

Effect of Magnetic Water on Concrete

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Abstract- In this research, the compressive strength and workability of the concrete by using magnetized water, have improved certain percentages depending on the process of the formation of this concrete. The experiments comprise the preparation of standard cubes from this concrete according to the standard ratios of ingredients and mixed with magnetized water, which was prepared by passing tap water through the devices of different magnetic strength in terms of (4000, 6000, 9250) Gauss. Then the factors affecting some physical and mechanical properties were studied, and developed some methods to be tested and verified. To complete the scope of the present experimental results, the study was necessitated the preparation of similar cubes using ordinary tap water.

Several experiments were conducted to determine the velocity of water through the magnetic field, which gave the highest value for the compressive strength, where it was up to 0.8 m / sec. It was also appeared from the tests for compressive strength of more than 63 cubic concrete mixed with magnetic water that there is an increase ranging between (10-22%) compared to the results of the control cubes, Where the highest increase upto 22% at the magnetic intensity equal to (9250) gauss. Investigations of the slump test have shown best softness and good workability to the mix concrete in the range between (6.25-7) cm. It is compatible with a number of international standards, for this, the percentage of water to cement (w/c) was determined, regardless of the quality of water used.

Index Terms- Magnetic water, Ph Value, Compressive strength, Concrete.

1. INTRODUCTION

Concrete is made by Ordinary Portland Cement, water and aggregates. Ordinary Portland Cement is a hydraulic cement that hardens in water to form a water-resistant compound. The hydration products act as binder to hold the aggregates together to form concrete. The setting and hardening of concrete are the result of chemical and physical processes that take place between Portland cement and water called

hydration. This hydration reaction is an exothermic reaction which liberates considerable quantity of heat and this is to be dissipated for continuing hydration process. Curing is one method to provide favorable environment for an uninterrupted hydration which is essential for achieving a good quality C-S-H structure. In many parts of India at many construction sites this curing is done by immersion, ponding and spraying water on concrete surface. More than one hundred relevant articles and reports are available in the open literature regarding usage of magnetic structured water for different applications like reducing salinity in water, improving crop yield and germination in plants and many medical applications in human body. Present work focuses on use of this Magnetic structured water in manufacturing & curing of concrete. Much research in recent years has been devoted to establishing the fundamental and engineering properties of high-strength concretes, as well as the engineering characteristics of structural members made with the material. Increasing the compressive strength of concrete is an aim which most researchers are looking for, using various methods to do so, as the use of fiber reinforcement in a concrete mixture to increase concrete strength. Gopalan and Haque found that the design methods influenced the strength development of fly ash concrete significantly for structural concrete, at prevalent replacement ratios, the variation of strength of 20% has been observed. Other researchers used fly ash and combination of fly ash and silica. Vipulanandan and Dharmarajan studied strength of both epoxy polymer and polymer concrete. When fiber comes from recycle fiber which is derived from recycling of waste paper (magazine) by dry mechanical processing, the improve stiffness (possible of filler action of fines in recycled fibers) are observed [8], the damage stiffness and all aspects of flexural performance are observed, to be enhanced through refinement of fiber. Certain admixtures

including high-range water-reducing super plasticizers also are used to produce high-strength concrete.

2. LITERATURE REVIEW

2.1 Saddam M Ahmed "Effect of magnetic water on engg. Properties of concrete"

Magnetic water increases compressive strength and workability of concrete. Cement content can be reduce upto 75% without affecting compressive strength.

2.2 M Gholizadeh, H Arabshahi "The effect of magnetic water on strength parameters of concrete"

Magnetic water that caused the average compressive strength of samples has 23% more than that of samples made by ordinary water. It also increases plasticity, efficiency and resistant in comparison with non-magnetic samples

2.3 Arihant Jain "Effect of magnetic water on properties of concrete."

The more water available for the hydration, the more number of cement particles are hydrated. This results increase in hydration that may lead to increase in compressive strength of concrete.

2.4 Hanan Alwediyani, Aisha Almasoudi "The change in physical properties of magnetic water"

Density of magnetic water was found to be 955.6kg/m³. Surface tension of magnetic water decreased by 4.62%. The pH of magnetic water increases by 7.14%. Electrical conductivity of magnetic water increases by 71.4%.

2.5 Ali S Faris, Awad Jadooe "Implementation of magnetized water to improve the properties of concrete."

The treatment of water with 9000 Gauss magnetic intensity in this study is the best treatment of water for preparing fresh concrete. It is possible to increase the workability of concrete without adding access water or any other materials.

PROBLEM STATEMENT:

- In general, adding certain chemicals while mixing concrete is practiced to alter the properties of concrete to obtain a concrete with desired property. But in most of the cases these

admixtures are added to get concrete with increased strength. The chemicals that are required for increasing the strength will be rarely available in rural areas and it will cost more in case of large projects.

- The usage of magnetic water while mixing concrete will increase compressive strength and also there will be higher workability for the same water cement ratio. Magnetic water treatment is a proposed method of reducing the effects of hard water, as an alternative to water softening

3. OBJECTIVE

- To improve the workability and strength of concrete by using magnetized water Without adding super plasticizer or chemical plasticizer.
- To reduce the quantity of cement content in the concrete mix.
- To study the effects of magnetic treatment on properties of water.
- To study the effect of PH and hardness of water on concrete.

