Spectrum Journal of Innovation, Reforms and Development

Volume 10, Dec., 2022	ISSN (E): 2751-1731

Website: www.sjird.journalspark.org

RESEARCH OF ASH-SLAG MIXTURES FOR PRODUCTION OF CONSTRUCTION MATERIALS

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Abstract.
The article deals with the use of ash-slag mixtures in the production of building materials, presents the results of studies to determine the physical and mechanical characteristics of solutions prepared from various compositions.

Keywords: Concrete, binder, cement, ash-slag mixtures, plasticizing additives, sulfite-yeast stillage, super-plasticizers.

Among industrial waste, one of the first places in terms of volumes is occupied by ash and slag from the combustion of solid fuels (coal of various types, oil shale, peat) at thermal power plants. Ash and slag waste (ASH) negatively affects the environment, their accumulation leads to contamination of groundwater and earth resources. It should be noted that the USA is not exported from the territory of the thermal power plant, they combine with the circulating waters to form hydropulps.

The territories allocated for the WHR become unsuitable for use in agriculture or for other purposes, become exclusion zones. To create waste zones (ash dumps) for ash-slag impurities (SFS) in TPPs operating on coal, the given costs, environmental payments, investment expenses make up 5-7% of the cost of generated electricity. In particular, for the creation of new ash dumps, the costs can amount to 2-4 billion rubles, for the construction of fencing dams more than 1 billion rubles, and these costs are borne by consumers of energy and heat.In this regard, ensuring the environmental safety of the TPP is the disposal of the SPC.

In most developed countries, much attention is paid to the use of ZShP for the production of building materials: in Germany and Denmark about 100%, in the USA, Great Britain, Poland and in China about 50-70%. However, in the CIS countries, only 8-10% of SFS is recycled and used in the production of building materials. In the goods market, the main consumers of ZCO are the construction industry and the construction materials industry. The use of SPZhP reduces the cost of construction materials (cement, dry building mixtures, concrete, mortar, etc.) by at least 15-30%.

Of the greatest interest are technologies for the use of sol-slag waste in the following industries [1]:

• in the production of Portland cement (as active silica additives) in the amount of 10 15 percent, in the production of pozzolan Portland cement brands 300 400 - up to 30 40 percent (gold Portland cement);

• in the manufacture of mortars - as an active additive in the amount of 10 30 percent of the weight of cement, when using high-grade Portland cement in mortars (400 500), the use of dust ash can reduce its consumption by up to 30 percent;

• as an active microfill in heavy concretes, which reduces cement consumption from 6 10 percent in normal hardening concretes to 12 25 percent in steamable concretes;

• in the production of silicate bricks;

• in heat-resistant concretes - as filler instead of chamotte powder, which significantly reduces the cost of such concretes;

• in the manufacture of ash and agloporite gravel;

• in the production of fine-grained aerated ash concrete and products based on it, as a fine fraction of light concretes on porous aggregates of dense and porous structure;

• as raw materials for the road industry;

• use of sol-slag waste with increased content of unburned fuel particles in clay brick production, which not only improves its quality, but also reduces the consumption of process fuel for firing.

In the production of concrete mixtures and mortars, fly ash and ash-slag material can be used as a mineral additive that partially replaces cement, as well as for partial or complete replacement of fine aggregate. The most effective use of fly ash in low-grade concretes (up to B20), in particular in concretes used for construction of dams, foundations, foundations. The amount of ash introduced ranges from 30 to 90 kg per 1 m3 of concrete mixture.

