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INFLUENCE OF PLASTICIZING ADDITIVES ON THE RHEOLOGICAL PROPERTIES OF LEGO BRICK MORTAR

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Abstract: In *this article, constructive in its strength, has been based on Lego bricks, service equipment, and usage processes. The analysis was carried out independently with special features, and asbestos cement and microsilica waste were used instead of stone.*

Keywords: *Microsilica, _ stone, asbestos cement, cement, earthquake, wall, construction materials, earth, lego brick, construction, statics, dynamics, loads brick wall, stone wall, wood the wall*

Introduction

One of the factors determining the physical and mechanical properties of concrete used in the production of Lego bricks is the water-cement ratio (W/C). Reducing this indicator allows increasing the strength and durability of concrete. This can be achieved by introducing plasticizing additives into the concrete mixture, which reduces water demand without reducing its workability.

Today, the introduction of additives is one of the most flexible universal ways to improve all the properties of concrete mixtures. At the same time, by introducing a plasticizing additive, it is possible to reduce the water demand of concrete and thereby reduce the influence of elastic deformation.

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Experts predict that in the coming years, the share of concrete with additives in our country will be more than 50%. In this case, plasticizers, complexes, and frost-resistant additives predominate.

In recent years, research on the use of highly effective plasticizers called superplasticizers (SP) has generated significant interest. These substances differ from conventional plasticizers by a high plasticizing effect.

Methods

The first superplasticizers appeared in the early 70s of the last century as a result of research by Japanese and German specialists in the field of concrete research and design. The main idea of using these additives was to obtain molded concrete mixtures without mechanical impact.

The main advantage of superplasticizers, despite their strong melting effect, is that they do not reduce the strength of concrete, and therefore their use in larger doses compared to conventional plasticizers allows obtaining a high plasticizing effect.

The use of superplasticizers and complexes based on them, along with increasing the activity of cements, made it possible to significantly increase the average and maximum strength of concrete.

Today, superplasticizers are synthesized from organic compounds. Their use in optimal quantities allows, without reducing strength, to obtain cast or highly mobile mixtures from thick concrete mixtures (MW = 2-4 cm) (MW = 18-24 cm).

Modern superplasticizers differ from previously used plasticizing additives by the immutability of their chemical composition and strict adherence to the technical requirements of the corresponding technical specifications of the products. The mechanism of action of superplasticizers of the naphthalene formaldehyde (NF), melamine formaldehyde (MF), and lignosulfonate (LST) types is dominated by electrostatic repulsion and stabilization of cement particles. In this case, the adsorption layers of the superplasticizer molecules increase the value of the ζ (dzeta) -potential on the surface of cement particles. The value of the ζ-potential depends on

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the adsorption capacity of the superplasticizer, moreover, the higher the adsorption value, the greater the absolute value of the negative charge ζ-potential.

Many specialists attribute this difference to the structure of the superplasticizer molecules: NF, MF, LST are characterized by a linear shape of the polymer chain; for polycarbocylate type superplasticizers, two- or three-dimensional cross-links are characteristic. It is the transverse link that forms an adsorption-volume protective shell around the particles of the solid phase, preventing the adhesion of particles to each other and forming interconnections that contribute to their mutual repulsion. It is the transverse link that forms an adsorption-volume protective shell around the particles of the solid phase and contributes to the avoidance of adhesion and mutual repulsion of particles (Fig. 1.3).

Some studies have shown that the repulsive forces of polycaryoxylate-type superplasticizers are almost twice as high as in MF and NF and three times higher than in LST.

In the literature, this group of superplasticizers is called "hyperplasticizers". They have a higher ability to reduce water demand compared to conventional superplasticizers (30%

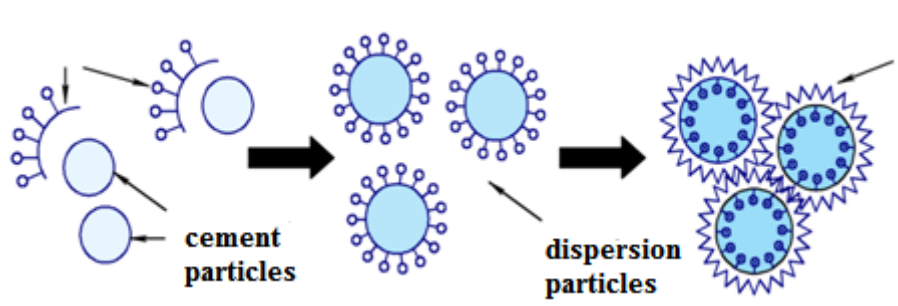

Figure 1.3. Mechanism of action of polycarboxylate-type superplasticizers.

or higher), even at a low water-cement ratio, they differ from traditional superplasticizers in their high plasticizing properties (0.2 for cement paste) and low use (~0.2%).

