

CHEREPAKHA D.V. (UKRAINE, VINNYTSIA)

COMPREHENSIVE USE OF INDUSTRIAL WASTE FROM THE VINNYTSIA REGION IN THE CONSTRUCTION INDUSTRY

Vinnitsia National Technical University

21021, Khmelnytsky highway, 95, Vinnytsia, Ukraine; cherepaha@i.ua

Abstract. В результаті проведеного дослідження можна стверджувати, використання промислових відходів у технології виробництва будівельних матеріалів дає змогу отримати нове ефективне золофосфатне в'язуче. Тому використання таких промислових відходів є економічно вигідним та доцільним рішенням.

The current state of the Ukrainian economy requires the immediate introduction of resource-saving technologies for the production of effective building materials. Ash-slag waste accumulated in the dumps of energy industry enterprises is one of the varieties of such raw materials for the production of building products. Hazardous waste from chemical industry enterprises has also not been widely used in the building materials industry [1-2].

In Ukraine, 7-9 million tons of fly ash and slag are produced annually. The main components of fly ash - SiO_2 , Al_2O_3 are mainly in the form of glassy phases, so they can be considered inert components [3-4]. The amount of SiO_2 , Al_2O_3 , Fe_2O_3 , CaO , MgO significantly affects the main physicochemical properties of fly ash.

Phosphogypsum waste is a by-product of the production of phosphoric acid by the extraction method. Depending on the temperature-concentration conditions of the decomposition of phosphate raw materials, the solid phase of calcium sulfate can be represented by one of three forms: dihydrate, hemihydrate or anhydrite.

By chemical composition, phosphogypsum waste can be attributed to gypsum raw materials, since they consist of 80-95% calcium sulfate. However, due to the peculiarities of their production, a number of negative properties occur: increased humidity, the presence of acidic residues, etc. [5-6].

The use of pre-activated fly ash as a filler in the composition of molding solutions is one of the promising ways of saving resources. The complex method of mechano-chemical activation of fly ash involves the destruction of its surface vitreous shell by using acidic residues [7-8]. The use of mechanical mixing of ash-phosphogypsum mixtures in a specially designed continuous mixer will contribute to a more complete destruction of the vitreous shells of fly ash [9].

References

1. Glovyn, N., et al. Technical, agricultural and physical sciences as the main sciences of human development. International Science Group, 2024.
2. Березюк, О. В., В. П. Ковальський. "Будівельні вироби з механо-активованих промислових, побутових відходів." (2023).
3. Lemeshev, M., "Preparation of industrial waste for use in the construction industry." Technical, agricultural and physical sciences as the main sciences of human development: collective monograph. Chap. 2.4: 83-91. (2024).
4. Березюк, О. В. (2023). Поширеність переробки золи при виготовленні будівельних матеріалів. Сучасні технології, матеріали і конструкції в будівництві, 35(2), 56-61
5. Lemeshev, M., et al. "Composite radiation-shielding concrete for special purposes." The development of technical, agricultural and applied sciences as the main factor in improving life. 2.2: 52-61. (2024).
6. Черпаха, Д. В., Комплексне використання металургійних шлаків для отримання жаростійких бетонів. БНТУ, 2025.
7. Lemeshev, M., "Perspectives on the use of technogenic raw materials in the production of low-clinker composite binders." Technical, agricultural and applied sciences as mechanisms for the development of human self-knowledge: collective monograph. Chap. 1.3: 30-39. (2024).
8. Kazachiner O., Boychuk Y. Theoretical and scientific foundations of pedagogy and education. International Science Group, 2022. – 476 p.
9. Stadnychuk, M., Composite materials based on man-made waste. БНТУ, 2021.