

FLEXURAL BEHAVIOUR OF MAGNETIC WATER CONCRETE WITH VARYING DURATIONS OF MAGNETIZATION

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ABSTRACT: *The present paper describes the use of magnetic water concrete with magnetic water of varying intensities subjected to different durations of time. The magnetized water in the cement matrix behaves as a main property which reduces the salinity in water. It also increases the strength because the magnetic water is used for casting and curing. The voids in the concrete get reduced due to the heat of hydration (less surface area). Magnetic water obtained from different intensities with 0.2T, 0.4T, 0.6T magnetic water casting for 12 hours, 24 hours normal curing (28 days), and also magnetic water casting with magnetic water curing for 12 hours, 24 hours (28 days) on the structural properties such as compressive strength, split tensile strength, flexural strength test. The replacement of portable water with magnetic water rapidly increases the compressive strength of concrete. The magnetic water curing promoting hydration of cement by controlling the temperature and moisture in this study it is found that the magnetic water does not mean that water has been acquired magnetic strength but it has also been subjected to the magnetic field.*

KEYWORDS: *magnetic structured water, compressive strength, split tensile strength, flexural strength.*

I. INTRODUCTION

Concrete is the main constitution material in a significant portion of this infrastructural system. It is necessary to enhance its characteristics by means of strength and durability. It is also reasonable to compensate concrete in the form of using different techniques such as properties of magnetic water concrete with magnetic water of varying intensities subjected to the different durations of time. Concrete generally develops micro cracks and they propagate rapidly under applied stress resulting in low tensile strength of concrete. Hence the addition of magnetized water increases the strength reduces the heat of hydration. The hydration reaction is an exothermic reaction. Curing is one method to provide favourable environment for an uninterrupted hydration which is essential for achieving a good quality C-S-H structure. In the present paper combination with magnetic water compared with conventional water has been increased gradually.

A. OBJECTIVES

- To study the effect of varying magnetic field intensities on fresh magnetic water concrete
- To study the effect of varying magnetic field intensities on hardened magnetic water concrete.
- To study the behaviour of magnetic water concrete in flexure.

B. MATERIALS USED

CEMENT: For the present investigation 53 grade OPC with specific gravity of 2.92 was used.

AGGREGATES: Crushed coarse aggregate with nominal size of 12mm and 20mm is used in the present work. The specific gravity of coarse aggregate is 2.56 and specific gravity of fine aggregate is 2.56 respectively.

The physical properties of aggregates were tested in accordance with IS:2386.

C. MAGNETIC WATER:

In this research study, magnetic water is prepared by retaining water in a beaker over a circular magnet which is obtained from scientific store. magnetic water is obtained by placing the beaker filled with water over the (neodymium) magnets for a period of 24hours and 12hours. During the time of magnetization the fields penetrates through the glass which absorbs the magnetism and this magnetized water is used for making concrete. One of the most recent important technologies to enhance concrete workability and compressive strength by using magnetized water instead of normal water within concrete mixes. When ordinary water flows through magnetic field, the physical properties of water are changed. therefore, the number of molecules in water clusters will decreased to 6 or 5 molecules which causing decrease in surface tension and increase the percentage of molecules which leads to the hydration process. In the process of magnetization. magnetic water (molecules) will lose their attractive and repulsive forces and then oriented on a magnetic pole or electric charge. In the magnetic field , the effect of magnetic water illustrates the stronger hydrogen bonds with higher viscosity , due to the broken hydrogen bond after the magnetization , the structured water bond angle is decreased to 104.5°.

The structure of water is aligned in one direction after magnetization. The decrease in the bond angle in water molecule when exposed to magnetic field. Therefore viscosity and surface area increases by magnetization, hence the hydration rate increases. In his study after magnetization , the water layer surrounding the cement is thinner when compared with with normal water molecules. Therefore less amount of water demand is used in the construction industry wherever it is possible by the process of magnetization. the water molecule having positive effect of hardenend concrete properties.

II. IMPACT ON CONCRETE

In the process of magnetization, the cement reacts chemically with the water and other ingredients to form a hard matrix which binds the material together. Water causes the hardening of concrete by the process known as hydration. Using , magnetized water in concrete is the best technique forming lower porosity and higher density. There is a rapid increase in the implementation of magnetic water technology on the eighties and nineties decades. this is due to the development of magnetic devices and their influences in the concrete properties. Importance of mechanical properties in magnetic water have been used in many fields of civil engineering , military construction like airports and jetties. The project describes about the magnetization along with the increase in the workability of concrete , compressive strength and also mechanical properties. the main trajectory of magnetic field describes the charged particles in the hydrogen bond (movement) but not its energy. The breakdown of water molecule clusters are separated to form a small cluster which allow easily and penetrate into cementitious grains leading to a effective hydration for the improvement of a concrete durability. Clusters contain 100 water molecules at room temperature.

