IJDIAS International Journal of Discoveries and Innovations in Applied Sciences

| e-ISSN: 2792-3983 | www.openaccessjournals.eu | Volume: 1 Issue: 5

Strength Properties of Carbonate Filled Concrete

Rajabov Shohrukh Shermahmatovich
Basic doctoral student. Tashkent Chemical Technological Institute, Uzbekistan

Mirzakulov Kholtura Chorievich
doctor of technical sciences professor, Tashkent Chemical Technological Institute, Uzbekistan

Yunusov Mirjalil Yusupovich
doctor of technical sciences professor, Tashkent Chemical Technological Institute. Uzbekistan

ANNOTATION

It has been shown by numerous experiments that, according to the properties of carbonate aggregates, higher grade concretes can be obtained than other types of aggregates of similar strength. The strength of concrete obtained from high-strength and high-strength carbonate rocks reaches a value of 600 kg/cm^2 and above. Aggregate concretes made of porous carbonate rocks have a strength of 100 to 400 kg/cm^2, depending on the group of aggregates.

Laboratory work was carried out at Tashkent Chemical Technological Institute (TCTI) on the direct dependence of the strength of concrete on the bulk density and hardness balance of carbonate rocks added to it. Experiments conducted here have confirmed that it is possible to obtain carbonated filler concrete with a strength of 500 kg/cm^2 and higher.

Keywords: Carbonate filler, sand, concrete, cement, fraction, limestone, dolomite, activity, hardness limit, cold resistance, water content.

I. INTRODUCTION

The presence of 10-25% of the smallest fractions (less than 0.14 mm) in carbonate sands improves the ease of laying the mixture, depending on the type of concrete mix. Helps to increase the density and waterproofing properties of concrete. However, exceeding the specified limit values of carbonate dust can lead to deterioration of the technical properties of concrete, in particular, a decrease in its strength. The positive effect of carbonate powder is explained by the fact that it plays the role of a micro-filler of cement. As it is not only chemically close to cement, but also close in particle size. However, if carbonate dust covers the surface of the aggregate grains (especially when it is wet), it can worsen the bonding of the aggregates with the cement stone and lead to a decrease in the strength of the concrete. If necessary, the aggregates can be crushed and mixed in a concrete mixer before cement loading and other known means can be used.

II. MAIN PART

According to the results of the laboratory, despite the low strength of the aggregates made of porous limestone and ordinary limestone (average 15 to 100 kg/cm^2), according to the structure, texture and chemical-mineralogical composition, the typical cement consumption is 150-300 kg/cm^2 and higher. showed that the production of high-strength concrete

Comparative data on the strength of concrete made of medium and low strength limestones (concrete composition-1; 2.3; 3.2; .... cement consumption 284 kg/m^3; cone subsidence-16 cm)

(Table 1)

Name of aggregate rocks	Strength of rock kg/cm^2	Cubic strength of concrete (kg/cm^2) in days	
		7	28
Granite	1720	146	202
10–15% fine-grained(less than 0.14 mm) limestone	150-220	136	196
Limestone without additives	100-130	125	158
Typical Additives (gravel)	300-600	114	144

This table shows that limestone with a fine fraction of 10–15% (less than 0.14 mm) has a higher strength than conventional and unadulterated limestone.

IJDIAS International Journal of Discoveries and Innovations in Applied Sciences

| e-ISSN: 2792-3983 | www.openaccessjournals.eu | Volume: 1 Issue: 5

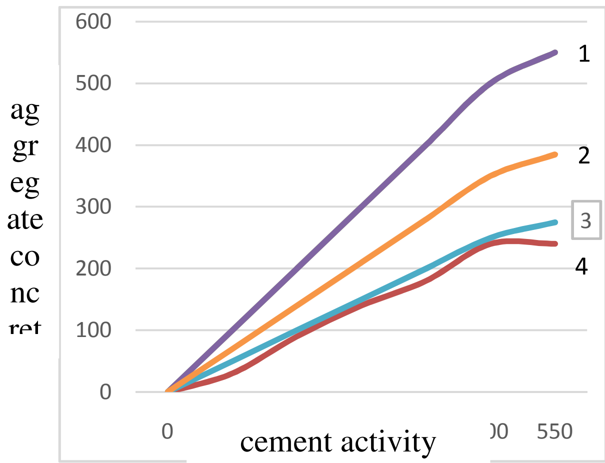
In construction practice, the widespread introduction of not only gravels, but also sands formed during the crushing of carbonate rocks is of great practical importance. Because carbonate sands usually meet the requirements for fine aggregates of structural concrete. Such sands are chemically active compared to cement, characterized by the ability to bond with cement stone in high photos. The strength, water absorption, and other properties of carbonate sands vary widely. The homogeneous properties of large and fine aggregates of carbonate rocks lead to a decrease in temperature and input (microstructural) stresses and, consequently, an increase in strength, cold resistance and other technical properties.

