}, $\nu(CH)$ 1409 cm^{-1}, n_c (-CO_2-) 1361 cm^{-1}, $\nu(S\text{-}O)$ 1232 cm^{-1}, ν (C_6H_4= 1 ,4th exchange.) 1105 cm^{-1} (Fig. 1).

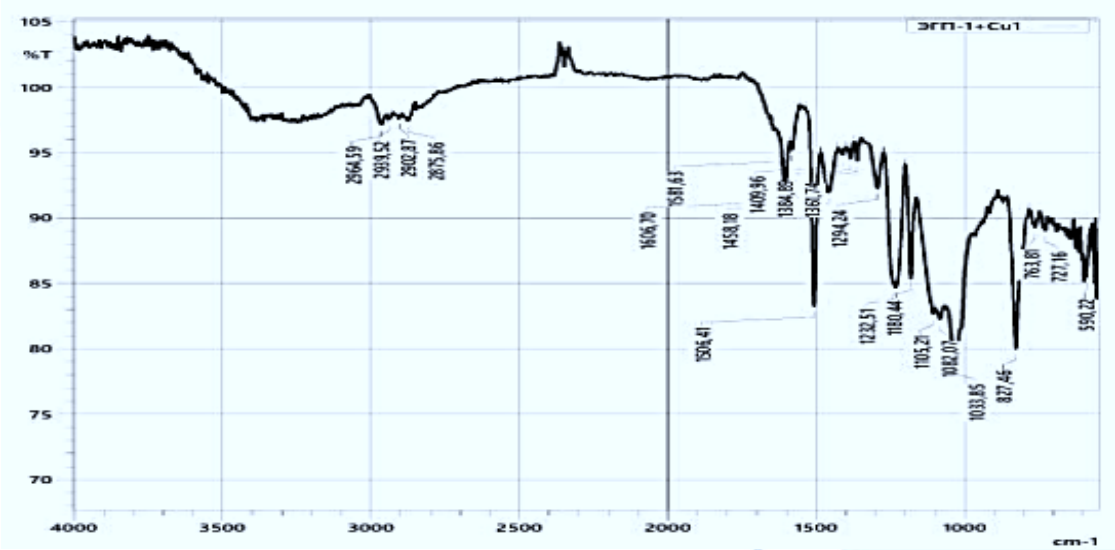

Fig.1. EASP +Mn (II) ion IR-spectrum.

