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Investigation on the Durability Properties of Concrete with Superplasticizers

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ABSTRACT: Concrete that has just been mixed can be molded into any shape. The qualities of concrete in both its wet and hardened states are determined by the proportions of cement, aggregate, and water in the mixture.Workability is the capacity of a freshly mixed concrete to correctly fill the mold with the appropriate work without compromising the strength and quality of the concrete. Workability is influenced by the amount of water, aggregate, cement, and age. It can also be changed by adding a chemical admixture, such as superplasticizer. Concrete's workability can be improved by adding chemical admixtures or adding more water. Increased bleeding or segregation caused by too much water will result in lower-quality concrete. A highly harsh mix design with a very low slump can be produced by using an aggregate with a bad gradation, and it cannot be easily made more workable by adding a sufficient amount of water. Workable concrete is that which overcomes the frictional resistance provided by the formwork surface or exhibits very minimal internal friction particle. Chemical admixtures are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes. In normal use, admixture dosages are less than 5% by mass of cement and are added to the concrete at the time of batching or mixing. In this project two admixtures Conplast SP 430 and Glenium 7500 are used. The Workabilitytest,compressive strength test and durability testsfor conventional concrete and concrete with two superplasticizers at various proportions such as (0%,1.5%,1.75%,2%)are conducted.

KEYWORDS: Superplasticizer – (Conplast SP 430 and Glenium 7500).

I. INTRODUCTION

The most popular building material is concrete. They are adaptable due to their favorable engineering characteristics. With readily available resources, it may be created on the spot. They may be molded into any shape, and for aesthetic reasons, the surface can be given any texture or color. Intake towers for drawing water, dams and water tanks for storing water, and canal linings for carrying water can all be built out of concrete due to its excellent water resistance capabilities. In order to produce high-quality concrete, numerous mineral admixtures that are byproducts of other industries are used. Sand and crushed rock are typically used as coarse and fine aggregates in the production of concrete, together with water. Either a huge batch plant or a hand mixer can mix it.

II. MATERIALS USED

- Cement – (OPC 43 Grade)
- Fine aggregate
- Coarse aggregate
- Water.
- Glenium 7500.
- Conplast SP 430.

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1. Mix design:

Water	Cement	Fine Aggregate	Coarse Aggregate
144 l	360 kg/m3	666 kg/m3	1269.63 kg/m3
0.4	1	1.85	3.52

Table-1 Mix Design

2. Fresh properties:

S.NO	CHEMICAL ADMIXTURE %	CONPLAST (mm)	GLENIUM (mm)
1	0%	5	5
2	1.5%	6	12
3	1.75%	55	70
4	2%	122	140

Table-2 Slump flow values

III. COMPRESSIVE STRENGTH

The important property of concrete is its strength in compression. The strength in compression has definite relationship with all other properties of concrete i.e. these properties are improved with the improvement in compression strength.

S.NO	COMPRESSIVE STRENGTH (N/mm^2)	0%	1.5%	1.75%	2%
1	7^{th} day	29.05	31.21	33.42	33.81
2	28^{th} day	33.23	36.95	39.09	40.18

Table-3Compressive Strength OfGlenium 7500

S.NO	COMPRESSIVE STRENGTH (N/mm^2)	0%	1.5%	1.75%	2%	
1	7th day	27.00	30.23	31.35	32.03	
2	28^{th} day	33.23	34.07	38.12	40.25	

Table-4Compressive Strength of Conplast SP 430

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IV. DURABILITY TESTS

Durability is a major concern for concrete structures exposed to aggressive environments. Many environmental phenomena like acid rain, polluted water etc significantly influence the durability of concrete structures. When reinforced concrete structures are exposed to harsh environments, deterioration of concrete will occur due to many reasons like chloride and sulphate attack, acid attack and corrosion failure. It is now recognized that the strength of concrete alone is not sufficient. The degree of harshness of the environmental condition to which concrete is exposed over its entire life is equally important.

4.1 Water Absorption and Porosity tests:

Sl.No	Mix Proportion	Saturated Weight (kg)	Dry Weight	Saturated Water Absorption
1	CONTRO	3.16	2.98	6.04
2	G 1.5 %	4.11	3.75	9.60
3	G 1.75 %	4.32	3.94	9.64
4	G 2 %	4.61	4.11	12.17
5	CP 1.5 %	3.67	3.37	8.90
6	CP 1.75	3.91	3.54	10.57
7	CP 2 %	4.54	4.22	7.58

Table-5Results for Water Absorption Test at 28 Days

Proportion	Dry Weight in kg (Wd)	Saturated Weight in kg (Ws)	Submerged Weight in kg (Wsub)	Porosity (n) In (%)
G 1.5 %	3.75	4.11	3.11	36
G 1.75 %	3.94	4.32	3.32	38
G 2 %	4.11	4.61	3.61	50
CP 1.5 %	3.37	3.67	2.67	30
CP 1.75 %	3.54	3.91	2.91	37
CP 2 %	4.22	4.54	3.54	32

Table-6Results for Porosity Test at 28 Days

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4.2 Alkalinity result:

Sample of 20gms powder of crushed concrete of 28 days and 90 days were collected and mixed with 100ml distilled water. The solution was kept for more than 72 hours. The pH meter was used to measure the value. The results were tabulated in table.

PROPORTION	CONPLAST	GLENIUM
0%	10.2	10.2
1.50%	10.5	11.1
1.75%	11.3	10.3
2.00%	11.1	11.5

Table-7Alkalinity test result of concrete at 28 days

V. CONCLUSION

The admixture conplast is the best superplasticizer that suits the high strength which gives high workability and good compressive strength.Optimum dosage of conplast is 2% by weight of cement the quantity of conplast to be added for 100 Kg of cement is 2 liters. By using chemical admixtures like conplast and glenium the fresh concrete tests like slump cone test are conducted.

According to that we confirm the chemical admixture glenium having higher workability than conplast. The 2% of conplast has high workability, good compressive strength when compared to other proportions of conplast. The 2% of glenium has higher workability but some loss in compressive strength compared to 1.75% of glenium.

REFERENCES

[1] L. Coppola, S. Lorenzi, P. Marcassoli.(2007), ―An Experimental Evaluation of the Compatibility of NSF and PCE Superplasticizers with Different cement Types‖, Ninth Cement/ACI International Conference on Fly Ash, Silica Fume, Slag and Natural Pozzolans in Concrete, Varsavia, Polonia, 27 Maggio – Giugno.

[2] Szwabowski, J. Suchon, S. Golaszewski, (1995), ―Problem of Workability Measurement in High Strength Concrete and Prefabrication.‖ Proc., 15th conf. on Res. And Tech. in the concrete industry. Jadwisin95 ,CEBET, Warsaw, Poland.

[3] Faroug, F. (1994) ―Influence of Superplasticizers on Rheological Property of Fresh Concrete,‖ PhD LI Thesis, Silesian Technical University, Gliwice, Poland (in polish).Cheung, A. B.; Scaliante, R. M.; Lindquist, M.; Christoforo, A. L.; Calil Junior, C. Confiabilidadeestrutural de umaponteprotendida de madeira considerandotráfego real. AmbienteConstruído (Online), v. 17, p. 221-232, 2017.

[4] Malhotra, M. (1990). ―Superplasticizers and Other Chemical ADMIXTURES ,IN CONCRETE.‖ LI PROC., 3rd Int. Conf. Constr. Mat. Energy Mines and Resour, America Concrete Institute.