MATERIALLARINING HAJMI VA O'RTACHA ZICHLIGINI ANIQLASH. ACADEMIC RESEARCH IN MODERN SCIENCE, 1(19), 54-57.

6.Ismoilov, D., Abdumanopov, M., Abdusalomov, Z., Zarfullayev, M., Ne'matov, J., & Norqulov, M. (2022). YOG‘OCH MATERIALLARINING QO’LLANILISHI VA ULARNING XOSSALARINI ANIQLASH. Eurasian Journal of Academic Research, 2(13), 569-572.

7.Ismoilov, D., Davronov, D., Smaylov, Y., Sultonov, S., Rayimqulov, Y., & Jumanov, B. (2022). NOTO’G’RI VA TO’G’RI GEOMETRIK SHAKLGA EGA BO’LGAN QURILISH MATERIALLARINING HAJMI VA O’RTACHA ZICHLIGINI ANIQLASH. Академические исследования в современной науке, 1(19), 54-57.

8.Ismoilov, D., Raxmonov, S., Maxmudov, U., Muxtorov, U., Muxtorov, S., Nazarov, A., ... & Saparov, D. (2022). KONUSLI MAYDALAGICH VA UNING ISHLATILISHI. Журнал интегрированного образования и исследований, 1(6), 217-221.

9.Ismoilov, D., Saydullayev, G., Temirov, S., Toshboyev, M., Xosilbekov, Z., Xujamqulov, X., & Xusanov, L. (2022). ISSIQLIK IZOLYATSIYA MATERIALLARI. Журнал интегрированного образования и исследований, 1(6), 221-224.

10.Ismoilov, D., Abdiqulov, Y., Abduraxmonov, N., Djorayeva, H., Doniyorov, T., & Ibodullaev, M. (2022). COMPARISON BETWEEN JAW CRUSHER AND CONE CRUSHER. Journal of Integrated Education and Research, 1(6), 208-212.

11.Ismoilov D. Baxromov, J., Sh, H., Nazarov, R., O‘mirboyev, A., & Ibragimov, J. (2022). KONUSLI MAYDALAGICHNING ELEKTRODVIGATELI QUVVATINI HISOBLASH. Journal of Integrated Education and Research, 1(6), 193-195.

12.Sanayev, T., G‘ayratova, O., Sherqulov, N., Mo‘minov, S., & G‘ayratova, D. (2022). VALIKLI MAYDALAGICHNING ELEKTRODVIGATELI QUVVATINI HISOBLASH. Journal of Integrated Education and Research, 1(6), 196-199.

13.Ismoilov, D., Mo’minov, R., Nurullayev, D., Normurodov, R., Madiyev, S., & O’ktamov, O. (2022). BETON QORISHTIRGICHNING ELEKTRODIVIGATELI QUVVATINI HISOBLASH. Journal of Integrated Education and Research, 1(6), 190-192.

14.Begaliyev, B., Raximov, M., Siddiqov, R., & Mixliyev Sh, O. H. (2022). VALIKLI VA KONUSLI MAYDALAGICHLARNING AFZALLIKLARI. Journal of Integrated Education and Research, 1(6), 200-202.

15.Ismoilov, D., Ibragimov, S., Inomqulova, A., Iskandarov, E., Jonimova, Z., Sh, J., & Sh, M. (2022). YIRIK VA MAYDA TO’LDIRUVCHILARNI MAYDALASHDA ISHLATILADIGAN G’ALVIRLARNING TURLARI. Журнал интегрированного образования и исследований, 1(6), 213-216.

УДК 691

OBTAINING OF CARBAMIDE POLYMER COMPOSITIONS WITH ENHANCED PROPERTIES

Associate Professor ARSLANOV I.K. (Kimyo International University in Tashkent)

Annotation. *This scientific article provides physicochemical studies where the addition of a gel polymer has a positive effect on the process of structure formation of the urea composition with quarts sands. The presence of chemical bonds between the components, a change in the morphology of the structure, a decrease in microporosity, an increase in the density and thermal stability of the urea composition are shown.*

Аннотация. *В этой научной статье представлены физико-химические исследования, которое добавление полимерной добавки – гидрогеля к карбамидной композиции с кварцевым наполнителем, оказывает положительное влияние на процесс структурообразования композиции. Показано наличие химических связей между компонентами, изменение морфологии структуры, уменьшение микропористости, увеличение плотности и термостабильности композиции.*

Аннотация. *Ушбу мақолада тўлдирувчиси кварц қуми бўлган карбамид композициясига гидрогель қўшимчаларни киритилиши юзасидан физик-кимёвий тадқиқотлар натижалари келтирилган. Полимер қўшимчанинг сув боғлаш хусусияти, карбамид композициянинг структура ҳосил қилиши жараёнига ижобий таъсир қилиши кўрсатилган.*

Keywords: *physico-chemical properties, gel polymer, quartz sand, urea composition, water binder additive.*

Ключевые слова: *физико-химические свойства, гельполимер, кварцевые пески, карбамидная композиция, водосвязующая добавка.*

Калит сўзлар: *физик-кимёвий хоссалар, гельполимер, кварц қумлари, карбамид композиция, сув боғловчи қўшимча.*

Introduction. Polymer composite materials are used as chemically resistant coatings, polymer mortars and polymer concretes. Due to the comparatively low toxicity of urea-formaldehyde resins, construction composites based on them are most widely used.