III. RESULT AND DISCUSSIONS

Depending on the type of aggregates, the linear temperature deformation coefficients of concrete vary over a very wide range. For example, according to laboratory experiments, for concrete in quartz sand it is $11.9 \cdot 10^{-6}$, in sandstone - $11.7 \cdot 10^{-6}$, in granite - $9.5 \cdot 10^{-6}$, in basalt - $8.6 \cdot 10^{-6}$ and in limestone - $6.8 \cdot 10^{-6}$.

The coefficient of deformation of the concrete with the introduction of medium and low strength limestone aggregate with respect to the linear temperature is $(4 - 6.5) \cdot 10^{-6}$.Thus, the temperature-related deformations of concrete made of limestone of medium and low strength are significantly lower than those of conventional heavy concrete.

In the conducted experiments, the correct ratio of $R_c = f(RT_c)$ to the volume of limestone with 10–15% fine-grained limestone and no additives was checked. Series 4 tests were performed in each of them, with practically the same specific consumption and mixing hardness of the materials, and the activity of Portland cement at 300, 380 and 500 kg/ cm^3. In the first two series, gravel and its sand made of limestone without additives were used as fillers: in the first series, the cement consumption was 390 kg/m^3, W/C=0.5, the hardness of the mixture was 65 min; cement consumption in the second series is 364 kg/m^3, W/C=0.7, hardness of the mixture - 60 min. In the third and fourth series, the concrete was prepared in limestone gravel and its sand with 10–15% fine-grained limestone filler. In the third series, the cement consumption was 306 kg/m^3, W/C=1.0, the hardness of the mixture was 55 min; in the fourth series - 288 kg/m^3, respectively, 1.3 and 50 min.



1. Picture. Dependence of the strength of limestone aggregate concrete on cement activity:

1,2 - 10–15% fine-grained limestone aggregate concrete, W/C= 0.5 and 0.7;

3,4 - concrete with limestone filler without additives. W/C= 1 and 1.3

The results of the experiments (Figure 1) show that $R_c = f(RT_c)$ is directly proportional to the activity of 10–15% fine-grained limestone aggregate concrete, including W/C ratios of 0.77 - 2.0 (limit values obtained in the test) for changes up to 500 kg/m^3. We learned that it was fair for.

The strength of the bonding zone and the strength of the aggregate grains with cement stone play a very important role in the formation of the structure of concrete and their properties.

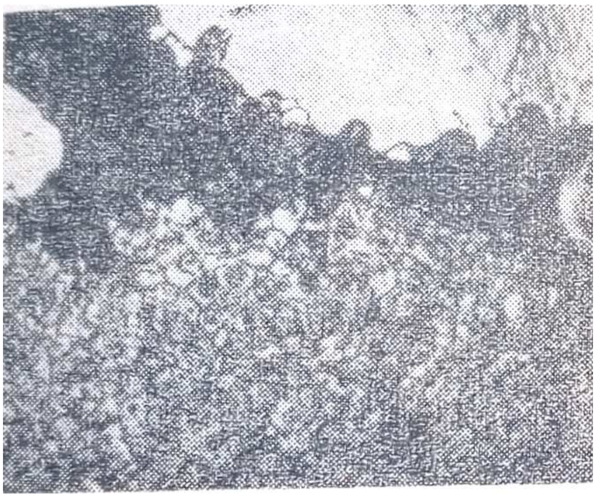
The separation zone between the aggregate and the cement stone can be considered as an independent element of the concrete structure, which significantly determines the technical properties of concrete, including the contact zone covering the surface, as well as the bonding layers of cement stone and aggregate. As the nature and structure of the

ISSN 2792-3983 (online), Published under Volume: 1 Issue: 5 in October-2021

IJDIAS International Journal of Discoveries and Innovations in Applied Sciences

| e-ISSN: 2792-3983 | www.openaccessjournals.eu | Volume: 1 Issue: 5

bonding zone depends on the properties of the filler and binder, the methods of preparation and compaction of concrete, the conditions of hardening, etc. depends on. As a result of insufficient bonding of the cement stone to the aggregates, the deterioration of the concrete occurs at the point of contact of the cement mixture and the aggregates. This leads to the fact that the strength of both the fillers and the cement mixture is not fully utilized. Naturally, this reduces the technical and economic performance of concrete.



2. Picture. Cement stone and cement stone in concrete filler from solid sugary limestones in concrete mutual growth of new derivatives of crystals (enlargement x 90 times)

Figure 2 shows the bond zone formed by the cement stone with sugarcane recrystallized limestone dalomites. The bonding zone consists of the passage of the filler grains over the surface of the cement stone through a well-crystallized carbonated mass. Strong bonding is ensured by the mutual growth of crystals of cement stone and new derivatives of fillers.

