THE COMPOSITE MATERIALS BASED ON POLYMER-POLYMER COMPLEXES AND DISPERSED FILLERS

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ABSTRACT

The article provides composite materials for the dispersion fillers (phosphogips-FG and sand) in the polymer-polymer complex (PPC) based on the urea salt of the urea-formaldehyde (KFS) and sodium salts of carboxymethyl-cellulose (KMS - Na). Many of the properties of the composite material, including the dispersion fillers in the PPC, have been shown to vary with their physical, chemical and mechanical properties.

The resulting composite material was studied by an electron microscope, showing the locations of pores and the sizes. In addition, the composite material obtained was investigated by infrared spectrophotometric and thermogravimetric methods. It describes changes in the location of functional groups.

Key words: karbamido-formaldegid with(KFW), carboxymethyicellulose - Na (CMH-Na), interpolymeric complexes (IPC), fosfogips (FG), compositional polymeric materials(SM).

INTRODUCTION

One of the ways to improve the complex properties of composite materials (KM) is to physically modify them by adding various fillers. This improves the strength, hardness, heat resistance, water resistance and a number of other important properties of KM[1]. It has been reported in the literature that the properties of interpolymer complexes (IPCs) can be controlled by altering the nature of the intermolecular bonds of the interacting components [2]. The equilibrium action of the starting materials results in the formation of IPKs, and the over-administration of one of the substances results in the formation of nonstechiometric interpolymer complexes (NIPKs) [3].

In recent years, significant progress has been made in the development of modified polymeric materials - polymer-polymer complexes (PPK), which has opened up new aspects of the physicochemical direction of composite materials[4]. The polymer-polymer complexes that make up the PPKs we have obtained are based on the Na li salt of carboxymethylcellulose and carbamidoformaldehyde resin. PPKs are known for a new wide class of composite materials, which are used in medicine as structural constituents of dispersed systems (soil, soil, dispersed ores), semiconducting membranes, surface coatings, effective follicles, in the process of protein degradation and others. and used in practice as materials for medicines[5,6].

The study studied the formation of polyfunctional polyelectrolytes stabilized by saline interpolymers and hydrogen bonds, but it was found that the amount of this or that type of bonds can be kept within a wide range[7]. These studies have shown that it is possible to uncover a science-based approach to the possibility of obtaining IPKs with expected properties[8]. The results of the study showed that the intermolecular bonds in the polycomplex are characteristic of cooperatives[9]. It has been shown that the strength of the IPC membrane increases with the increase in the proportion of amino groups in the polymer macromolecules[13,14].

What was new was the introduction of polkation (PK), how it affects polyanion (PA), and the degree of adaptation. More accurate information on the compatibility of polymers can be obtained by thermodynamic methods. The compatibility of the polymers in a system is determined by their average free energy shift [9,11].

METHODS

Studies have shown that an excess of one of the interacting components allows a higher sorption capacity than an interpolymer complex composite (IPKK). In this case, the IPK obtained in the volume ratio PK: PA = 1: 1 is relatively small. The sorption isotherms of PK and PA are located between them. As the amount of PK in the IPC increases, its sorption capacity increases. The isothermal condition corresponding to a polycomplex with PK: PA = 1: 1 is interesting. The decrease in sorption capacity appears to be due to a chain of polymer components of different chemical nature, and their tendency to each other and to the solvent, the densification of the IPK structure, and the increase in the aggregation density of macromolecules. Such a description of the location of the isotherm reflects the complex mechanism of sorption. It is reflected in the chemical structure of the sorbent and sorbent molecules, as well as the flexibility of the chain and the structure of the sorbent. Data on changes in the structure of IPK and IPKK products obtained by these electron microscopic and suffocation methods are consistent with the above data [10].

A polycomplex containing MFS and Na-KMS is a 1: 1 (in terms of monomer links) polycomplex, however, containing a polycomplex and a material that contains an excess of one or another polymer component is the first to matrix urea and formaldehyde into Na-KMS obtained due to polymerization and PAK [5].