Mix design:

Cement by weight=492.5 kg/m³

Fine aggregate=631.82 kg/m³

Coarse aggregate=1128.89 kg/m³

Methodology for project:

1] Preparation of magnetic water by passing tap water through magnetic water conditioner.

2] Properties of water

- Determination of PH of tap and magnetic water.
- Determination of hardness of magnetic and tap water.
- Preparation of sample for neat result.

3] Cubes

- For that purpose we are going to use M25 grade of concrete and compare timely effect of magnetic water on concrete cubes prepare by both normal water and magnetic water.
- Total 18 specimens is to be casted of normal size as per IS code method.
- Out of which 6 cubes are to be casted with the normal water and 6 cubes are casted with 12 hr magnetic water and remaining 6 cubes are

casted with 24 hr magnetic water. Grade of concrete :M25

- Proportion of cement:sand:gravel for M25 grade of concrete is 1:1.28:2.29
- Type of cement : OPC
- Grade of cement : G53
- Sand : Crushed sand
- Gravel size : 20 mm and 10mm

4] Curing process of cubes

A] Cubes

- Six cubes to be casted with tap water to cured with tap water.
- Six cubes to be casted with magnetic water to be cured with 12 hour magnetic water.
- Six cubes to be casted with magnetic water to be cured with 24 hour magnetic water.

5] Properties of concrete.

A] Properties of fresh concrete.

- To find out the effect of magnetically treated water on workability of concrete following test is to be performed.

1] Slump cone test

B] Properties of hardened concrete.

- To find out the effect of magnetically treated water on strength parameters of concrete following test to be performed.

1] Compressive test of concrete.

a] For 7 days

b] For 28 days.

Water Magnetising Process:

This study aim to investigate the affect of using magnetized water on concrete properties. Therefore prior to the proportion of each mix, water is prepared for that specific concrete mix. The water was simply treated by passing it through magnetic field (magnetizer). For that purpose we are going to use magnetic water conditioner. Magnetic water was prepared by passing it through magnetic field for one hour with a velocity of $9 \text{ m}^3/\text{hr}$ at a gauss of 12000.



Fig.1

4. RESULT

Table no.1 Compressive strength of concrete cube casted with Normal water after 7 days

Sr no	Wt of cube (Kg)	Load (KN)	7 days compressive strength		
			area	kn/mm ²	Avg
1	8.79	405	2250	18	
2	8.80	408	2250	18.13	17.98
3	8.78	401	2250	17.82	

Table no.2 Compressive strength of concrete cube casted with Normal water after 28 days

Sr no	Wt of cube	Load	28 days compressive strength		
			Area	kn/mm ²	Avg
1	8.80	604	2250	26.44	
2	8.85	602	2250	26.75	26.58
3	8.81	598	2250	26.57	

Table no.3 Compressive strength of concrete cube casted with 12 hours magnetic water after 7 days.

Sr no	Wt of cube	Load	7 days compressive strength		
			Area	kn/mm ²	Avg
1	8.76	468	2250	20.8	
2	8.75	470	2250	20.88	20.78
3	8.79	465	2250	20.66	

Table no.4 Compressive strength of concrete cube casted with 12 hours magnetic water after 28 days.

Sr no	Wt of cube	Load	28 days compressive strength		
			Area	kn/mm ²	Avg
1	8.79	659	2250	29.28	
2	8.80	662	2250	29.42	24.34
3	8.77	660	2250	29.33	

Table No 5. Compressive strength of concrete cube casted with 24 hours magnetic water after 7 days

Sr no	Wt of cube	Load	7 days compressive strength		
			area	kn/mm ²	Avg
1	8.76	479	2250	21.28	
2	8.75	475	2250	21.37	21.28
3	8.74	477	2250	21.20	

Table No 6 Compressive strength of concrete cube casted with 24 hours magnetic water after 28 days

Sr no	Wt of cube	Load	28 days compressive strength		
			area	kn/mm ²	Avg
1	8.77	685	2250	30.44	
2	8.72	687	2250	30.53	30.42
3	8.74	682	2250	30.31	

[6] IS:10262-2009, recommended guidelines for concrete mix, bureau of Indian standards, New delhi.

[7] IS:516-1959, Indian standard methods of test for strength of concrete, bureau of Indian Standards, New Delhi.

Table 7 Physical properties of water

Sr no	Parameter (ppm)	Normal water	Magnetic water	% increase or decrease
1	pH	7.26	8.27	11.39 % increase
2	Hardness	326	282	11.35% decrease

5. CONCLUSION

- Compressive strength of concrete at 7 days increases by 11.83% and that of 28 days increases by 11.44 % when treated and cured with 24 hours magnetic water.
- Compressive strength of concrete at 7 days increases by 11.55% and that of 28 days increases by 11.03% when treated and cured with 12 hours magnetic water.
- It is advisable to use magnetic water for casting and curing of concrete in construction industry.
- Eliminates the use of any known admixture and supplementary materials.
- One time investment for life time operation.
- Treated water surface tension will be low compare to non-treated water.

REFERENCE:

- [1] Saddam M Ahmed "Effect of magnetic water on engg. Properties of concrete"
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