It should be noted that along with such valuable properties as incombustibility, colorlessness, good miscibility with water, etc., urea resins and compositions based on them have a number of disadvantages: high internal stress during hardening, fragility, a large amount of chemically unbound water, low heat resistance, which make it difficult for practical use on a large scale.

The main direction of progress in the technology of urea compositions is the development of effective methods for binding free water formed in the process of oligomer polycondensation.

The strength and chemical resistance of urea compositions will be significantly improved if free water is bound, which is by-produced during the polycondensation of the resin and amounts to about 35 - 40% of the binder weight. Intensive release of free water during polycondensation of the urea oligomer is accompanied by high internal stresses, which leads to a decrease in crack resistance, the formation of defects in the structure, deterioration of the physical and mechanical properties and chemical resistance of composites based on it. The choice of effective water-binding additives is very difficult due to the acidic nature of the hardening of carbamide composites. Therefore, the search for effective acid-resistant water-binding additives is an important stage in the development of urea composite materials. This can be achieved by using artificial and natural zeolites, polymeric and other substances, the products of new formation of which are water and chemically resistant.

Analysis of the literature data have shown that modern methods of obtaining polymer compositions based on urea resins do not guarantee the achievement of the required properties in terms of strength, specific impact strength, chemical resistance, etc. One of the ways to obtain chemically resistant urea compositions with improved deformation properties is chemical bonding of free water, which is side-released during the polycondensation of the resin in an amount of 35-40% by weight [1,2].

Methods of research. The methodological basis of the study is the poly structural theory of composite building materials and the modeling of the study of the chemical resistance of the urea composition in aggressive conditions.

The aim of the study is to substantiate the possibility of obtaining a carbamide composition with a quartz filler and a water-binding additive - a gel polymer, which provides an improvement in the indicators of physical and mechanical properties and chemical resistance, as well as the establishment of patterns of its structure formation.

Slope of tasks:

- will reveal the mechanism of action of the gel polymer additives and its interaction with the components of the composition;
- to investigate the structure formation and optimize the composition of the carbamide composition with quartz filler and the addition of a gel polymer;
- to investigate the physical and mechanical properties and chemical resistance of the developed urea composition.

For the study, a carbamide composition with the following components was used:

carbamide resin, hardener - aniline hydrochloric acid, water-binding component - gel polymer and filler - ground quartz sand.

The physical mechanical and operational properties of the urea composition with quartz filler and addition of a gel polymer were investigated using standard methods. The structure formation of the urea composition was studied by physicochemical methods of analysis (DTA, IR spectroscopy, X-ray diffraction, differential porosity, and electron microscopy).

Recently, more and more attention of researchers has been attracted by the class of polyelectrolytes - hydrogels, for example, gel polymers with a macroreticular structure, possessing ion-exchange activity, the ability to multiple swelling in water and having sufficiently high physical and mechanical properties, as well as the possibility of their chemical modification in order to regulate properties.

Gel polymers are substances that have the ability to absorb and retain a very large amount of moisture, sometimes hundreds and more times their own weight. Gel polymers are obtained from substances that do not dissolve in water; they are cross-linked polymers with a macroreticular structure. In their original state prior to hydration, they are similar to rigid polymers – inflexible brittle and tough. When immersed in water, the hydroxyl groups of a dry polymer attract water molecules and the polymer absorbs water.

Experimental studies were carried out to study the effect of gel polymer additives on the main physical and mechanical properties and to determine their optimal amount in the composition. When determining the dosage of the gel-polymer additive in the composition, the amount of free water released during the polycondensation of the urea-formaldehyde resin was taken into account.

The effect of the gel polymer additive was assessed by the change in the compressive strength of the samples from the urea composition. For the experiments, urea compositions were prepared with different gel polymer content from the weight of the filler at constant values of dispersion and degree of filling.

Aniline hydrochloric acid (HA) was used as a hardener in an amount of 3% of the resin mass, and a filler was quartz flour with a degree of filling Cv = 2.

As a result of studies, it was found that the absorption effect and the calculated amount of bound water released during the polycondensation of the urea resin depend on the content of the gel polymer additive in the composition. It is shown that when the content of the gel polymer additives in the composition is 0.05; 0.09; 0.13 and 0.17% binds 25, 50, 75 and 100% free water. The extreme character of the change in the strength of the urea composition from the content of the gel polymer additive with a maximum of the indicator at 0.13% of the filler weight was experimentally established. In this case, compressive strength R_c increases by 15% in comparison with the composition without additives [3].

