6. Israelachvili, J., "Intermolecular and Surface Forces," Academic Press, 3rd ed., 2011.
7. Yang, J., "Mechanisms of Controlling Rheology in Cement Pastes," Cement and Concrete Research, vol. 40, no. 1, pp. 1020–1028, 2010.
8. Kim, H., Lee, H., "Polycarboxylate-Based Superplasticizers and Their Role in Improving the Performance of Construction Materials: A Review," Construction and Building Materials, vol. 112, pp. 547–558, 2016.
9. Wang, F., "Synergistic Effects of Mixed Superplasticizers on Concrete," Journal of Applied Chemistry, vol. 28, no. 3, pp. 101–107, 2017.
10. Zhang, Y., Li, Q., "Zeta Potential in Cement Hydration with Superplasticizers," Journal of the American Ceramic Society, vol. 92, no. 10, pp. 2083–2088, 2009.
11. A.S. Dukhin, P.J. Goetz, Ultrasound for Characterizing Colloids: Particle Sizing, Zeta Potential, Rheology, Elsevier Sci¬ence B. V., Amsterdam, 2002.
12. Kh. Kh. Kamilov, D. R. Abdazov . SUPERPLASTICIZERS FOR MORTARS AND CONCRETES. REVIEW ARTICLE /CENTRAL ASIAN JOURNAL OF MATHEMATICAL THEORY AND COMPUTER SCIENCES. Volume: 04 Issue: 6 | Jun 2023. Pp. 24-37/
13. Kh. Kamilov, A. Zaitov, A. Tulaganov, On a formula finding fractal dimension, Archives of Materials Science and Engineering 104/1 (2020) 19-22. DOI: https://doi.org/10.5604/01.3001.0014.3865

REDUCING ALKALINE CORROSION OF BASALT FIBER IN CONCRETE

ISMOILOV D.J. (Jizzax Politexnika instituti)

Annotation: *The article presents the results of studies on the development of fiber-reinforced concrete using composite binders and basalt fibers obtained in an experimental plasma reactor. To reduce the negative impact of Portland cement on the mineral fiber, composite binders based on Portland cement and fly ash were used in thestudy. To reduce the normal density in the composition of the binder, a polycarboxylate type superplasticizer was used in the work. The microstructure of cement stone was studied using SEM and IR-spectroscopy. The compressive strength was tested on cubes with an edge of 100 mm according to EN 12390-6, flexural strength – on prisms with a size of 100×100×500 mm according to EN 12390-3. The optimum content of fly ash (30 %) in the composite binder is evaluated, which allows to obtain high mechanical properties.*

Аннотаци: *В статье представлены результаты исследований по разработке фибробетона с использованием композиционных вяжущих и базальтовых волокон, полученных в экспериментальном плазменном реакторе. Для снижения негативного воздействия портландцемента на минеральное волокно в исследовании использовались композиционные вяжущие на основе портландцемента и золы-уноса. Для снижения нормальной плотности в составе связующего в работе использован суперпластификатор поликарбоксилатного типа. Микроструктуру цементного камня изучали методами РЭМ и ИК-спектроскопии. Прочность на сжатие испытывали на кубах с ребром 100 мм по EN 12390-6, прочность на изгиб – на призмах размером 100×100×500 мм по EN 12390-3. Оценено оптимальное содержание золы-уноса (30 %) в композиционном вяжущем, позволяющее получить высокие механические свойства.*

Annotatsiya: *Maqolada eksperimental plazma reaktorida olingan kompozit bog'lovchilar va bazalt tolalari yordamida tolali temir-betonni ishlab chiqish bo'yicha tadqiqotlar natijalari keltirilgan. Portlandsementining mineral tolaga salbiy ta'sirini kamaytirish uchun tadqiqotda portlandsement va uchuvchi kulga asoslangan kompozit bog'lovchilar ishlatilgan. Bog'lovchi tarkibidagi normal zichlikni kamaytirish uchun ishda polikarboksilat tipidagi superplastifikator ishlatilgan. Sement toshining mikro tuzilishi SEM va IR-spektroskopiya yordamida o'rganildi. Siqilish kuchi EN 12390-6 bo'yicha qirrasi 100 mm bo'lgan kublarda, egilish kuchi - EN 12390-3 bo'yicha 100 × 100 × 500 mm o'lchamdagi prizmalarda sinovdan o'tkazildi. Kompozit bog'lovchida uchuvchi kulning optimal miqdori (30%) baholanadi, bu esa yuqori mexanik xususiyatlarni olish imkonini beradi.*

Keywords: *fiber reinforced materials, fiber-reinforced concrete, cements, cement-based composites, binders, concretes, mechanoactivation*

Introduction. Despite the proven effectiveness of fiber-reinforced concrete in comparison with traditional reinforced concrete, their use is quite rare in construction practice. This is due,

inter alia, to the fact that for some types of fiber there is insufficient information about the possibility of its use in certain conditions. In particular, the study of mineral fibers remains relevant, due to the high mechanical properties of individual fibers and a lower density of these fibers compared to steel fibers.

