Spectrum Journal of Innovation, Reforms and Development
Volume 21, November, 2023 | ISSN (E): 2751-1731
Website: www.sjird.journalspark.org

THE USE OF INDUSTRIAL WASTE IN OPTIMIZING THE PROPERTIES OF CONCRETE

Abobakirova Zebuniso Asrorovna
Farg'ona Politexnika Instituti, PhD Dotsent
z.abobakirova@ferpi.uz), (ORCID 0000-0002-9552-897X).

Abstract
This article presents an analysis of the ways of using glass production waste in the production of concrete with an assessment of the possibility of using glass-grinding clay. The use of modern technological approaches in the molding of products can significantly improve the quality of concrete and increase its conservation of natural resources, the use of waste and glass is to produce concrete with improved properties by adding waste to concrete.

Keywords: glass waste, superabsorbent, cement, energy efficiency, concrete production.

Introduction

In addition to optimizing the composition of concrete mixtures used for the production of concrete and reinforced concrete structures on a global scale, many R & D works are underway in their preparation, aimed at the use of industrial waste, chemical and mineral additives, targeted management of structure formation in hardened cement stone. In this regard, it is important to use chemical and mineral additives in order to increase the resistance of concrete and reinforced concrete structures to the harmful effects of the environment, especially groundwater, ensure the comfortable fit of the concrete mixture, accelerate the initial strength of concrete by intensifying cement hydration, and ensure high strength, and at the same time increase the strength of

Particular attention is paid to the introduction of resource and energy-efficient technologies and the creation of corrosion-resistant concrete types in our republic, which allow the development of the building materials industry, the economy of natural raw materials and the use of industrial waste in production. Important aspects of any optimization in the production of cement concretions are the improvement of physical, mechanical and other properties; reduction of the use of low components; reduction of the cost of the final product. Improving the quality of mixtures is carried out by increasing the amount of binder, introducing chemical additives, etc. Each additive to which the mixture is added has its own mechanism of action and can have both positive and negative effects when interacting with the astringent. Various parameters can be used as a basis for optimizing the composition of additives in concrete. Since the subject of the study was monolithic and prefabricated reinforced concrete, the most important characteristics were obtained: the water demand of the concrete mixture and the strength of the concrete. The compositions of the concrete mixture for the study are presented in Table 1 B15, B25, B30 used for three classes of concrete [1-10]. Mathematical methods of planning the experiment were used when choosing compositions of multicomponent systems and developing the technology for their preparation. With the help of experimental theory, experimental plans were developed, the components that make up the material, the modes of heat treatment were selected, and their degrees of variability were assigned. The factors were selected taking into account the optimization criterion. Early experiments were applied to establish volatility limits, allowing experiments to be made as close as possible to the optimal area. As a result of the implementation of the experiment planning matrices, regression equations were obtained, and graphical dependencies of the change in the properties of materials on the type and composition of the components were drawn up.

The scientific significance of the results of the study is that with the help of various chemical additives for underground structures, the structure and structure of corrosion-resistant concrete was determined, which is explained by the fact that, together with shubilan, its physical and mechanical properties, their change and quality indicators, the scientific basis for the establishment of thegp was created.

In Real-world conditions, concrete structures are usually affected by a complex of aggressive factors that work two or more. The combined effect of aggressive conditions and mechanical stress leads to increased destruction and, in particular, to an acceleration of decay processes.

Concrete decay is a violation of its structural integrity and a weakening of its strength.

Decay of concrete can occur as a result of the decomposition of hydrated clinker minerals in cement stone, as well as due to the appearance of internal tension in concrete as a result of crystallization of Decay products in the pores of cement stone. The destruction of concrete as a result of the breakdown of hydrated neoplasms is associated with the elimination of their dissolved components from the porous liquid, causing an imbalance between the cement stone and its liquid phase.

The process of decay caused by crystallization of Decay products in the pores of cement stone is associated with the kinetics of the appearance of these products and the structural properties created by them[11-19].

