GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 10, Issue 1, Jan. (2022)

THE THEORY OF OBTAINING POLYMER CONCRETES WITH THE ADDITION OF CHEMICAL ADDITIVES OBTAINED ON THE BASIS OF INDUSTRIAL WASTE

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ABSTRACT

The article discusses the creation of high-strength and resistant to chemical environments polymer-concrete technologies based on quartz and phosphogypsum industrial waste and urea resins, the study of their structure and properties.

Keywords: quartz, phosphogypsum, industrial waste, carbamide, polymer concrete, gelpolymers, small and large aggregates.

INTRODUCTION

In our country, the construction complex, in particular, the construction of the chemical and petrochemical industries, the construction of new land development and use systems, the construction of special facilities, etc. High-strength polymer concrete, resistant to aggressive environments, and products based on them are in great demand. The development of the oil and gas industry in the Republic of Uzbekistan has made it possible to produce many types of polymers at local chemical plants. The utilization of quartz and phosphogypsum industrial wastes is a huge environmental and economic problem [1].

In developed countries, the problem of activation of industrial waste by mechanical and chemical activation and production of polymer concrete on their basis is being solved.

MATERIAL AND METHODS

It is known that the industrial waste mentioned in the article has accumulated hundreds of millions of tons in the territory of the republic, causing environmental problems.

The article solves the problem of creating a technology for the production of polymer concrete on the basis of cheap, economical urea-formaldehyde resin, quartz and phosphogypsum waste produced in Uzbekistan.

RESULTS AND DISCUSSION

Preparation and application in the construction industry of high-strength, resistant to chemical environments, resource-saving polymer concrete on the basis of urea resin, quartz and phosphogypsum industrial waste.

Table 1. The composition of expanded clay concrete and the coefficient of its thermal conductivity

Lightweight concrete composition, kg / m³				Additive SJ-1, %	*K кк, MPa* (kg/m³)	λ, Wt/(m·K)
Cement	Sand	Expanded clay	Water			
322	456	373	200	-	0,0125	0.1850
			172	0.6	0,0183	0.1764
			160	1.0	0,0209	0.1630
			150	2.0	0,0189	0.1707

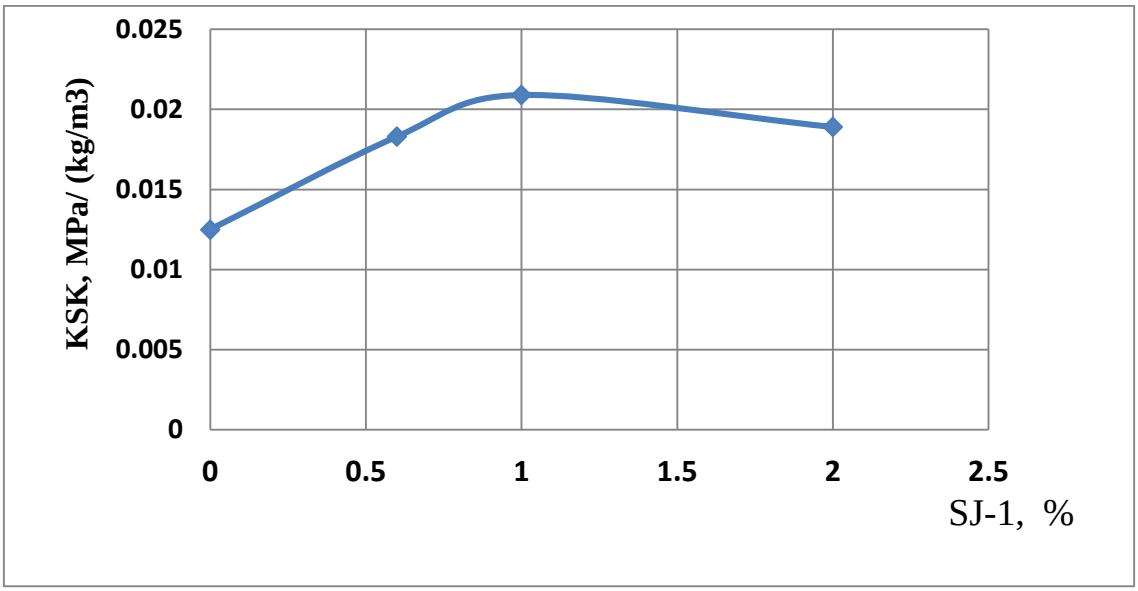

Figure 1. Influence of the addition of KJ-3 on the structure quality factor (KKK) of lightweight concrete

Year by year increase in the volume of construction in independent Uzbekistan, in particular, the construction of industrial facilities, the development of agricultural construction in saline soils requires the creation, research and use of special building materials - polymer concrete, resistant to high and aggressive environments.