The binding of aggregates to the cement stone is also affected in some way by the volume change of the cement paste during hardening. Inlet deformations lead to a decrease in the bonding of the cement stone with the filler, so it is a good and convenient factor in the first period of time of absorption of the cement paste by the dry, porous filler. Because real water - reduces the ratio of cement and, consequently - reduces the penetration deformations of cement stone.

IV. CONCULION

Studies have shown that low-strength limestones and shell-concrete made from limestone can withstand freezing and thawing tests until the SO cycle, depending on the properties of the aggregates. The cold resistance of such concretes is not less than that of concretes prepared in other widely used carbonate fillers.

The high cold resistance of concretes made of carbonate aggregates is explained by the homogeneity of the physical properties of cement stone and aggregates, high bonding between them, density and strength of adjacent layers, carbonate aggregates have many pores that are not filled with water. The increase in the cold resistance of concrete is also facilitated by the proximity of the values of the coefficients of deformation of the cement and aggregates to the movement. For Portland cement and conventional concrete, the average is $17 \cdot 10^{-6}$ for different types of carbonate aggregates - $(4 - 18) \cdot 10^{-6}$.

The waterproofing properties of concrete in dense carbonate aggregates are, as experiments show, no less than those of high-strength aggregate concretes of volcanic rocks. Concretes with carbonate rocks with a water absorption of 2% showed C– 24 and higher.

The waterproofing properties of concrete in dense carbonate aggregates are, as experiments show, no less than those of high-strength aggregate concretes of volcanic rocks. Concretes with carbonate rocks with a water absorption of 2% showed C–24 and higher. It should be noted that such a high impermeability property is present even in carbonate concrete with a porosity of about 17%, but their water-repellent property is only 2.5%. Clearly, the waterproofing properties of concrete are affected not by the overall porosity of the gravel, but by the open and cohesive pores that are convenient for water ingress.

REFERENCES

1. Khozin VG, Khokhryakov OV, Sibgatullin IR, Korbanatnye cements of low water demand. Technology of concretes. - M., 2009., No. 11-12. -P. 25-94.

2. Kozlova V.K., Wolf A.V., Likhosherstov A.A., Chepurnova E.V. On the mechanism of the influence of carbonate additives on the setting time of the cement paste. Polzunovsky Bulletin. - M., 2010. - No. 3. - p. 112-115.

3. Atakuziev T.A., Uteniyazova G.K., Iskenderov A.M. Waste from the Kungrad sodium plant and their usage in the production of binders. Actual problems of protection of the population in emergency situations: Materials of the scientific-practical conference. - Tashkent, 2000 .-- p. 51-54.

4. Uteniyazova G.K., Iskenderov A.M., Atakuziev T.A. The main construction and technical properties of Portland cement with limestone addition. DAN RUz. - Tashkent, 2003. - No. 4. - p. 57-60.

5. Uteniyazova G.K., Iskenderov A.M., Atakuziev T.A. Improving the sulfate resistance of concrete by using crushed carbonate rocks. Chemistry and chemical technology. - Tashkent, 2005. - No. 3. - p. 30-32.

6. Uteniyazova G.K., Atakuziev T.A., Iskenderov A.M., Shamadinova N.E. Carbonate aggregate as an agent against magnesia-sulphate corrosion of concrete. Bulletin of the CCCAN RUz. - Nukus, 2005. - No. 3. - p. 27-28.

7. Uteniyazova G.K., Iskenderov A.M., Atakuziev T.A. About the influence of calcium carbonates on the properties of cements. DAN RUz. - Tashkent, 2006. - No. 2. -p. 60-62.

8. Atakuziev T.A., Ruziev N.R. Multicomponent cements (technology and application). - Tashkent: Vektor-press, 2008 .-- 328 p.

9. Otakuziev T.A., Yokubov U.A. Carbonated Portland cements modified with soda plant waste and carbonate-filled concrete based on them. Uchebnoeposobie.-Toshkent: Sirli Olam, 2009. –47 p

10. Yokubov U.A., Atakuziev T.A., TalipovN.Kh. The use of sludge waste from the Kungrad soda plant as additives to cement. Composite materials. - Tashkent, 2009. - No. 4. - p. 64-68.

11. Yokubov U.A., Atakuziev T.A., TalipovN.Kh. Waste of soda production as an intensifier of hardening and a component of multicomponent cements. Chemical technology, control and management. - Tashkent, 2009. - No. 5. - p. 18-23.

12. Yokubov U.A., Atakuziev T.A., Tolibzhonov I.R., Sanaev G.M. Waste from the Kungrad soda plant as additives for the manufacture of carbonate Portland cement and concrete. Topical issues in the field of technical and socio-economic sciences: Republican interuniversity collection. - Tashkent, 2011 .-- p. 72-74.

ISSN 2792-3983 (online), Published under Volume: 1 Issue: 5 in October-2021