Due to the saturation of concrete with a sulfate solution, high sulfate formation of calcium hydrosulfoalyuminate (GSAK) in its residues is formed in its cavities: $3SaO \cdot Al_2O_3 \cdot 3SaSO_4 \cdot 31N_2O$ and low sulfate $3SaO \cdot Al_2O_3 \cdot 3SaSO_4 \cdot 12N_2O$. form is the most dangerous, and etringite is its natural analogue.

In the first hours after the cement has been mixed, GSAK does not have a stretching effect, unless the structural bases of the cement stone have not yet been formed.

in order to perfect the composition of the perfect concrete with the addition of a polymer additive, the results of non-mathematical experiments on their effect on the deformable, operational, technological, reinforced properties of concrete are presented. Portland concrete mixtures with a consumption of B15, B25, B30 proportional to the concrete classes 290-430 kg/m^3 were taken as a research object.

As an initial parameter: Y_1 – 28 kunlik (R_{sik}^{28}) MPa concrete strength of; Y_2 – (V) water tensile strength of concrete mixture was adopted.

The optimal composition of additives can be influenced by a large number of prescription – technical elements. As a variable element based on the results of previous research: X_1 – cement consumption, kg/m^3, X_2 – fine and large – particle filler cross-ratio P/Щ; X_3 – factors such as % additive amount (D) depending on the volume of Cement were taken into account.

The concentration of poly-ANS polymer additives is determined by the results of experiments in active experiments, in which preliminary studies were carried out in the experimental Matrix.

As a result of calculating the coefficient of multiple compositions according to the T-criterion and assessing their significance, the back-return criteria were obtained, while a statistical analysis conducted according to Fisher's t-criterion showed that the second-degree polynomial concrete peculiarities were correctly described[14-23].

Technological analysis of mathematical models of concrete properties was carried out graphoanalytically, and it was found that the main factor affecting both the strength of concrete and the water requirement of the concrete mixture is cement consumption.

The second most important factor affecting the strength of concrete and the water demand of the concrete mixture is the amount of POLY–ANS (X3) additive; the optimal doses of POLY– ANS additives determined by differentiating the equations obtained are: POLY–ANS 1-0.01 %; POLY– ANS 2-0. 02 %; POLY– ANS 4-0. 04%.

The optimal values of the ratio between small and large differentiation,determined by differentiating the equations obtained for the considered additions,were: POLY–ANS 1-0,52; POLY–ANS 2-0, 50; POLY–ans 4-0, 48.

At moderate temperatures, POLY-ANS additives slightly slow down the initial content of concrete, which should be taken into account in the manufacture of reinforced concrete products. In order to effectively use POLY–ANS in concrete plants, it is necessary to properly set the processing modes in the case of heat and moisture in the concrete mixture.

As a determining indicator, the viscosity of one-day concrete after r_sik^IXI or Y evaporation and in the following variable factors: X1 – initial storage duration, s; X2 – isothermal heating Duration, s; X3 – isothermal heating kharorat, 0s were adopted.

Determined as a result of active experiment and with the statistical development of laboratory indicators, the concrete strength after TNT was obtained precisely for Poly–ANS-0.01%, POLY–ANS-0.01%, Poly–ANS-0.02% additives, the technological analysis of which indicates a positive effect on the optimal size of POLY–ANS additives on the strength of concrete under normal conditions, heat and moisture treatment.

Adding an optimal amount of additives will help reduce water absorption in concrete and separation into layers by 1.8-3 and 1.6-2.7 times. POLY-ANS–0.01% additive is known to have a better effect on dry concrete mixtures, POLY-ANS– 0.02% and POLY-ans -0.04% on “greasy” concrete mixtures, which is determined by their different mechanism of action.

The reduction in water demand due to cement volume suggests that reinforced concrete enclosures are less susceptible to separation into layers and water separation.