In the structure formation of composite materials, the nature of the bond between the components is important. For this purpose, the nature of the interaction of the components in the hardened urea composition has been studied by IR spectroscopy. Studies have shown that the introduction of a gel polymer additive in the urea composition in an amount of 0.05-0.17% does not significantly affect the changes in the structure of the urea composition. However, in the spectrum of compositions with a gel-polymer additive content of 0.05-0.13%, a shift of absorption bands to the low-frequency region is observed, which refers to the absorption of OH-groups associated with hydrogen bonds and is characterized by deformation vibrations of water in comparison with the additive content. At the same time, a higher value of the frequency of asymmetric stretching vibrations of the quartz sand included in the composition is observed.

For polymer composite materials, it is important not only the nature of the bond between the components, but also the morphology of the structure, including the supramolecular one. Electron microscopic studies have shown that due to the absorption of free water, the morphology of the structure of the urea composition changes significantly. In the latter, there is a transition from a block microstructure to a continuous crystallized mass.

The appearance of a pronounced interface is apparently explained by stresses arising from different coefficients of linear expansion of the filler and urea resin, and also the shrinkage of the latter during the curing process. The introduction of a gel polymer additive into the composition of the urea composition leads to a change in the structure, makes the cleavage surface relatively smooth, absorbing and separating the internal stresses arising between the phases. Due to the presence of a water-binding additive, the surface of the composite is represented by globular lumpy - small formations on relatively round grains with low stepped areas [1,2,3].

Results. The results of studies to determine the microporosity of the composition showed that the composition with the addition of a gel polymer has a total porosity of 0.1468 - 0.1507 cm^3/g. In this case, micropores with a size of 0.01-100 microns make up 35-40% of the total volume. Due to the absorption of free water by the gel polymer additives, the microporosity of the composition is reduced. As a result of curing, the carbamide composition acquires a dense and strong structure. The best porosity values are achieved with the addition of 0.13% gel polymer.

Experimental data indicate that the strength of the compositions with the gel polymer additive is higher by 10-15% in comparison with the carbamid compositions without additives.

The studies carried out also have shown, that the linear shrinkage of the control samples increases intensively in the first 1-2 days of hardening, when the resin polycondensation process takes place. During this period, the shrinkage kinetics is superimposed on the process of water evaporation from the surface, in which the molecular structure of the composition is rapidly compacted and microcracks appear in them. Intensive growth of linear deformations in urea compositions with a gel polymer additive occurs in the first 1-3 days of hardening and its value is 5-7% lower than in the control.

Conclusion. 1. Received urea composition with improved structure, with increased physical and mechanical properties and chemical resistance by using a gel polymer additive in an amount that provides binding of free water separation during the polycondensation of the resin.

2. Physicochemical studies have established that the addition of a gel polymer has a positive effect on the process of structure formation. The presence of chemical bonds between the components, a change in the morphology of the structure, a decrease in microporosity, an increase in the density and thermal stability of the urea composition are shown.

3. It is shown that with the optimal content of the gel polymer additives in the composition of 0.13% by the weight of the filler, the compressive strength and specific impact strength are increased to a large extent.

4. It was found that due to the strengthening of the adhesive bond between the components and the improvement of the pore structure under the action of the gel polymer additive, the chemical resistance of the urea composition with quartz filler increases.

References

1. Arslanov I.K. Enhancement the Properties of Construction Urea Composition with Polymer Additive. International Journal of Community Service & Engagement e-ISSN: 2746-4032 Vol. 2, No. 2, May 2021. Published by Training & Research Institute – JIS/

2. Arslanov I.K. Properties of polymer concrete based on modified carbamide binder. Халқаро миқёсдаги илмий-техник конференция материаллари. 27-28 октябрь 2022 йил. СамДАҚУ, Самарқанд. 11-13 бетлар.

3. Modified urea binders for polymer concretes. International on-line Scientific - Practical Conference. Tashkent institute of Architecture and Civil Engineering. Tashkent, 2021. p.436-439

UO'K 691.32

PLASTIK QOPQOQLARDAN BETON BORDYUR TAYYORLASHDA DEKORATIV ELEMENT SIFATIDA FOYDALANISH

(PhD), dotsent, Muxamedbayev Ag.A., bakalavr, Komiljanova M.S. (TAQU)

Annotatsiya. *Plastik suv idishi qopqoqlarini dekorativ element sifatida beton bordyurlar tayyorlashda ishlatilish imkoniyatlari tadqiq etilgan.*

Kalit so'zlar: *beton bordyur, plastik suv idishi qopqoqlari, sement, qum, chaqiq tosh.*

Аннотация. *Исследованы возможности использования крышек пластиковых бутылок в качестве декоративного элемента при изготовлении бетонных бордюров.*

Ключевые слова: *бетонный бордюр, крышки пластиковых баклажек, цемент, песок, щебень.*

Abstract. *The possibilities of using plastic bottle caps as a decorative element in the manufacture of concrete curbs are investigated.*