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Research Article

CURRENT STATUS OF THE SHIFTING SAND SOLIDIFICATION PROBLEM

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ABSTRACT

This article talks about ways to solidify shifting sands for construction on lands with shifting sands. Also, the results of experiments on this topic are clearly expressed in tables. Currently, this problem is observed around the world and in how many regions of Uzbekistan.

KEYWORDS

Polymer reagents, the efficiency of reagents, fixative reagents, water-soluble polymers, dispersed particles.

INTRODUCTION

According to the information released by the UN in recent years, desert and semi-desert areas make up about 40% of the Earth's surface and are spread over more than 100 countries of the planet. This problem is so urgent that in the near future, approximately by 2025, as a result of water scarcity, climate change, and the intensive increase in the problem of desertification, it is estimated that every second citizen of the planet will have to live in an uninhabitable desert area.

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This threat, that is, the problem of desertification, has a negative impact on the land that is suitable for agriculture today, and this trend is 15 million hectares per year. [1.]

In particular, in the Republic of Uzbekistan, the areas where shifting sands are spread have shown their negative effects on an area of more than one million hectares, and its danger is unprecedented economic, technological, ecological and social damage in irrigated areas intended for the cultivation of agricultural products, around irrigation and reclamation facilities, road and railway infrastructure. is delivering This problem is characterized by the fact that it has intensified in recent years in all regions of the Aral Sea region, in the regions occupied by the Amudarya banks of the Kyzylkum desert, which occupies more than 30% of the territory of our republic. [2.]

THE MAIN PART

Despite the use of sand-curing polymer reagents for many years, they have not been widely used [3]. The main reason for this is that the resulting coating is not sufficiently durable, the cost of reagents, the low efficiency of the synthesized hardeners, and the lack of equal compatibility in all types of sand zones, in some cases are limited by the complexity of the extraction process [4].

In this aspect, the relevance of the topic is determined by studies aimed at studying the influence of polymer substances on various practical properties of volatile sand, determining the effectiveness of water-soluble and insoluble polymer reagents, developing a new, universal, cheap and effective polymer-fixer for sand based on industrial man-made waste and secondary sources.

Research on the solidification of volatile sand with "CXM"-series polymer fixative reagents was formed on the basis of research, systematic experiments, and field tests.

In this regard, we conducted research on the development of the technology for the production of water-soluble polymer-fixers based on the waste of hydrolyzed polyacrylonitrile, phosphorylated with phosphorus compounds obtained from the waste of "Maxam-Ammofos" OJSC, and studying their practical properties.

During the research, it was found that the interaction of the water-soluble polymer "CXM-1" with dispersed particles depends on many factors: the concentration of water-soluble polymers and mineral suspension, the presence of electrolytes, temperature, salinity, etc. Thus, a comparative analysis of water-soluble polymers produced by us with water-soluble polymers polyacrylamide showed that when polyacrylamide preparations interact with sand particles, a less strong brittle structure is formed on the surface of the sand, because of this, large macromolecules of polyacrylamide are suspended from the sand. and other dispersed particles are more difficult to diffuse into the inner layer, that is, to absorb. As a result of its mobility, high activity and low molecular weight, the aqueous solution of the polymer synthesized by us led to the easy penetration into the inner

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layers of sand particles, as well as to the formation of a strong chemical bond with the Si-element of silicon in quartz sand, this phenomenon was hardened by the polymer-fixer. we determined during the study of the IR-spectrum of the sand sample (Fig. 1). As a result, the physical and mechanical strength of the protective layer formed on the surface of the sand increased, as well as the resistance to wind and water erosion. We discovered this phenomenon during the study of the IR spectrum of a sample of sand hardened with a polymer fixer (Fig. 1). As a result, the physical and mechanical strength of the protective layer formed on the surface of the sand increased, as well as the resistance to wind and water erosion. We discovered this phenomenon during the study of the IR spectrum of a sample of sand hardened with a polymer fixer (Fig. 1). As a result, the physical and mechanical strength of the protective layer formed on the surface of the sand increased, as well as the resistance to wind and water erosion.