Improving the technological properties of the concrete mixture with the addition of additives and lowering its water requirement have a positive effect on the strength properties of the concrete (figure 1,2).

The cubic strength of the concrete selected in the Optimal amount will lead to an increase of 9-10% with POLY–ANS 1; 20-28% with POLY–ANS 2; 28-36% with POLY–ANS 3, and the stretch in the Bend will increase by 11-12; 26-39; 40-54[9].

Experimental indicators show the positive effect of additives on reducing concrete defects, increasing the spread of cement Crystal hydrates and increasing bond strength. The result of this is a natural increase in the Prismatic strength coefficient, the indicators of which are suitable for concrete with additives: 0.72-0.73; 0.74-0.79; 0.78-0.82 ni. At the same time, there is a decrease in the ratio of Rsj/RR.

At the initial time (3-7 days), an increase in the strength of the reinforced concrete against bending and pressing is observed to slow down in relation to etalon naamuna. The concrete maturation rate, which is then added between 28 days and a year, increases to 9-16% (Rsik) and 11-18% (Regil) for POLY–ans 1; 20-42% (Rsik) and 26-48% (Regil) for POLY–ANS 3; and 29-49% (Rsik) and 40-62% (Regil) for POLY–ANS 3.

These factors are determined by their low water demand, uniform content and low defects. In addition, the cement stone with the addition of additives has a small amount of capillary, and the common pores are conditionally – multi-volume small pores of a berk character.

The effect of additives on water saturation in concrete, resulting in frost resistance and waterproofing properties, has been studied. The water absorption property of concrete with additives is 22-39% less than that of etalon concrete. Additives reduce the saturation of concrete with water by 1.2-1.7 times.

The frost resistance of concrete with the addition of poly–ANS 1, POLY–ANS 2, POLY–ANS 3 is 1.7-2.7 times higher than that of ethalonic concrete, which is 250, 300 and 400 respectively.

The water resistance of concrete with additives is 1-3 times higher than the control composition, which is explained by the low initial water content of concrete with additives and a significant improvement in the properties of the porous structure.

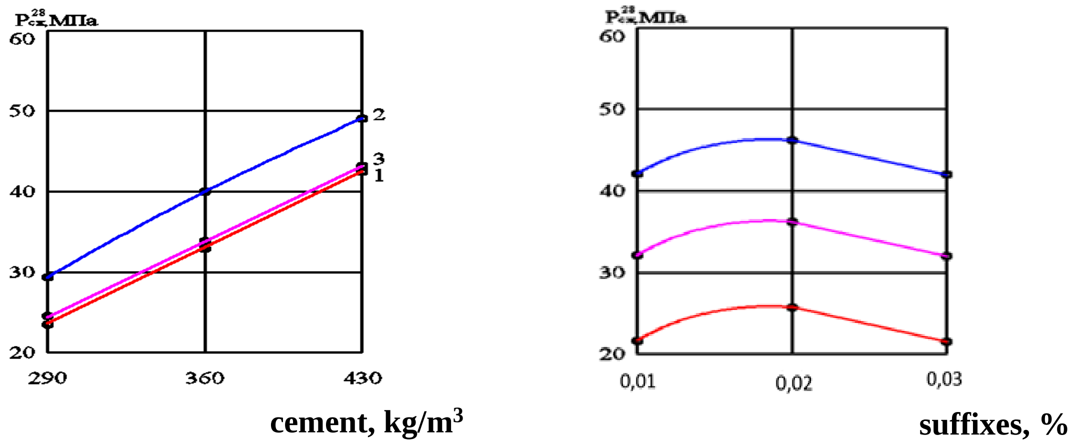

Figure 1. The strength of poly-ANS 2 additive concrete. A. effect of cement cost 1,2,3-290,360,420 kg / m3, respectively; B. additive dose effect