Alkaline solutions, which cause corrosion, affect basalt fiber, as well as glass fiber, which in turn leads to fiber destruction. The resulting loss of strength causes the destruction of the composite under load during operation. Wei et al proved that the alkali resistance of basalt fiber is higher than that of E-class fiber glass. There are differences in corrosion resistance of basalt fiber and fiberglass from E-class components, although the main components, SiO_2 and Al_2O_3, are the same for the two types of fibers. E-glass fiber has a much larger contribution from CaO and B_2O_3, while Fe_2O_3 and FeO are found only in basalt fiber.

Materials and Methods. The studies used follow materials: Portland cement (OPC) CEM I 32.5 N (Spasskcement, Russia), fiber based on basalts of the Selendum deposit (Russia) and fly ash. Composite binders were obtained by joint grinding of fly ash (0–50 % by weight of the OPC) with Portland cement to a specific surface area of 430–450 m^2/kg.

Concrete cubes of dimensions 100×100×100 mm were prepared for compressive strength test at the age of 2, 7 and 28 days for all mixes. The concrete specimens were unmolded after 24 hours of casting and then immersed in curing tank at room temperature and relative humidity at 65 ± 5 % until the age of testing. This test was carried out using a Shimadzu (Kyoto, Japan) tester machine with a capacity of 200 kN according to EN 12390-3. Flexural strength of the prisms with an edge length of 100×100×500 mm specimens was tested according to EN 12390-6.

Results and Discussion. The test results showed that the use of fly ash in the composition of composite binders leads to a change in normal density, setting time and physicomechanical parameters.

The high content of SiO_2 in the fly ash (57 wt. %), when grinding with Portland cement leads to the activation of a composite binder. Fly ash acts as an active mineral additive, participating in the structure formation of cement stone. However, due to the fact that ash increases water demand, this effect is compensated by the addition of superplasticizer. Moreover, as can be seen from Figure 1, the addition of superplasticizer leads to an increase in compressive strength of composite binders by 10–15 %. In addition to the water-reducing effect, which helps to increase the mechanical characteristics of cement stone, superplasticizer significantly affects the processes occurring in the cement system through various effects, which was described by the authors earlier. In particular, the molecules of surfactants, adsorbed on the surface of the particles, reduce surface energy, while there is a partial saturation of free chemical bonds on the surface of the solid phase, preventing adhesion.

The change in the mechanical properties of fiber concrete occurs due to the directed formation of the structure and increase the corrosion resistance of the fiber by reducing the alkalinity of the binder. SEM results showed a change in the microstructure of Portland cement and a composite binder with basalt fiber in an amount of 4 wt. % at the age of 28 days

References:

1.Dilshod, I. (2022). Producing of the optimal ingredients of multi-component cements and research of the physical-mechanical properties. European International Journal of Multidisciplinary Research and Management Studies, 2(11), 90-92.

2.Ismoilov, D. (2022). CALCULATION OF THE POWER OF THE GRINDER ELECTRIC MOTOR. Science and Innovation, 1(7), 629-633.

3.Шавқиев, А., & Исмоилов, Д. (2022). БИНО ВА ИНШООТЛАРНИНГ МАҲАЛЛИЙ МАТЕРИАЛЛАР АСОСИДА ҚУРИШДА ГАЗОБЕТОНДАН ФОЙДАЛАНИШНИНГ ЭНЕРГИЯ САМАРАДОРЛИГИ. Science and innovation in the education system, 1(5), 80-87.

4.Ismoilov, D. (2022). JAG ‘LI MAYDALAGICHNING ELEKTRODVIGATELI QUVVATINI HISOBLASH. Science and innovation, 1(A7), 629-633.

5.Dilshod Jo'raqul o'g, I. (2022). li, Davronov D, Smaylov Y, Sultonov Sh, 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. 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.*