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OLIY TA’LIM, FAN VA INNOVATSIYALAR VAZIRLIGI
ABU RAYHON BERUNIY NOMIDAGI URGANCH DAVLAT UNIVERSITETIDA 15-16-SENTABR

“QURILISH VA ARXITEKTURA SOHASIDAGI INNOVATSION G‘OYALAR, INTEGRATSIYA VA TEJAMKORLIK” MAVZUSIDAGI RESPUBLIKA MIQYOSIDAGI ILMIY VA ILMIY-TEXNIK KONFERENSIYA MATERIALLARI

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“INNOVATIVE IDEAS, INTEGRATION, AND ECONOMY IN THE FIELD OF CONSTRUCTION AND ARCHITECTURE” SCIENTIFIC AND PRACTICAL REPUBLICAN CONFERENCE

РЕСПУБЛИКАНСКАЯ НАУЧНО-ПРАКТИЧЕСКАЯ КОНФЕРЕНЦИЯ «ИННОВАЦИОННЫЕ ИДЕИ, ИНТЕГРАЦИЯ И ЭКОНОМИКА В ОБЛАСТИ СТРОИТЕЛЬСТВА И АРХИТЕКТУРЫ»

URGANCH-2025

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ILMIY-TEXNIK ANJUMAN DASTURIY QO‘MITASI:

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Abu Rayhon Beruniy nomidagi Urganch davlat universitetida 2025 yil 15-16-sentabr kunlari “Qurilish va arxitektura sohasidagi innovatsion g‘oyalar, integratsiya va tejamkorlik” mavzusidagi respublika miqyosidagi ilmiy va ilmiy-texnik konferensiya materiallari kiritilgan.

To‘plamga kiritilgan maqolalar mazmuni, ilmiy salohiyati va keltirilgan dalillarning haqqoniyligi uchun mualliflar mas’uldirlar.

	mumkin.		

EKOBETON: ECOLOGICAL AND SUSTAINABLE CONSTRUCTION MATERIALS BASED ON RECYCLED WASTE

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Annotatsiya

Maqolada beton sanoatida chiqindilardan foydalanish masalasi va ularning ekologik xavfsizligi tahlil qilingan. Chiqindilarni beton tarkibiga qo'shish usullari, ularning afzalliklari, sifat nazorati va ekologik jihatlari yoritilgan. Ushbu yondashuv atrof-muhitni muhofaza qilish va iqtisodiy samaradorlikni oshirishga xizmat qiladi. Mualliflar ilmiy izlanishlarni kengaytirish va me'yoriy bazani takomillashtirish zaruratini ta'kidlagan.

Kalit so`zlar

ekobeton, ekologik xavfsizlik, barqaror qurilish materiallari, shisha chiqindilari, plastik chiqindilar, eski shinalar, metall parchalari, keramika chiqindilari, po'lat shlaklari, aylanma iqtisodiyot, betonning elastikligi, kimyoviy analizlar, toksikologik test, standartlashtirish, sertifikatlash tizimi.

Аннотация

В статье проанализированы вопросы использования отходов в бетонной промышленности и их экологическая безопасность. Рассмотрены способы добавления отходов в состав бетона, их преимущества, контроль качества и экологические аспекты. Такой подход способствует охране окружающей среды и повышению экономической эффективности. Авторы подчеркивают необходимость расширения научных исследований и совершенствования нормативно-правовой базы.

Ключевые слова

экобетон, экологическая безопасность, устойчивые строительные материалы, стеклянные отходы, пластиковые отходы, изношенные шины, металлические фрагменты, керамические отходы, сталеплавильные шлаки, циркулярная экономика, эластичность бетона, химический анализ, токсикологическое тестирование, стандартизация, система сертификации.

Abstract

The article analyzes the use of waste materials in the concrete industry and their environmental safety. It examines methods of incorporating waste into concrete mixtures, their advantages, quality control, and ecological aspects. This approach contributes to environmental protection and improves economic efficiency. The authors emphasize the need to expand scientific research and improve the regulatory framework in this field.

Keywords

Eco-concrete, Environmental safety, Sustainable building materials, Glass waste, Plastic waste, Old tires, Metal scraps, Ceramic waste, Steel slag, Circular economy, Concrete elasticity, Chemical analyses, Toxicological tests, Standardization, Certification system.