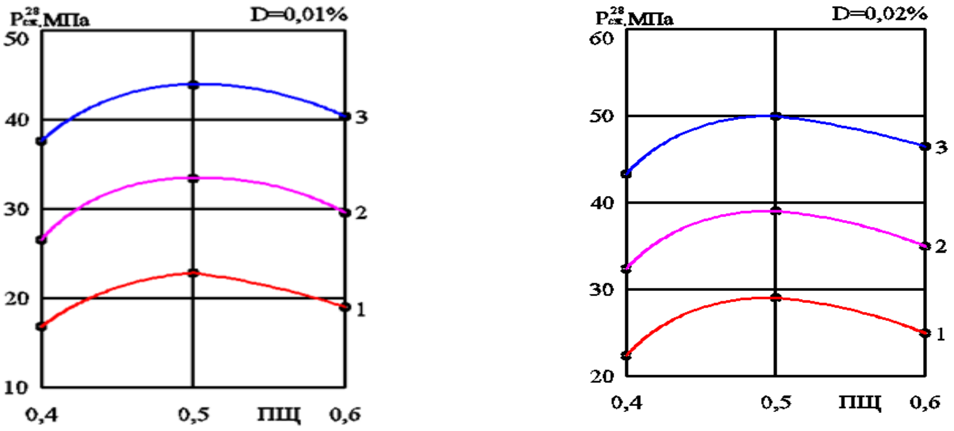

Figure 1.1. The strength of poly-ANS 2 additive concrete.

With POLY–ANS additives, the frost resistance of concrete is 1.7-2.7 times higher than standard; water demand is 22-39% lower; water saturation – 1.2-1.7 times less, the water absorption property increases from 4 to 6-12 ATI or 1.5-4 times.

The paper places great emphasis on indirect experimental studies of the effects of POLY–ANS additives on internal stress in concrete. For the same purpose, experimental studies of Decay properties (contraction, tension modulus, relative decay) were carried out.

Table 1. Water resistance level of concrete of Grade C25 of the mixtures

Additive type	maximum pressure up to water leak,	ATI maximum pressure retention time up to water leak, s-daq
	C 25 klass	
1	2	3
Etalon	4	3-52
POLY– ANS 1	6	4-40
POLY– ANS2	8	5-36
POLY– ANS3	12	6-45

POLY-ANS additives reduce the hardness of concrete and improve its deformation properties by increasing the elasticity of the composition. At this point, the tension modulus of the concrete with the addition of additives decreases by 18-24%, and the ratio of the Puasson increases from 0.208-0.232 to 0.212-0.249. [17-21].

The relative deformation limits of poly-ANS mixed concrete are 13-18 and 22-28% more on an elongated surface compared to additional non-added concrete. Deformations in the compacted concrete zone with added additives are 3-10 and 15-22% higher than ordinary concrete, respectively.

Poly-ANS polymer additive reducing the absorbency of the added concrete is determined by the adhesive layer between the crystalline hydrates of the cement stone, the depphir property formed due to the expansion of the adsorption floors, the high degree of homogeneity of the concrete structure and increasing the strength between the small pores, mixture and filler.

When using cement concrete in an aggressive environment, it is necessary to determine the effect of polymer additive concrete on crack resistance. When cement consumption decreases by 5-20 percent without affecting the initial strength of concrete, crack resistance indicators naturally increase by 1.3-1.52 times. [21-29].

Conclusion

Based on the results of theoretical and practical research of the article" design and optimization of the properties of effective corrosion-resistant concrete composition with an ionogenic nature additive for subsurface structures", the following conclusions were drawn:

1.The possibility of developing an excellent composition of effective, resistant to decay Cement Concrete based on mixed casting and ionogenic chemical additives for subsurface structures has been proven.

2.For the first time, an additive with ionogenic properties (POLY–ANS) in cement concrete was applied to the polymer reagent stabilizing hydrolyzed (hydrolyzed stationary polyacrylonitrile), using combining agents (polymerizers) and modifiers, obtained by hydrolysis in an alkaline environment.

