ҚАЗАҚСТАН РЕСПУБЛИКАСЫ ҒЫЛЫМ ЖӘНЕ ЖОҒАРЫ БІЛІМ МИНИСТРЛІГІ

«Л.Н. ГУМИЛЕВ АТЫНДАҒЫ ЕУРАЗИЯ ҰЛТТЫҚ УНИВЕРСИТЕТІ» КЕАҚ

Студенттер мен жас ғалымдардың
«ǴYLYM JÁNE BILIM - 2023»
XVIII Халықаралық ғылыми конференциясының
БАЯНДАМАЛАР ЖИНАҒЫ

СБОРНИК МАТЕРИАЛОВ
XVIII Международной научной конференции
студентов и молодых ученых
«ǴYLYM JÁNE BILIM - 2023»

PROCEEDINGS
of the XVIII International Scientific Conference
for students and young scholars
«ǴYLYM JÁNE BILIM - 2023»

2023
Астана

УДК 001+37
ББК 72+74
G99

«ǴYLYM JÁNE BILIM – 2023» студенттер мен жас ғалымдардың XVIII Халықаралық ғылыми конференциясы = XVIII Международная научная конференция студентов и молодых ученых «ǴYLYM JÁNE BILIM – 2023» = The XVIII International Scientific Conference for students and young scholars «ǴYLYM JÁNE BILIM – 2023». – Астана: – 6865 б. - қазақша, орысша, ағылшынша.

ISBN 978-601-337-871-8

Жинаққа студенттердің, магистранттардың, докоранттардың және жас ғалымдардың жаратылыстану-техникалық және гуманитарлық ғылымдардың өзекті мәселелері бойынша баяндамалары енгізілген.

The proceedings are the papers of students, undergraduates, doctoral students and young researchers on topical issues of natural and technical sciences and humanities.

В сборник вошли доклады студентов, магистрантов, докторантов и молодых ученых по актуальным вопросам естественно-технических и гуманитарных наук.

УДК 001+37
ББК 72+74

ISBN 978-601-337-871-8

UDC 691

REVIEW ARTICLE ON PRODUCTION OF CONCRETE FROM WASTE ALUMINUM OF KAZAKHSTAN JSC

Absalamov Nurislam Maratuly
absnuris@gmail.com
MA student at L.N. Gumilev Eurasian National University, Astana, Kazakhstan
Supervisor - Zhumagulova A.A.

The growing concern for environmental sustainability is forcing researchers to explore innovative ways to use industrial waste in a variety of industries. One such study, on the production of concrete from the production waste of Aluminum of Kazakhstan JSC, highlights the potential environmental and economic benefits of using aluminum waste in the construction industry.

The article presents a well-structured research methodology, including laboratory tests to determine the physical and mechanical properties of concrete mixtures using aluminum waste. The results show that the proposed concrete mixtures have satisfactory strength and durability, making them a viable alternative to conventional concrete.

One of the key aspects of this study is its emphasis on the environmental impact of waste use. The authors argue that by reusing waste to produce concrete, the consumption of natural resources can be reduced and the ecological footprint of the construction industry can be reduced. This approach is in line with the principles of circular economy, where waste is turned into valuable resources, contributing to sustainable development.

Moreover, the use of aluminum waste in concrete production can have significant economic benefits. The cost of raw materials can be reduced and waste disposal costs for aluminum producers can be reduced. This approach could also create new market opportunities for waste-derived products, which would contribute to the overall economy.

This article discusses a study on the production of concrete using industrial waste from the aluminum production process. The study aims to solve environmental problems and reduce landfill pressure by using waste in the construction industry. The article discusses the chemical composition of the waste, the preparation process, and the properties of the resulting concrete. The results show that the use of aluminum waste in the production of concrete can improve its properties and contribute to solving the problem of waste disposal.

The article arrived at its results by conducting a study on the production of concrete using industrial waste from the aluminum production process. The chemical composition of the waste was analyzed, and a preparation process was developed to produce concrete with the desired properties. The resulting concrete was then tested to evaluate its properties, which showed an improvement in performance over traditional concrete mixes.