The construction industry is one of the largest global consumers of natural resources. This sector requires vast amounts of raw materials, especially sand, gravel, and other aggregates. However, the volume of industrial and household waste is increasing annually. Waste such as glass, plastic, and used tires poses significant environmental threats. Therefore, the development and implementation of innovative approaches for the secondary utilization of waste materials is of critical importance.

The incorporation of waste materials into concrete presents a promising approach to reducing the environmental footprint of the construction industry while also improving economic efficiency. Below is a detailed analysis of various types of waste materials used in concrete production, including their benefits and limitations.

Glass waste, when crushed, can be used as a replacement for sand or aggregate. It enhances the decorative properties of concrete, improves strength, and supports the principles of a circular economy. Glass can increase the strength of fine-grained concrete; however, due to the risk of alkali-silica reactions and internal stress caused by uneven particles, its application requires careful control.

Plastic waste, particularly polyethylene terephthalate (PET), high-density polyethylene (HDPE), and low-density polyethylene (LDPE), is incorporated into concrete as small granules or fibers. These plastics improve the elasticity of concrete, are useful in the production of lightweight concrete, and contribute to better thermal insulation. Nonetheless, plastic additives may increase water absorption and reduce compressive strength, thus requiring specific usage conditions.

Used tires are processed into crumb rubber and added to concrete mixtures. These materials enhance the impact absorption of concrete, reduce noise and vibration, and are ideal for applications such as sports surfaces and road pavements. However, the low density of tire-derived rubber can reduce the weight of the concrete, and adhesion (bonding) issues may arise.

Metal fragments, ceramics, fly ash, and steel slags can improve the density and thermal stability of concrete. However, their environmental safety must be thoroughly evaluated, as some of these materials may pose health hazards.

The utilization of waste in concrete has both environmental and economic benefits. Firstly, recycling reduces the load on landfills, conserves natural resources, and lowers carbon dioxide (CO_2) emissions associated with concrete production. Additionally, the secondary use of waste materials fosters the development of a circular economy. However, strict quality control of waste is essential. Certain waste materials, such as microplastics, may pose health risks. Therefore, it is crucial to test and verify the safety of waste materials before their incorporation into concrete.

Extensive research is being conducted in countries such as India, China, the United States, and various European nations to develop lightweight, thermally insulated, and acoustic concrete types using recycled waste. In Uzbekistan, practical experience in this area remains limited. However, several universities and research institutes are beginning to explore this field. With a scientific and systematic approach, the efficiency and potential of this sector can be significantly improved.

Despite its promise, the use of waste in concrete production presents several challenges and controversial aspects. Issues such as reduced strength and inconsistent quality can be addressed through the use of supplementary admixtures or reinforcing fibers. These challenges underscore the need for standardization. To ensure environmental safety, chemical analyses and toxicological tests must be conducted.

In summary, the integration of waste materials into concrete production represents a forward-looking approach to environmental conservation and waste reduction. The successful implementation of this strategy requires a science-based

methodology, improvement of regulatory frameworks, and stronger collaboration between industry and academia.

Recommended measures include developing a standardized list of waste-based components for concrete, introducing tailored processing technologies for each type of waste, conducting experimental testing aligned with construction standards, and establishing a robust certification system.

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AVTOMOBIL YO‘LLARI ASOSLARINI QURISH UCHUN QURILISH CHIQINDILARI

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Qurilish sohasi iqtisodiyot uchun juda muhim bo‘lib, u nafaqat ko‘plab ish o‘rinlarini yaratadi, balki shaharlar va infratuzilmaning faol rivojlanishiga ham hissa qo‘shadi. Biroq, qurilishning o‘sishi bilan to‘g‘ri utilizatsiya qilish va qayta ishlash talab qilinadigan chiqindilar miqdorining ko‘payishi ham kuzatiladi. Chiqindilarni utilizatsiya qilishning eng samarali usuli ularni yangi materiallar ishlab chiqarishda foydalanish uchun qayta ishlashdir va bu yo‘nalish nafaqat yo‘l qurilishi sohasida, balki inson faoliyatining boshqa barcha sohalarida ham eng tez rivojlanayotgan yo‘nalishlardan biridir. Yo‘l qurilish-ta’mirlash ishlarini amalga oshirishda