3.Casters mixed with IES ash and ionogenic chemical additives (POLY–ANS) with improved physical and technical characteristics and a porous structure have been developed, indicating that they have increased resistance to aggressive environments.

References:

[1]. Akramov, X., Davlyatov, S., Umarov, S., & Abobakirova, Z. (2023). Method of experimental research of concrete beams with fiberglass reinforcement for bending. In E3S Web of Conferences (Vol. 365, p. 02021). EDP Sciences

[2]. Goncharova, N., Abobakirova, Z., Davlyatov, S., Umarov, S., & Mukhamedzanov, A. (2023). Polymer reagent in construction practice. In E3S Web of Conferences (Vol. 365, p. 02024). EDP Sciences

[3]. Goncharova, N. I., Abobakirova, Z. A., & Mukhamedzanov, A. R. (2020, October). Capillary permeability of concrete in salt media in dry hot climate. In AIP Conference Proceedings (Vol. 2281, No. 1, p. 020028). AIP Publishing LLC.

[4]. Y Karimov, I Musaev, S Mirzababayeva, Z Abobakirova, S Umarov, Land use and land cover change dynamics of Uzbekistan: a review, E3S Web of Conferences 421, 03007,.

[5]. Abobakirova Z. A. Regulation Of The Resistance Of Cement Concrete With Polymer Additive And Activated Liquid Medium //The American Journal of Applied sciences. – 2021. – T. 3. – №. 04. – S. 172-177.

[6]. Akhrarovich A. X., Mamajonovich M. Y., Abdugofurovich U. S. Development Of Deformations In The Reinforcement Of Beams With Composite Reinforcement //The American Journal of Applied sciences. – 2021. – T. 3. – №. 5. – S. 196-202.

[7]. Goncharova N. I., Abobakirova Z. A., Kimsanov Z. Technological Features of Magnetic Activation of Cement Paste" Advanced Research in Science //Engineering and Technology. – 2019. – T. 6. – №. 5.

[8]. Kimsanov Z. O., Goncharova N. I., Abobakirova Z. A. Izuchenie texnologicheskix

faktorov magnitnoy aktivatsii tsementnogo testa //Molodoy uchenыy. – 2019. – №. 23. – S. 105-106.
[9].Goncharova N. I., Abobakirova Z. A. RECEPTION MIXED KNITTING WITH MICROADDITIVE AND GELPOLIMER THE ADDITIVE //Scientific-technical journal. – 2021. – T. 4. – №. 2. – S. 87-91
[10].Goncharova N. I., Abobakirova Z. A., Mukhamedzanov A. R. Capillary permeability of concrete in salt media in dry hot climate //AIP Conference Proceedings. – AIP Publishing LLC, 2020. – T. 2281. – №. 1. – S. 020028.
[11].Umarov, S. A. (2021). Development of deformations in the reinforcement of beams with composite reinforcement. Asian Journal of Multidimensional Research, 10(9), 511-517.
[12].Умаров, Ш. А. (2021). Исследование Деформационного Состояния Композиционных Арматурных Балок. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 60-64.
[13]. Abdugofurovich, U. S. (2022). BONDING OF POLYMER COMPOSITE REINFORCEMENT WITH CEMENT CONCRETE. Gospodarka i Innowacje., 24, 457-464.
[14]. Абдуллаев, И. Н., Умирзаков, З. А., & Умаров, Ш. А. (2021). Анализ Тканей В Фильтрах Систем Пылегазоочистки Цементного Производства. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 16-22.
[15]. Davlyatov, S. M., & Kimsanov, B. I. U. (2021). Prospects For Application Of Non-Metal Composite Valves As Working Without Stress In Compressed Elements. The American Journal of Interdisciplinary Innovations Research, 3(09), 16-23.
[16]. Умаров, Ш. А., Мирзабабаева, С. М., & Абобакирова, З. А. (2021). Бетон Тўсинларда Шиша Толали Арматураларни Қўллаш Орқали Мустаҳкамлик Ва Бузилиш Ҳолатлари Аниқлаш. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 56-59.
[17].Тошпулатов, С. У., & Умаров, Ш. А. (2021). ИНСТРУМЕНТАЛЬНО-УЧЕБНО-ДИНАМИЧЕСКИЕ ХАРАКТЕРИСТИКИ СРЕДНЕЙ ШКОЛЫ И КОНСТРУКТИВНЫЕ РЕШЕНИЯ СРЕДНЕЙ ШКОЛЫ№ 2 Г. ФЕРГАНЫ. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 10-15.
[18]. Mamazhonovich, M. Y., Abdugofurovich, U. S., & Mirzaakbarovna, M. S. (2021). The Development of Deformation in Concrete and Reinforcement in Concrete Beams Reinforced with Fiberglass Reinforcement. Middle European Scientific Bulletin, 18, 384-391.
[19]. Набиев, М. Н., Насриддинов, Х. Ш., & Кодиров, Г. М. (2021). Влияние Водорастворимых Солей На Эксплуатационные Свойства Наружные Стен. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 44-47.
[20]. Hasanboy o'g'li, A. A. (2022). Stress Deformation of Flexible Beams with Composite Reinforcement under Load. American Journal of Social and Humanitarian Research, 3(6), 247-254.