These structural changes can be visualized as follows:

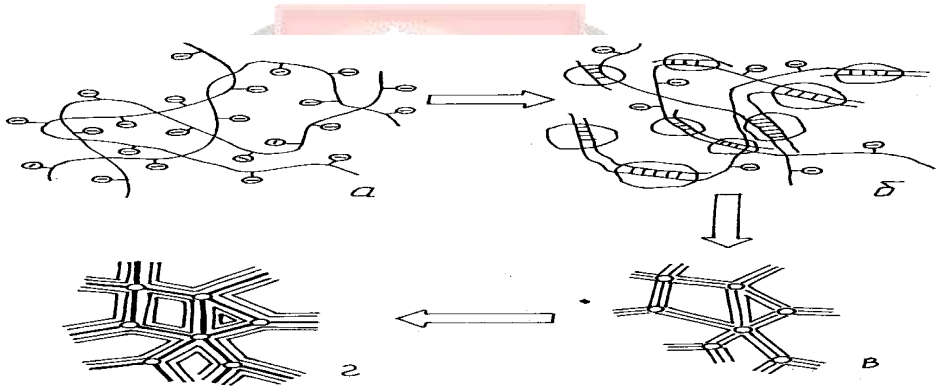

Figure 1. Scheme of formation of urea and formaldehyde matrix polycondensation products in the presence of Na-KMS: a - a sufficiently concentrated solution of the matrix; b - gel formation (product containing polycomplex and excess Na-KMS); v - stoichiometric polycomplex of KFS-Na-KMS; g is polycomplex and contains excess KFS.

CONCLUSION AND DISCUSSION

The formation diagram of the product is shown in Figure 1. Figure 1a shows the formation of a gel in the initial solution of the matrix and monomers (only the polymer-matrix is shown), i.e., after it has remained immersed in water, the immersed polycomplex remains in the water (1 v) and then polycondensation continues, but this does not go under the control of the matrix, and a product consisting of polycomplex and KFS is formed, i.e. IPK (Fig. 1g) [6].

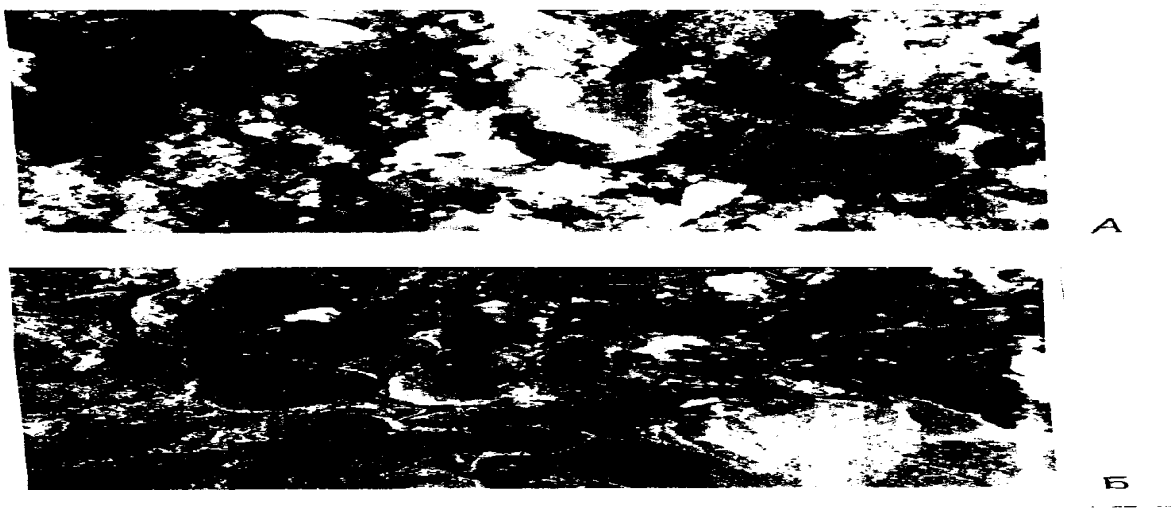

Figure 2. Microphotograph PPK and PPK-MFS micrographs of phosphogypsum (10-15m.q.) (A) and sand (35m.q.) (b) (x55), obtained at a temperature of 25°S.

As a result of the specific interaction of KFS with phosphogypsum, the number of large pores (cracks disappear completely) in the KM is reduced. During the formation of the morphological structure of KM, the presence of nitrogen atoms in the KFS macromolecule, its electron pair, and the presence of calcium cations in the phosphogypsum lead to an increase in intermolecular interactions. decreased. During the formation of the morphological structure of KM, the presence of nitrogen atoms in the KFS macromolecule, its electron pair, and the presence of calcium cations in the phosphogypsum lead to an increase in intermolecular interactions. Then we added sand as an additional filler to IPK + FG and studied the properties of KM. KM with added sand (35 m.q.) has a sufficiently strong microstructure. The same can be said about the content, as it has no visible defects (Figure 2b).

The surface of this structure is relatively monolithic, with a scattering of particles (sand) that looks like more stones have been collected. The particles are connected to each other by a matrix solution. Under the electron microscope, individual pores of 0.2-0.02 mm can be seen on the surface of the sample.