According to the author of the article from the Pavlodar region, one of these wastes is sludge from alumina production. In addition to the existing problems of waste storage (dust formation, impact on groundwater), there is a problem of preparing new sludge reservoirs, which in principle are land suitable for agricultural activities and are pressing issues. In the production of aluminum, bauxite is used as the main raw material, resulting in a large amount of waste in the form of aqueous suspension of dispersed particles - sludge. From 1 ton of alumina comes about 4 tons of sludge. Bauxite sludge is characterized by a high content of iron and aluminum oxides. Nepheline, bauxite, sulfate, white and monocalcium slimes are of industrial importance for the production of construction materials. Since aluminum smelters use bauxite, bauxite sludge is a waste product. A preliminary analysis of the chemical composition of sludge allows us to draw conclusions about the convenience of their processing by extracting iron contained in them in the form of oxides. As shown by scientific research, red mud can be used as: iron ore agglomeration, pelletizing, an additive in blast

furnace smelting, raw materials in the production of cast iron, for refining cast iron and steel, slag-forming agents, clays in the production of partially exchangeable forms. , additives in the production of cement and ceramics, additives in the production of building bricks and refractories, as the basis of mineral fertilizers [2]

They also pointed out that the advantages of bauxite-based binders over cement or cement-concrete (cement-mineral mixtures) are the lack of rapid hardening and slow curing process, if the time between preparation and its compaction as a rule should not exceed 4 - 6 hours, otherwise the quality of the layers laid will sharply deteriorate, and when using slurry binders this time can be up to 3 days. This allows for longer interchangeable grippers, a wider operating range, increased productivity, and adverse effects on the final strength of the material due to equipment failures and unexpected stoppages in process schedules due to delays in mixing. In this project, the task was to determine the possibility of using the waste products of the Pavlodar Aluminum Plant, namely sludge in the production of building materials. For this purpose, it was named after the laboratory of Pavlodar State University. Toraigyrov was conducted an experiment to select and determine the composition of samples of building materials. Selection of the composition of construction materials was made experimentally on the basis of research data from Novosibirsk State Technical University. [1]

Figure 1- Concrete samples

The main conditions for consistently good quality: 1 The quality of raw materials. The higher the quality of raw materials, the higher the quality of the finished product. Cement must be fresh and not in "lying" condition (for 1 month of storage cement loses up to 10% of strength, i.e. grade 400D20 is stored for 1 month, after this period its grade drops to 360, and in a month it falls to 320, even to zero). The sand should be as fine as possible and have a minimum content of silt and clay. 2 Stable supply of raw materials. The properties of the components used should not vary from batch to batch. A change in any component entails an adjustment of the mixture. For example, different cement manufacturers may have very different water requirements. A change of cement supplier may change the amount of water used in the mixture by up to 20%, which will affect the level and intensity of lift of the mixture, which in turn will affect the quality of the final product. 3 Stability of production conditions. A great influence on the strength of the mixture rise and the uniformity of strength gain in the array have a temperature of raw materials (mainly water) and the temperature in the shop. Ignoring this point often leads to the following errors: First, the water temperature varies from batch to batch, resulting in uneven rise of the mixture. As a result, each batch rises to a different level, resulting in blocks with different densities at the output, and arrays that do not rise to the board level are considered defective. Secondly, the low temperature in the workshop leads to a rapid cooling of the array surface, which significantly slows down the curing reaction in those areas. As a result, we get the following - when the surface of the array reaches the necessary strength to be able to remove the sides, at this point it is impossible in principle to cut the interior of the array into blocks, which will

give you power. Making non-autoclave concrete blocks consists of the following basic technological steps: Preparation of concrete mortar, pouring the mortar into the mold. Cutting concrete blocks, heat treatment, splitting arrays into individual blocks. [1]

At the end they came:

Марка бетона и их прочность

Марка образца	Предел прочности, МПа	Класс бетона по прочности на сжатие	Ближайшая марка бетона по прочности, М
SH0040	65,5	B50	M600
SH1035	63,78	B50	M600
SH2030	52,65	B40	M550
SH3025	48,4	B35	M450
SH4020	32,3	B25	M350
SH5015	18,27	B15	M200

One of the strengths of the article is its emphasis on the environmental impact of waste disposal. The authors emphasize the importance of reducing industrial waste and its negative impact on the environment. The authors argue that by reusing waste for concrete production, it is possible to reduce the consumption of natural resources and reduce the ecological footprint of the construction industry.