Currently, the most effective plasticizers for cement systems are polycarboxylate-based hyperplasticizers. However, scientists' opinions on the influence of these additives on the hydration and structure-forming properties of cement stone are not uniform.

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The main disadvantage of polycarboxylates is called "nonconformity." This term was originally used to denote the dependence of the effectiveness of polyester carboxylates on the chemical and mineralogical composition of Portland cement, primarily on the content of free alkalis. However, the expansion of the scope of use and experience of polycarboxylates has shown their incompatibility with some other chemical additives. It should be noted that in some literature, the first example of the incompatibility of polycarboxylates with additives is considered to be their inability to combine with polynaphthalene sulfates.

The incompatibility of polycarboxylates with Portland cement is currently one of the main problems in technology. Many technical solutions have been proposed, but the problem still does not have a definite solution.

Many scientists believe that the introduction of hyperplasticizers leads to a decrease in Portland cement hydration [53]. Currently, questions related to the influence of these additives not only when used separately, but also when used together with other additives, on the processes and products of cement hydration remain open. At the same time, since polycarboxylate-type superplasticizers are the most expensive materials, it is recommended to use them in combination with other superplasticizers.

At first glance, it might seem like the future belongs to polycarboxylate plasticizers. However, this is an urgent conclusion, and if we consider this issue in more detail, the large-scale research will determine which plasticizers will be more effective in the near future. One thing is clear - all plasticizers available on the world market have their advantages and disadvantages. And, despite the large assortment of plasticizing additives, they currently do not meet the needs for them. In addition, there is an opinion that the use of superplasticizers based on sulfate melamine-formaldehyde or naphthalene-formaldehyde polymers is environmentally dangerous and highly toxic to the human body, as the sodium sulfate in their composition leads to sulfate corrosion of concrete and negatively affects its strength properties. Therefore, the search for additives in a new structure and composition, intended for various purposes, is an urgent task today.

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Results

In the production of concrete and reinforced concrete structures at construction sites and enterprises of our republic, superplasticizers based on synthetic polymers, produced by foreign and CIS companies, which are considered more effective than traditional additives, are being used. These include the CIS superplasticizers S-3, VS (MFAS-R100-P, MFAR), 10-03 and 40-03, KM-30, NIL-10, Dofen, LSTM, XDS and the most popular foreign superplasticizers Melment (Germany), Komplast and Kormiks (Great Britain), Maiti (Japan), Lomar D, Blankov N, Total N. Orzan S. (USA), Agililast, Chris Fluid (France), Posolish 300 (Japan, USA, South Africa), Plasttiment V 40 (Great Britain and France), Batakom LR (Finland), Reobild (Italy) and others. [67].

Most of these additives, produced abroad, have a complex effect and high efficiency, however, these additives, successfully used in concrete abroad, are expensive and do not always give a good effect in our conditions, since foreign additives are intended for very high-quality cement and aggregates.

Therefore, scientists of our republic are conducting large-scale research on the creation of high-quality and inexpensive additives based on local raw materials and their application in concrete technology. In particular, presents the results of studies conducted on concrete with the addition of water-soluble acetone formaldehyde (ASF) oligomers. For the first time, it has been proven that water-soluble ASF is used as a plasticizer and chemically resistant polymer binder in improving the technology of expanded clay concrete and increases the strength and durability of expanded clay concrete barrier structures .

A.I. Adilkhodjaev and his students, using compositions based on chlorosulfonated polyethylene, developed methods that allow increasing the service life of concrete and reinforced concrete products by 15-20 years .

Analysis

In recent years, the research conducted by Karimov M.U., Djalilov A.T., and Samigov N.A. on the creation of new generation superplasticizers is noteworthy [69-76]. As a result of their research on the study and comparison of the influence of

polycarboxylates on the structuring processes and physical and mechanical properties of cement composites, complex polymer-mineral superplasticizers of grades KDj-1 - KDj-5 were created from local raw materials. It has been shown that the use of these additives is a more effective way to solve the problem of resource saving in concrete production, reducing cement consumption, improving product quality, and significantly reducing its cost.

Conclusion

1. In the study of literary sources, the application of plasticizing additives in cement concretes and their influence on the properties of unpressed concrete have been well studied. However, the question of the influence of these factors on the properties of pressed Lego bricks has been overlooked.

2. It has been established that when pressing pressure is applied, elastic deformation occurs in the concrete and leads to a decrease in the density and strength of the concrete under their influence, but the factors influencing them have not been sufficiently studied.

3. The physical and mechanical properties of fiber-reinforced concrete have been studied, however, the strength of the dispersed reinforcement in an alkaline environment of cement stone has not been sufficiently studied.

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