[21]. угли Ахмадалиев, А. Х., & угли Халимов, А. О. (2022, May). КОМПОЗИТНОЕ УСИЛЕНИЕ ИЗГИБАЮЩИЙ БАЛК ПОД НАГРУЗКОЙ. In INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING (Vol. 1, No. 7, pp. 409-415).
[22].Сон, Д. О., & Халимов, А. О. (2021). УПРАВЛЕНИЕ МЕТРОЛОГИЧЕСКИМИ РИСКАМИ КАК ОСНОВА ДЛЯ УВЕЛИЧЕНИЯ КАЧЕСТВА ПРОДУКЦИИ. Экономика и социум, (2-2), 202-210.
[23]. Бахромов, М. М. (2020). Исследование сил негативного трения оттаивающих грунтов в полевых условиях. Молодой ученый, (38), 24-34.
[24]. Бахромов, М. М., & Раҳманов, У. Ж. (2020). Проблемы строительства на просадочных лессовых и слабых грунтах и их решение. Интернаука, (37-1), 5-7.
[25]. Mirzaeva, Z. A. (2021). Improvement of technology technology manufacturing wood, wood with sulfur solution. Asian Journal of Multidimensional Research, 10(9), 549-555.
[26]. Мирзаева, З. А. К., & Рахмонов, У. Ж. (2018). Пути развития инженерного образования в Узбекистане. Достижения науки и образования, 2(8 (30)), 18-19.
[27].Абобакирова, З. А., & кизи Мирзаева, З. А. (2022, April). СЕЙСМИК ҲУДУДЛАРДА БИНОЛАРНИ ЭКСПЛУАТАЦИЯ ҚИЛИШНИНГ ЎЗИГА ХОС ХУСУСИЯТЛАРИ. In INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING (Vol. 1, No. 6, pp. 147-151).
[28]. Махмудов, З. Б. (2023). СПОСОБ УСИЛЕНИЯ МОНОЛИТНОЙ ЖЕЛЕЗОБЕТОННОЙ РАМЫ КАРКАСА ПРОИЗВОДСТВЕННОГО ЗДАНИЯ. Ломоносовские научные чтения студентов, аспирантов и молодых ученых–2023, 435.
[29]. Mirzababaeva, S. M. (2022). SOLUTIONS OF WOOD STRUCTURED BUILDINGS IN THE CONSTRUCTION OF THE SMART CITY. Journal of Integrated Education and Research, 1(5), 390-395.