The article also emphasizes the economic benefits of using waste in concrete production. By replacing traditional raw materials with industrial waste, production costs can be reduced, making the process more cost-effective and sustainable. This approach not only helps companies save money, but also promotes a circular economy where waste is turned into valuable resources.

The article also discusses the technical aspects of using aluminum waste in concrete production. It presents a comprehensive analysis of the chemical composition of the waste, as well as optimal proportions to create concrete mixtures with the desired properties. The authors present a detailed comparison of the characteristics of conventional concrete and concrete produced with waste materials, highlighting the similarities and differences in the characteristics of.

In addition, the article discusses the potential problems and limitations of the proposed approach. For example, it recognizes the need for further research into the long-term behavior of concrete made from aluminum waste, as well as the possible influence of various environmental factors on its durability. The authors also suggest that the implementation of this waste recycling method may require changes to existing production processes and equipment, which may entail additional investment.

Despite these challenges, the article emphasizes the importance of finding innovative solutions to recycle industrial waste and promote sustainable development. By showing the potential of aluminum waste as a valuable resource for concrete production, the authors contribute to a growing body of research on alternative building materials and waste management strategies. They also encourage the construction industry to adopt greener practices and find new ways to reduce waste generation and resource consumption.

In addition, the article's findings have broader implications for other industries that generate similar waste. By demonstrating the feasibility and benefits of recycling industrial waste in concrete production, the study opens the door to applying these methods to other industries, contributing to a more sustainable and circular economy.

Overall, the article is a valuable contribution to the field of sustainable construction, waste management and environmental engineering. It presents a well-researched and

compelling case for the use of industrial aluminum waste in concrete production, showing the potential environmental and economic benefits. The study also highlights the importance of continued research and innovation in developing sustainable solutions for waste management and resource use.

In conclusion, the article makes a compelling case for the use of industrial aluminum industry waste in concrete production. The research is well done and the results demonstrate the potential for both environmental and economic benefits. This study makes a valuable contribution to the field of sustainable construction and waste management, encouraging further research and implementation of industrial waste recycling techniques.

List of references

1. A. J. Kasenov, A. K. Tleulesov, A. N. Akhmetbek. Production of Concrete from Waste of JSC "Aluminium of KAZAKHSTAN"
2. Akhmetbek, A. N., Kasenov, A. J. The possibility of using red bauxite sludge in construction // Education and Science without Borders. - 2017.VOL. 12. - P. 64-67.
3. Dvorkin, L. I., Dvorkin, O. L. Construction materials from industrial waste // Training and reference manual. - Rostov-on-Don : Phoenix. - 2007. - 368 с.
4. Kudryshova, B. C., Stanevich, V. T. Production of construction materials based on industrial waste as an environmental dominant of modern economic development // Science and Technology of Kazakhstan. - 2014. - № 1-2. - С. 65-68.

УДК 691.3

ОЦЕНКА ОПТИМАЛЬНОГО СОСТАВА МОДИФИЦИРУЮЩЕЙ ДОБАВКИ ДЛЯ ТЯЖЕЛОГО БЕТОНА

Алтынбекова Алия Досжанкызы
kleo-14@mail.ru
Докторант PhD кафедры Технологии промышленного и гражданского строительства,
ЕНУ им. Л.Н. Гумилева, Астана, Казахстан
Научный руководитель – Р. Лукпанов

Введение

Улучшение качества бетонных составов может быть достигнуто как за счет применения химических добавок, так и при использовании местных компонентов для создания бетона нового поколения, что является весьма актуальной задачей технологии бетона. Бетон нового поколения - это высокотехнологичные, высококачественные, многокомпонентные бетонные смеси и составы с добавками, сохраняющие требуемые свойства при эксплуатации во всех условиях работы. Рост многокомпонентных бетонов обусловлен значительными системными эффектами, что позволяет управлять формированием структуры на всех этапах технологии, обеспечивая получение композитов «направленного» качества, состава, структуры и свойств [1].

Современный цементный бетон - это композиционный строительный материал, который можно получить с заданными характеристиками для определенных условий эксплуатации путем модификации его структуры и свойств различными добавками [2]. Это обеспечивает материалу долговечность, эксплуатационную надежность, экологическую безопасность и применимость в любых условиях эксплуатации [3, 4].

Современные экономические ограничения требуют ускорения темпов работ в строительной отрасли. Во многих ситуациях очень важна потребность в бетоне с