The quality of fly ash used in concretes and mortars shall comply with the requirements of GOST 25818-91 and sol-slag material - GOST 25592-91.
GOST 25818-91 applies to fly ash, which is used as a component for the manufacture of heavy, light, cellular concretes and mortars, as well as as a finely ground additive for heat-resistant concretes and mineral binders for the preparation of mixtures and soils in road construction.
For the manufacture of heavy and light concretes, fly ash mortars are used to reduce the consumption of cement and aggregates, improve the technological properties of concrete and mortar mixtures, and improve the quality of concretes and mortars [2].
The insufficient use of SPZhP is explained by their drawbacks - an increased content of evils (up to 53%), porosity (up to 1600 m2/kg), increased water consumption, leading to a decrease in the strength of construction materials and products based on them.
It should be noted that the joint grinding of cement clinker and SSA leads not only to a decrease in the cement fraction, but also to an increase in their specific surface area, which increases the interaction of cement particles with water. However, grinding of mixtures reduces the efficiency of production, as well as the use of SOH in concrete mixtures leads to an increase in water demand, which leads to a decrease in the strength of concretes.
At the Department of Construction Materials and Products of the Namangan Civil Engineering Institute, research work is carried out to obtain construction materials based on sol-slag impurities.
For this purpose, samples of size 70x70x70 mm were prepared from various components. The additives used are Jalilov-SDzh-3 superplasticizer [4]. The water-cement ratio is 0.5. The standard used is Portland cement of grade 400 (without additives). After 28-day hardening under normal conditions, the samples were tested under laboratory conditions to determine physical and mechanical characteristics. The research uses the results of scientific works by V.S. Prokopets [5].
Table 2 shows the results of studies to determine the physical and mechanical characteristics of solutions prepared from various compositions.

Table - 2. Physical and mechanical characteristics of samples

№ structure	Content of components in binder, %				Density, g/sm^3	Setting time, beginning - end, min. - hour.	Ultimate strength after 28-day hardening, MPa	
	cement (M400)	ashes	slag	additives			When compressed	Bending tension
1	100	-	-		3,1	45 - 10	40,2	6,2
2	70	30	-		3,2	50 - 11	34,8	3,2
3	27	40	30	3	3,04	52 - 11	39,5	6,4
4	36	40	20	4	3,05	53 - 13	40,7	6,5
5	47	29	19	5	3,07	55 - 14	41,5	6,6

It can be seen from the table that when only ash (2 composition) is added to the solution mixture, its strength is reduced.
When ash, slag and additives are added to the solution mixture (5-composition) - Jalilov-SJ-3 superplasticizer, the sample parameters are higher (compared to 1 composition). Promising directions for reducing the water porosity of mixtures are the use of plasticizing additives and

nanomodifiers (carbon astralenes, fullerones and nanotubes, metal oxides, lime, nanoparticles, etc.).

Introduction of plasticizing additives and nanomodifiers into concrete composition improves their physical and mechanical characteristics, increases strength and value of modulus of elasticity, water resistance, and frost resistance, reduces values of limit deformation of shrinkage [6]. The use of nanomodifiers to improve the properties of concretes based on ash and slag mixtures opens up wide possibilities for purposeful control of the economic, technological and physical-mechanical properties of concretes.

Conclusion

The use of sol-slag impurities (SOL) in the production of building materials is currently very relevant both from an economic and environmental point of view. Cement mortars on ash and slag waste have sufficient strength and can be used to prepare concretes.

An integrated approach to the processing of sol-slag waste can have a great economic effect. To do this, it is necessary to develop industrial technologies for the use of sol-slag waste, as well as develop a set of marketing measures to promote products based on ZCO. It is necessary to comprehensively study the market for building materials (manufacturers, their capabilities and desire to use sol - slag waste in their production), as well as find and establish contacts with potential consumers of the new product.