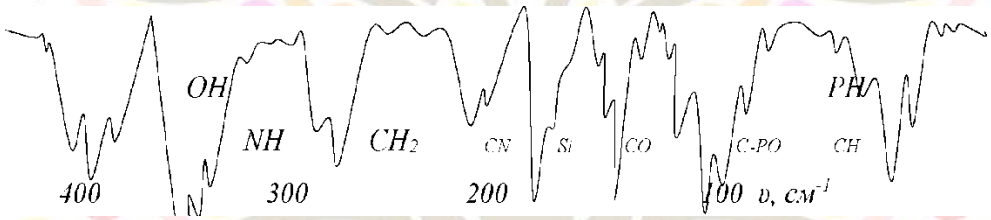

Figure 1. IR spectrum of sand sample hardened with "CXM-1" polymer-fixer

Table 1. Wind resistance indicators of the sand protection coating were obtained on the basis of "CXM-1". (wind speed u=20 m/sec).

Hardening polymer consumption q, l/m2	In dry sand			In wet sand		
	Coating thickness h, mm	Plastic strength R, kPa	Sample mass loss Dsh, %	Coating thickness h, mm	R, kPa of plastic pipe	Sample mass loss Dt, %
5	10	272	0.2	16	313	name 2
4	8	236	0.4	14	255	0.2
3	6	161	0.7	12	192	0.3
2	5	51	3	11	58	0.5
1.5	3	18	15	8	21	13

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1	3	7	22	5	9	15
0.5	0-2	2.6	32	3	4	30

Experimental tests have shown that the wind resistance of wet sand samples increases sharply with increasing concentration of "CXM" polymer solutions compared to dry sand samples, and it can be achieved with a small amount of polymer consumption. The main reason for this is that in dry sand samples, the water solution of the polymer penetrates deeper, and the protective coating is almost 2-3 times thicker compared to the wet sand sample (Table 1).

Taking into account the fact that the relief of the area intended for implementation is a desert area in a flat zone, and taking into account that the curvature (slope) of the relief is 5-10°, for such conditions, the plastic and mechanical strength of the protective coating is required to be no less than 6-10 KPa.

Due to the fact that a method combining biological and physicochemical methods was chosen for hardening sands, special attention was paid to increasing the effectiveness of phytomelioration in creating a protective polymer sand layer with physical and mechanical properties necessary for long-term moisture retention. For this, it is necessary to create a reserve of moisture under the protective shell. Undoubtedly, this can be provided by natural and artificial methods, that is, by sprinkling on the sand after rain or after pre-spraying (Table 2).

Table 2. Wind resistance indicators of sand protection coating were obtained on the basis of GIPAN and PAA. (wind speed u=20 m/sec).

Hardening polymer consumption q, l/m2	In dry sand			In wet sand		
	Coating thickness h, mm	Plastic strength R, kPa	Sample mass loss Dsh, %	Coating thickness h, mm	Plastic strength R, kPa	Mass loss Dt, %
GIPAN-5	6	139	0.8	12	141	0.7
GIPAN-4	4	36	2	10	38	3
GIPAN-3	3	18	2.7	8	19	3.3
GIPAN-2	2	12	4.9	6	13	4.5
GIPAN-1.5	2	9	8.5	4	10	8.5
GIPAN-1	1.5	4	12.4	2	4.3	10.5
GIPAN-0.5	0-1	3	14	1	3.2	14

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PAA-5	8	129	0.6	14	134	0.59
PAA-4	6	112	1	12.9	115	1.6
PAA-3	5	80	2	11	82	3.2
PAA-2	4	28	3.6	9.8	29.2	5.5
PAA-1.5	3	14	5.9	6.5	15	7.8
PAA-1.0	2.5	7	11.2	3.5	8	9.2
PAA-0.5	2	2	12.4	2.5	3	12.6

As a result of practical and field experimental research, it was found that there is a significant difference between the hardening compositions prepared on the basis of "CXM" hardening polymer solutions. That is, the effectiveness of the hardening composition prepared on the basis of the "CXM-2" polymer was shown to be higher than that of the "CXM-1" polymer. The main reason for this is that "CXM-2" polymer is obtained on the basis of the phosphorization of lignosulfonate, a natural polymer. "CXM-1" polymer is a synthetic polymer obtained on the basis of phosphorization of hydrolyzed polyacrylonitrile, which means that the properties of the polymer obtained on the basis of natural polymer lignin to retain moisture, increase the mechanical and plastic-elasticity properties of the sample have found their experimental confirmation in this case.

CONCLUSION

In conclusion, it should be said that the shifting sands, which are becoming a problem of the whole world in some sense, have an impact not only on the environment but also on the construction industry, therefore, every scientist should do large-scale work to solve this problem. In the article, I hope that this information will be useful in the future, and I hope that the article will provide promising suggestions about the stabilization of shifting sands and the creation of favourable conditions for construction.

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