In an era of market economy, the replacement of building materials, especially the main components of polymer concrete - polymers, aggregates, hardeners and modifiers - is an important factor in the replacement of local raw materials at the expense of secondary resources and industrial waste [2].

Production of polymer concrete components in Uzbekistan Chemical and polymer chemistry is explained by the rapid development of the industry.

High strength, acid, alkali, saline solutions, mineral fertilizers, etc. the creation of prefabricated and monolithic polymer concrete structures and technologies resistant to aggressive environments and resistant to dry hot climates is a problematic issue and awaits its solution.

Urea polymer concrete has a number of advantages as well as a number of disadvantages, the main of which is the rapid hardening of the mixture (20 - 30 min), the release of large amounts

of water (35% by weight) and the formation of internal stresses, sufficient for aggressive environments and temperatures. insufficiently durable, etc.

To improve the technological and operational properties of urea polymer concrete, it is advisable to use hardeners, plasticizers, activated quartz or phosphogypsum powder fillers, working on a fundamentally new mechanism.

It is recommended to use mineral (activated phosphogypsum) and hydrogel polymer water binders in order to reduce internal stress in the preparation of urea polymer concrete in dry hot climates, ie to prevent the formation of microcracks, to prevent premature dehydration of molded, especially monolithic cast products and structures. The study of the structure, technological and operational properties of additional urea polymer concrete, which binds mineral and gelpolymer water, and the optimization of such compositions is a topical issue [3].

At this point, it is necessary to dwell in detail on the use of phosphogypsum powder as a filler in the production of urea polymer concrete, which is a waste of the chemical industry. The use of phosphogypsum instead of powder filler in part or in whole polymer concrete requires pre-treatment of phosphogypsum. In this case, it is necessary to carry out certain technological treatment of phosphogypsum in order to bind the excess water released during the polycondensation from the composition of phosphogypsum urea resin.

Drying of phosphogypsum, grinding to a powder state in the presence of polymer activators is the main method of processing. Methods and compositions for complete or partial filling of urea polymer concrete with activated phosphogypsum are protected by the authors with more than 10 copyright certificates and their own R patents.

It should be noted that in this method, phosphogypsum has a dispersion of 2000 - 3000 cm^2/g and has the property of independent solidification due to the water content of urea resin. However, activated phosphogypsum may partially or completely act as a hardener for the urea polymer.

This gel polymer has the property of temporarily absorbing (binding) 50-1000 times more water than its mass and expelling a certain amount of water over time. Calculations and experiments have shown that it is sufficient to add 0,1-0,6% by weight of resin to 100% water-binding gelpolymers to bind 100% of the water in urea polymer concrete temporarily until the risk of internal stresses expires (10-12 hours) [4].

Preliminary scientific studies have shown that gelpolymers improve the properties of urea polymer concrete, its resistance to aggressive environments and, most importantly, create normal conditions for the solidification of monolithic and prefabricated polymer concrete products and structures in dry hot climates.

In the preparation of monolithic polymer concrete, because the gel polymers bind excess water at the microstructural level, internal stress is generated to a minimum and the structure is not brought to a dangerous state.

Preliminary study of the microstructure of gelpolymer urea polymer concrete by electron microscopy, infrared spectroscopy, symbolic porometry showed that gelpolymers do not disrupt the structure of the polymer concrete, but rather the structure is adjusted and stabilized [5].

Water-binding, structure-adjusting gel polymers can be added to urea polymer concrete directly into the resin or quartz, phosphogypsum powder fillers can be added by mechanical-chemical activation methods.

The addition of gelpolymer and other polymeric substances in the process of grinding quartz and quartz powder fillers gives good results. It is known that the surface of quartz rocks and industrial waste dust is smooth and always surrounded by a thin water curtain. The ultra-thin water film does not allow the urea polymer to adhere well to the quartz grains. Transformation (absorption) of a very thin water film on the quartz surface to strengthen the contact surface of the polymer-powder filler gives good results. It is advisable to use gel polymers in the transformation of water on the surface of quartz powder. Gelpolymer absorbs a thin layer of water on the surface of quartz powder particles, sharply increases the adhesion of the polymer-powder filler and leads to an increase in the cohesive strength of the composition [6].

CONCLUSION

Binders and polymer concretes formed on the basis of activated quartz and phosphogypsum powder fillers with urea polymer, gelpolymer and other polymers have high strength, technological properties, resistance to aggressive environments.

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