REFERENCES

1. Fathulloev A.M., Eshev S.S., Samiev L.N., Ahmedov I.G'., Jumaboyev X., Arifjanov S. Boglanmagan gruntlardan tashkil topgan uzanlarda yuvilmaslik tezliklarini aniklash [To the determination of non-effective speed in the beds containing from unconnected soils] //Journal "Irrigatsiya va melioratsiya". Tashkent. – 2019. – C. 27-32.
2. Arifjanov A., Akmalov Sh., Akhmedov I., Atakulov D. Evaluation of deformation procedure in waterbed of rivers //IOP Conference Series: Earth and Environmental Science. – IOP Publishing, 2019. – T. 403. – №. 1. – C. 012155.
3. Arifjanov A., Samiyev L., Akhmedov I., Atakulov D. Innovative Technologies In The Assessment Of Accumulation And Erosion Processes In The Channels //Turkish Journal of Computer and Mathematics Education (TURCOMAT). – 2021. – T. 12. – №. 4. – Pp. 110-114.
4. Axmedov I.G'., Muxitdinov M., Umarov I., Ibragimova Z. Assessment of the effect of sedibles from sokhsoy river to kokand hydroelectric power station //InterConf. – 2020.
5. Arifjanov A.M., Ibragimova Z.I., Axmedov I.G'. Analysis Of Natural Field Research In The Assessment Of Processes In The Foothills The American Journal of Applied sciences. – 2020. – T. 2. – №. 09. – Pp. 293-298.
6. Арифжанов А.М., Самиев, Л.Н., Абдураимова, Д.А., Ахмедов, И.Г. Ирригационное значение речных наносов [Irrigation value of river sediments] //Актуальные проблемы гуманитарных и естественных наук. – 2013. – №. 6.
7. Ахмедов И.Ғ., Ортиқов И.А., Умаров И.И. Дарё ўзанидаги деформацион жараёнлаарни баҳолашда инновацион технологиялар [Innovative technologies in the

assessment of deformation processes in the riverbed] // Фарғона политехника институти илмий-техника журнали. – Фарғона. – 2021. – Т.25, №.1. – С. 139-142.
8. Axmedov I.G'., Ortiqov I.A., Umarov I.I. Effects of water flow on the erosion processes in the channel of GIS technology // https://doi.org/10.5281/zenodo.5819579
9. Tadjiboyev S., Qurbonov X., Akhmedov I., Voxidova U., Babajanov F., Tursunova E., Xodjakulova D. Selection of Electric Motors Power for Lifting a Flat Survey in Hydraulic Structures // AIP Conference Proceedings 2432, 030114 (2022); https://doi.org/10.1063/5.0089643
10. Abduraimova D., Rakhmonov R., Akhmedov I., Xoshimov S., Eshmatova B. Efficiency of use of resource-saving technology in reducing irrigation erosion // AIP Conference Proceedings 2432, 040001 (2022); https://doi.org/10.1063/5.0089645
11. Холмирзаев С. А., Комилова Н. Х. Влияние сухого жаркого климата на ширину раскрытия трещин внецентренно-сжатых железобетонных элементов //Приволжский научный вестник. – 2015. – №. 4-1 (44).
12. Холмирзаев С. А. Температурные изменения в керамзитобетонных колоннах в условиях сухого жаркого климата //Журнал «Бетон и железобетон. – 2001. – №. 2.
13. Мусина К. Х., Холмирзаев А. А. Влияние гексахлорциклогексана на внешнесекреторную функцию поджелудочной железы //Ответственный редактор. – 2014. – С. 437.
14. Хамидов А. И. и др. Использование теплоизоляционного композиционного гипса в энергоэффективном строительстве. – 2021.
15. Хамидов А. И., Нуманова С. Э., Жураев Д. П. У. Прочность бетона на основе безобжиговых щёлочных вяжущих, твердеющего в условиях сухого и жаркого климата //Символ науки. – 2016. – №. 1-2. – С. 107-109.
16. Нуманова С. Э. Хамидов Адхамжон Иномжонович //ISSN 2410-700Х. – С. 107.
17. Хамидов А. И., Ахмедов И., Кузибаев Ш. Теплоизоляционные материалы на основе гипса и отходов сельского хозяйства. – 2020.
18. Хамидов А. И. Использование теплоизоляционных материалов для крыш в энергоэффективном строительстве //Научно–технический журнал ФерПИ. Спец. – №. 2018.
19. Хамидов А. И., Мухитдинов М. Б., Юсупов Ш. Р. Физико-механические свойства бетона на основе безобжиговых щелочных вяжущих, твердеющих в условиях сухого и жаркого климата. – 2020.
20. Kodirova F. M., Negmatov U. Algorithms For Stable Estimation Of The Extended State Vector Of Controlled Objects //Solid State Technology. – 2020. – Т. 63. – №. 6. – С. 14903-14909.
21. Кодиров Д. Т., Кодирова Ф. М. Алгоритмы совместного оценивания вектора состояния и параметров динамических систем //Universum: технические науки. – 2021. – №. 7-1 (88). – С. 66-68.
22. Кодиров Д. Т., Кодирова Ф. М. Перспективные энергоносители будущего //Вестник Науки и Творчества. – 2020. – №. 5 (53). – С. 50-53.