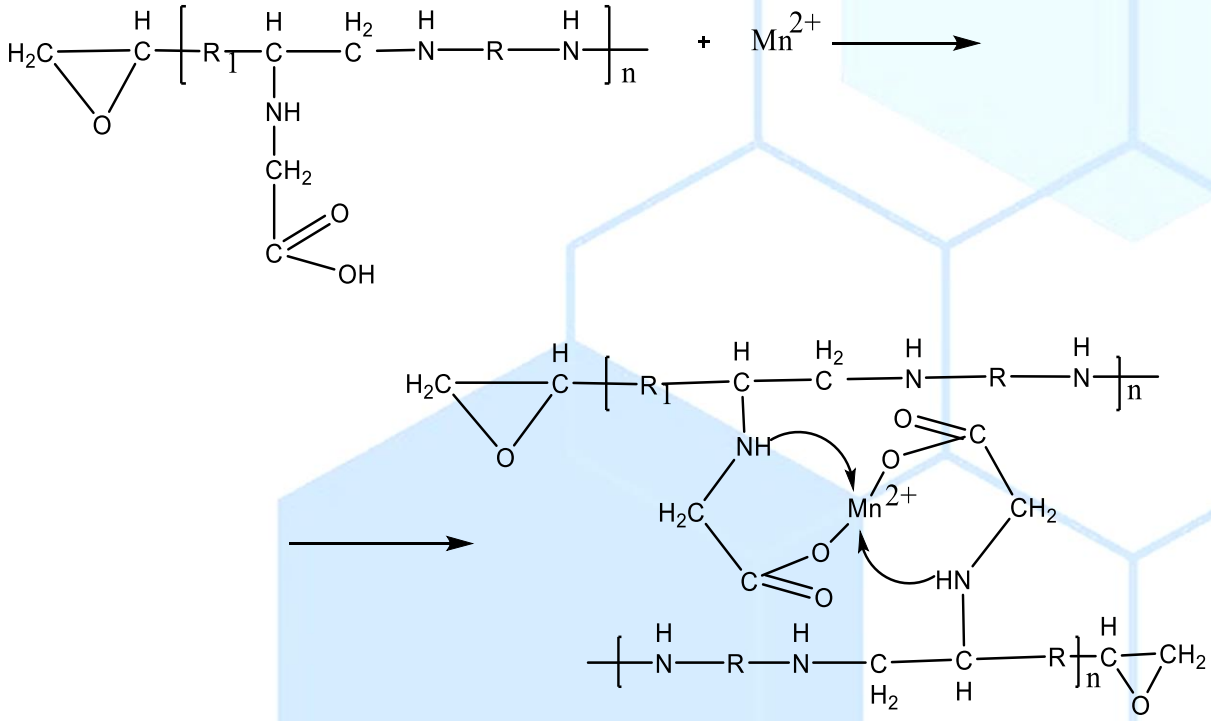

Fig.2. Reaction mechanism of EASP + Mn(II) metallocomplex.

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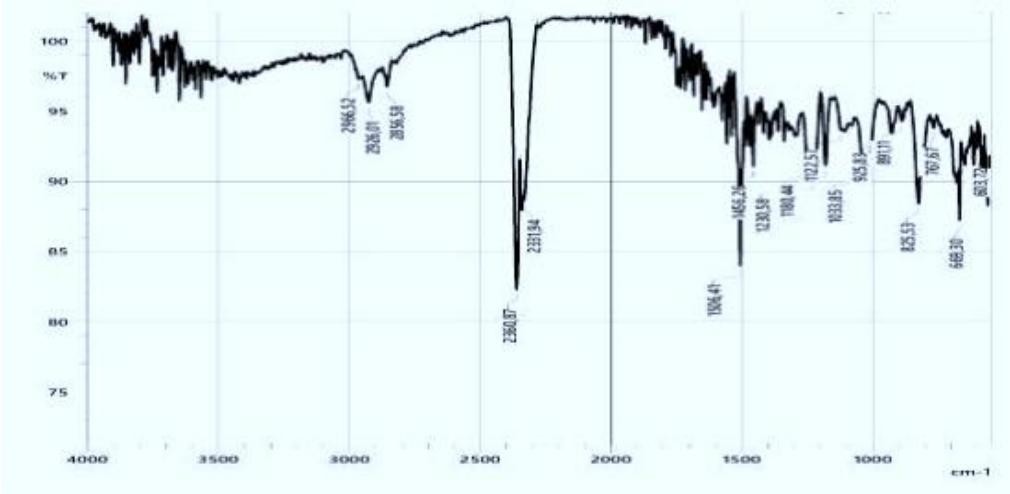

Fig.3. EASP +Co (II) ion IR-spectrum.

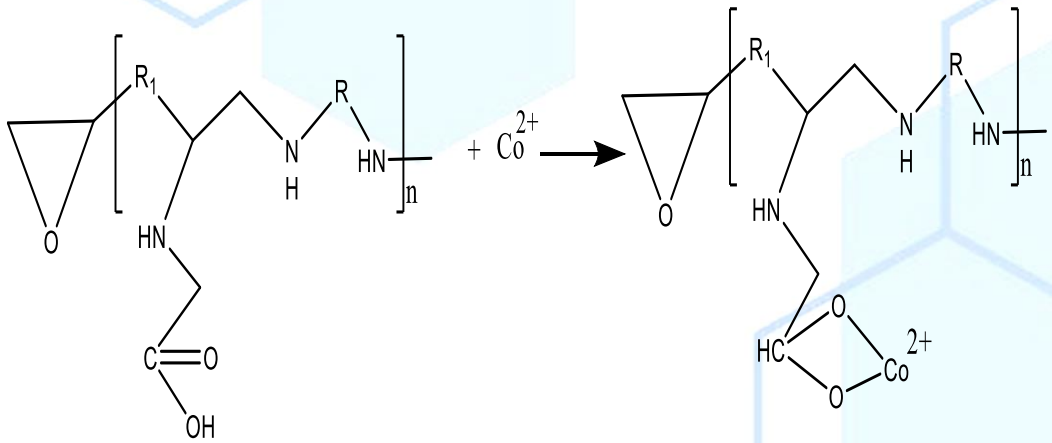

Fig.4. Formation reaction of EASP with Co (II) ion.

It can be seen from the formation reactions of complex compounds as a result of the polycondensation reaction of ortho-aminobenzoic acid and epoxysmol of manganese and cobalt cations that the initial substances are fully involved in the reaction.

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