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Hydrophobization of oil systems main features of protection system

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Abstract
This article covers the most important scientific and technical problems of cement-concrete technology, in particular, increasing the performance of concrete mixes with decreasing water-cement ratio and decreasing cement consumption, as well as increasing frost resistance and strength of concrete products. These problems are to some extent solved by the use of surfactant additives.

Keywords: Cement-concrete, water-cement, petrochemical, petrochemical, hydrophobic, synthetic fatty acids, surfactants

Introduction
The most important scientific and technical problems of cement-concrete technology include increasing the performance of concrete mixes with a decrease in water-cement ratio and a decrease in cement consumption, as well as increasing frost resistance and strength of concrete products. These problems are to some extent solved by the use of surfactant additives. In the past, technically active additives in cement-concrete technology were mainly natural products, now due to the rapid development of chemistry in our country, petrochemical synthesis products - synthetic fatty acids obtained by oxidation of paraffin [3] from below are of special importance as surfactants such as Vaseline.
The effect of additives is that petrochemical products in the cement system in many respects follow the general laws previously established in the study of naturally occurring high fatty acids and hydrophobic plasticizers in petroleum acids [3].
Thus, chemical additives to the reinforcing effect - surfactants, using additives for grinding cement clinker only at the same time P. A. The hardness set by Rebinder [1] can be achieved not only due to the adsorption drop, but also by preventing the adhesion of crushed cement and fine particles, which are in a state of adhesion to the grinding bodies and walls of the mill V.A As Kireev has shown, surfactants are usually particularly effective in the finest particles of powder [3]. In addition, the additives reduce the friction between the individual grains of cement and thus help in a denser packing, which affects the increase in bulk density in the mill. Therefore, the ratio between the weight of the crushing particles and the ground product volume changes positively, which in turn accelerates crushing. The decrease in the Hygroscopicity of cements containing a hydrophobic additive occurs due to the formation of the thinnest adsorption layer in the cement grains from the molecules of the directed surfactants converted to the environment by hydrocarbon radicals.
Hydrophobic cement powder is practically non-hygroscopic. Therefore, hydrophobic cement is able to keep for a long time even in wet conditions. It is known that ordinary cement of the middle class loses 25-30% of its activity during 2-5 months of storage. High-grade cements break down faster. Thus, for example, after one month of storage, the fast-setting cement of the “600” grade sometimes loses 25 percent of its initial activity. Therefore, the high initial activity of fine-grained quick-setting cements, the production of which is expanding every year, is almost completely unused if the cement is not even on a long journey or in stock.
Such losses of cement activity are usually not taken into account, but they can cause significant damage, as can be seen from the following examples. If it is possible to prepare 4.5 m3 of concrete of "150" from 1 ton of cement of "500", then with a loss of 20% of activity, only 3.75 m3 of concrete of 1 ton of ordinary cement can be obtained. When using hydrophobic cement, it is possible to avoid over-consumption of 20% of cement.

Water-resistant surfactants significantly plasticize the cement system. The high mobility of mortar and concrete mixtures when applying cement with waterproofing additives should be explained mainly by the lubricating effect due to the "layered" structure of thinly oriented films. Polar-active groups of hydrophobic substances tend to coalesce between them.

Hydrocarbon chains, by contrast, have a weak field. Such movements occur during mixing of mixtures, passage through pipes, as well as during laying and compaction of new concrete. During these operations, less or more frequent movements occur between the hard surfaces of the particles (sand, gravel, slag, lime mixer walls and blades, pipe walls, etc.). However, the strength field of clinker minerals, as well as calcium ions adsorbed, aggregates that are hot relative to water are partially neutralized and replaced by much weaker methyl groups that form the ends of hydrocarbon radicals (cement has not yet been established). Therefore, the friction generated as a result of molecular attraction is reduced.

Oriented molecules have the ability to slide along each other and resist deformation in all other directions. The plasticizing effect of hydrophobized type additives is more pronounced, i.e. the thinner the layer of cement paste. When using such additives, the effect of plasticization is most important in lean systems where the aggregate differs on the developed surface of the grains [1].

Therefore, the water demand of hydrophobic cement in concrete (especially oil-free) and lime mixtures is less than that of conventional cement; cement consumption in concrete can sometimes be reduced by 10-12%. Reducing cement consumption in concrete not only brings economic benefits, but also improves some properties of concrete structures. Thus, for example, when a certain amount of cement is reduced, the Exotherm of the concrete is reduced.

It is known that an increase in heat causes thermal deformations and unevenly distributed stresses in monolithic concrete, and this leads to the appearance of cracks. As cement consumption decreases, compression strains in concrete and concrete products also decrease.

Therefore, reducing cement consumption is not only an economic but also a technical factor. One of the main properties of concrete with the addition of hydrophobic substances is the formation of a homogeneous fine crystalline structure. P.A developed by M.I Higerovich. According to Rebinder rules, in cement systems with hydrophobic additives, the size of the growing crystals is ground and the shape changes.

By reducing the cross-section of the pores, it is especially important to direct the thin layers of water to the hard surfaces, which makes it difficult for moisture to move. Slowing down the ingress and movement of water improves the properties of materials against the effects of aggressive liquids and freezing. Thus, waterproof additives reduce capillary absorption, water absorption and water permeability, as well as increase frost resistance. In hydrophobized systems, cement prevents such material exchange between the stone and the aggressive substances in the environment.

Limiting the harmful interactions of concrete with the environment should help increase its durability. These are brief theoretical explanations of the nature of the effects of petrochemical Hydrophobizing additives in the cement system. As technical surfactants we used oxidized Vaseline, hereinafter referred to as OP, a number of synthetic fatty acid fractions, hereafter the distillation residues of synthetic fatty acids called FFA, and the following fatty acids and OKO-2, as a water-soluble emulsion. All of these additives were included in the clinker crushing. Sulfite-alcohol bar (SSB), often used in the production of slag concrete, has been used in a number of experiments in the form of additives with OP and FFA. Sulfite - an alcoholic bard was introduced directly with mixed water. In some experiments, soap-oil / MN / based hydrophobic cements were used for comparison.

Clinker crushing was carried out in laboratory ball mills with a capacity of 20 and 100 liters. Preparation of lime and concrete, molding and testing were carried out in accordance with applicable GOST. If necessary, a detailed description of the sample preparation and testing procedures is provided in the relevant sections. Low-temperature dilatometry method / from 800 / to study the nature of the structure of concrete and to determine its frost resistance. The properties of the starting materials used in the study are given below [4].

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