23. Кодирова Ф. М. Получение кондиционных углеводородов переработкой пироконденсата и подземной газификацией угля компаундированием //Вестник Науки и Творчества. – 2017. – №. 7 (19). – С. 15-18.
24. Нуманова С. Э. Хамидов Адхамжон Иномжонович //ISSN 2410-700X. – С. 107.
25. Yuvmitov A., Hakimov S. R. Influence of seismic isolation on the stress-strain state of buildings //Acta of Turin Polytechnic University in Tashkent. – 2021. – Т. 11. – №. 1. – С. 71-79.
26. Ювмитов А., Хакимов С. Исследование влияния сейсмоизоляции на динамические характеристики ЗДАНИЯ //Acta of Turin Polytechnic University in Tashkent. – 2020. – Т. 10. – №. 2. – С. 14.
27. Abdunazarov A., Soliev N. tudy of the performance of frameless construction structures under the influence of vertical stresses of ultra-submerged the lyoss soils //Студенческий вестник. – 2020. – Т. 28. – №. 126 часть 3. – С. 39.
28. Umarov, S. A. (2021). Development of deformations in the reinforcement of beams with composite reinforcement. Asian Journal of Multidimensional Research, 10(9), 511-517.
29. Умаров, Ш. А. (2021). Исследование Деформационного Состояния Композиционных Арматурных Балок. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 60-64.
30. Abdugofurovich, U. S. (2022). BONDING OF POLYMER COMPOSITE REINFORCEMENT WITH CEMENT CONCRETE. Gospodarka i Innowacje., 24, 457-464.
31. 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.
32. 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.
33. 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.
34. 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.
35. 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.
36. 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.

37. 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.
38. 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.
39. 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).
40. Сон, Д. О., & Халимов, А. О. (2021). УПРАВЛЕНИЕ МЕТРОЛОГИЧЕСКИМИ РИСКАМИ КАК ОСНОВА ДЛЯ УВЕЛИЧЕНИЯ КАЧЕСТВА ПРОДУКЦИИ. Экономика и социум, (2-2), 202-210.
41. Бахромов, М. М. (2020). Исследование сил негативного трения оттаивающих грунтов в полевых условиях. Молодой ученый, (38), 24-34.
42. Бахромов, М. М., & Раҳманов, У. Ж. (2020). Проблемы строительства на просадочных лессовых и слабых грунтах и их решение. Интернаука, (37-1), 5-7.
43. Mirzaeva, Z. A. (2021). Improvement of technology technology manufacturing wood, wood with sulfur solution. Asian Journal of Multidimensional Research, 10(9), 549-555.
44. Мирзаева, З. А. К., & Рахмонов, У. Ж. (2018). Пути развития инженерного образования в Узбекистане. Достижения науки и образования, 2(8 (30)), 18-19.
45. Abdullayev, I., & Umirzakov, Z. (2020). Optimization of bag filter designs (on the example of cement plants in the fergana region of the republic of Uzbekistan). Збірник наукових праць ΛΌГOΣ, 31-34.
46. Abdullayev, I. N., & Umirzakov, Z. A. (2021). Efficiency of Fabric in The Systems of Dust and Gas Cleaning of Cement Production.
47. 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).