It is known that many physicochemical and mechanical properties of KM depend on its morphological structure, as well as its degree of porosity. Therefore, in order to study the properties of IPK included in the KM, we took samples of KM with different porosity levels. We found that the obtained KM plays an important role in the irrigation of technical crops, ie in reducing the consumption of irrigation water. Figure 3 shows samples of KM (IPK-KFS with phosphogypsum -20 m.q. and sand - 10 m.q.). When its microstructure was studied, it was found to be homogeneous, with pores measuring 0.1 to 0.6 in size, uniform, and making up 20% of the surface area. The matrix material is completely covered with small pores (0.1 mm small). In the KM samples shown in Figure 3b (20 m.q. - phosphogypsum, 25 m.q. - sand) a relatively fine microstructure is observed. The surface area is wider and the pores are relatively large (up to 0.6 mm). The bulk of the volume is made up of a matrix that holds smaller pores than the pattern in Figure 3a. The relatively even distribution of the particles of the filler and matrix material is observed in the sample microforms in Figure 4c. For this sample, it is characterized by the presence of very small pores (0.2-0.3 mm). The amount of sand is 50 m.q. will make the samples more brittle. From the above it can be concluded that the internal morphological structure of the material obtained, as well as its physical and mechanical properties have a significant impact on the filler. YA, a lot depends on their activity.

The chemical activity of fillers depends primarily on their surface characteristics, ie the presence of active surface centers that interact with the active groups of interpolymer complexes.

According to the literature, in practice, on the surface of any filler there are active centers (OH-groups, unsaturated - coordination atoms of metals, V- and F-centers, free radicals, etc.).

Such centers have the ability to chemically interact with polymers. In addition to the chemical activity of the filler, PPK has the ability to interact chemically directly with the environment of the polymer nature that comes into contact with the filler, i.e. with the active centers on the surface of the filler. The presence of groups in [2, 12].

The specificity of the structure of PPK was revealed using the method of IR-spectroscopy. In order to structurally evaluate the obtained PPK, we studied its initial components and IR spectra of PPK. Data from the IR spectra of Na-KMS and KFS in the literature suggest the presence of different functional groups in the range of 800 - 3450 cm-1 absorption outputs.

Conclusion. The study of the groups in it suggests that the stability of the obtained PPK and PPKK is due to the binding of the ions in it to intermolecular forces. The change in the amount of ionic bonds allowed for the use of PPK-based thin-film materials with different modifications, including the addition of phosphogypsum. The physical and chemical properties of these materials have shown good results compared to other materials.

These properties depend on the concentration in the PPK, and the resistance to ions has an extreme characteristic.

The results of the research are very important. The study of the interaction of IPK with phosphogypsum is interesting, first, in terms of understanding the processes by which adsorption of macromolecules takes place between phases. Using these processes, the effect of flocculation and stabilization processes of colloids can be easily explained.

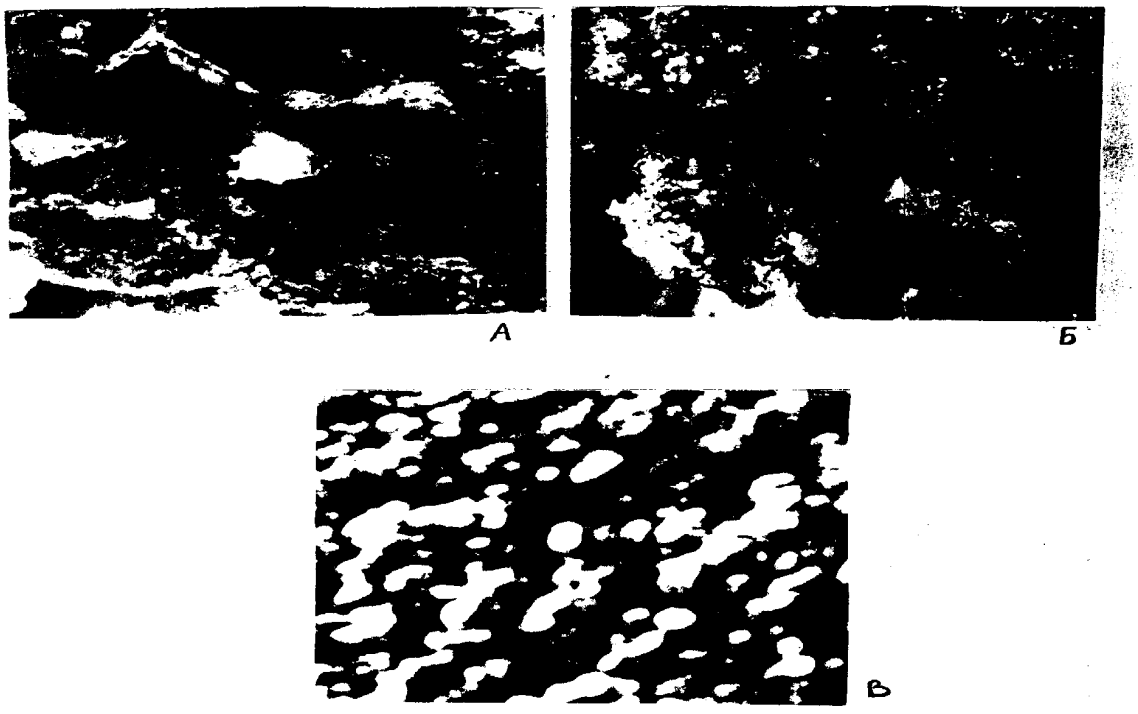

Figure 3. KM (PPK-MFS, phosphogypsum:: sand = 20: 10 v.ch. (A): 20: 25 v.ch. (B) and 20:20 v.ch. (V)) The quantities are modified micrographs

The interactions of PPK and phosphogypsum particles have been studied in terms of chemical equilibrium. The data suggest that the formation of hydrogen bonds between the phosphorous groups of phosphogypsum and the amino groups of KFS is assumed. Thus, we have developed a fundamental approach to the origin of efficient technology for the production and use of PPK.

REFERENCES

[1] Kurbanova A. J., Akhmedov A. M., Komilov K. U. Obtaining composite materials based on polymer-polymer complexes// Bulletin of NamGU. 2019. No.3, Pages. 36-40.

[2] Kurbanova A.Dj., Komilov Q.U., Mukhamedov G.I., Niyazov Kh.A. Interpolymeric complex for protection of the biosphere and spare water resources// Journal of Critical Reviews, 2020,V.7, issue 2, Pages. 230-233

[3] Inkhanova A., Kurbanova A.J., Komilov K.U. Polymer-polymer complexlar asocida modificationlangan interpolymer materiallar//Academic Research in Educational Sciences.2020. Vol. 1 No. 2, Pages. 44-48.

[4] Niyozov Kh. A., Komilov K. U., Kurbanova A. J., Mukhamedov G. I. The use of phosphogypsum to improve soil reclamation properties//Academic Research in Educational Sciences. 2020. Vol. 1 No. 1, Pages. 92-96.

[5] Yigitalieva R.R., Komilov Q.O., KurbanovaA. Dj. Gis application when using phosphogyptic compositions to improve meliorative soil properties // International Engineering Journal For Research & Development. 2021. Vol.5. Issue 8. Pades 1-6.

[6] Komilov K.U., Kurbanova A.J., Kedivan O.D.-S. The use of gis when using phosphogypsum compositions // Journal "Economics and Society" 2021. No. 3 (82)

[7] Komilov K.U., Kurbanova A.Dj., Mukhamedov G.I. New Technology of Cotton Sowing.// Psychology and education. 2021. 58(2): Pades 296-303.

[8] Mukhamedov G.I., Kurbanova A.J., Komilov K.U. Obtaining and application of porous composite materials// Journal "Economics and Society" No. 2 (81) part 2 2021. Page. 59-67.

[9] Eshmatov A.M., Komilov K.U., Kurbanova A.Dj., Mukhamedov G.I. Composite materials based on polymer-polymer complexes with dispersed fillers.// Academic research in educational sciences. 2021 № 2. Pages 334-341.

[10] Komilov K.U., Kurbanova A.Dj., Mukhamedov G.I., Allayev J. Obtaining and application of composite materials based on polymer-polymer complexes and phosphogypse.// Society and innovations. 2021. №4. Pade 114-120.

[11] Kurbanova A.Dj., Eshmatov A. M., Komilov K. U., Muxamedov G. I. Application of interpolimernyx kompleksov dlya uluchsheniya agrofizicheskix svoystv pochv // Jurnal Universum: tehnicheskie nauki. №5 (86). 44-47

[12] Komilov K.U., Mukhamedov G.I., Kurbanova A.Dj., Niyozov X.A. Interpolymer complexes, properties and their application. Monograph. Ch.2020 g. Peges.136.

[13] Ignacio Villal´on Forn´ esa, Danut˙e Vai˘ciukynien˙ ea, Dalia Nizevi˘cien˙ eb, Gintautas Tamo˘saitisa, Darius Pupeikis. The improvement of the thermal and acoustic insulation properties of phosphogypsum specimens by adding waste wood fibre Ignacio// Construction and Building Materials. 2022, №4

[14] Yue Cuia, I-Shin Changb, Song Yanga, Xiaokun Yua, Yunmeng Caoa, Jing Wua, aCollege. A novel dynamic business model to quantify the effects of policy intervention on solid waste recycling industry: A case study on phosphogypsum recycling in Yichang, China// Journal of Cleaner Production.2022,№4


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