The true mechanism still remains to be solved. since many phenomenon in liquid states have not been satisfactorily explained. When the water is magnetized it becomes anti-magnetized and inhibits the mineral in concrete for bonding the matrix (concrete) where the hydrogen bond in the magnetic water moves into the micropores of C-S-H gel structure to enhance the hydration process by which the strength of the concrete is increased.

III. METHODOLOGY

A. SCHEME OF EXPERIMENTAL WORK

Grade of concrete – M25

Type of cement OPC- 53 grade

Water: cement ratio – 0.43

Cement: fine aggregate: coarse aggregate – 1:1.52:3.06

Cubes cast with magnetic water – 0.2T, 0.4T , 0.6T for 12 and 24hours (28days) normal-curing.

Cylinders cast with magnetic water – 0.2T, 0.4T, 0.6T for 12 and 24 hours (28days) normal curing, magnetic water curing.

Beams cast with magnetic water – 0.2T, 0.4T, 0.6T for 24hours (28 days) normal curing.

B. PREPARATION OF A TEST SPECIMENS

The prepared concrete mixture is cast into cubes, cylinders and beams of standard sizes. The concrete mix is transferred into the cube moulds of standard size 150 mm x 150 mm x 150 mm, cylinders of diameter 150 mm and height 300 mm and beams of size 700mm x 100 mm x 150 mm. Before placing the matrix (concrete) slump test is done for the easy flow of concrete. The test specimens are demoulded and placed in a curing tank for 28days. After 28days the cubes are tested for compressive strength, cylinders are tested for split tensile strength and beams are tested for flexural strength as per IS516-1959.

C. TEST RESULTS

TABLE:I

Average Compressive Strength of concrete cast with magnetic water subjected to 24 Hours of magnetization and cured with normal water

S.NO	Type of mix	Average value
1	0.2T	52.14
2	0.4T	52.80
3	0.6T	53.45

TABLE:II

Average Compressive Strength of concrete cast with magnetic water subjected to 12 Hours of magnetization and cured with normal water

S.NO	Type of mix	Average value
1	0.2T	38.41
2	0.4T	50.21
3	0.6T	48.35

TABLE:III

Average Split Tensile Strength of concrete cast with magnetic water subjected to 24 Hours of magnetization and cured with normal water

S.no	Type of mix	Average value
1	0.2T	7.30
2	0.4T	7.46
3	0.6T	7.14

TABLE:IV

Average Split Tensile Strength of concrete cast with magnetic water subjected to 12 Hours of magnetization and cured with normal water

S.NO	Type of mix	Average value
1	0.2T	7.21
2	0.4T	7.35
3	0.6T	6.48

TABLE:V

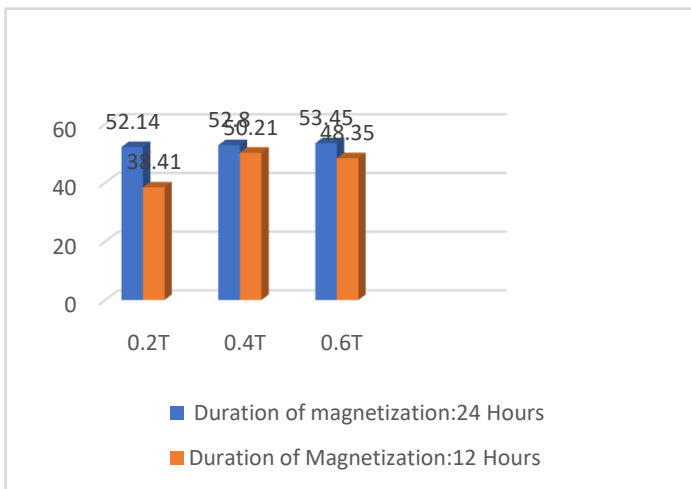
Flexural Strength of concrete cast with magnetic water subjected to 24 Hours of magnetization and cured with normal water

s.no	Type of mix	Average value
1	0.2T	2.46
2	0.4T	1.84
3	0.6T	1.75

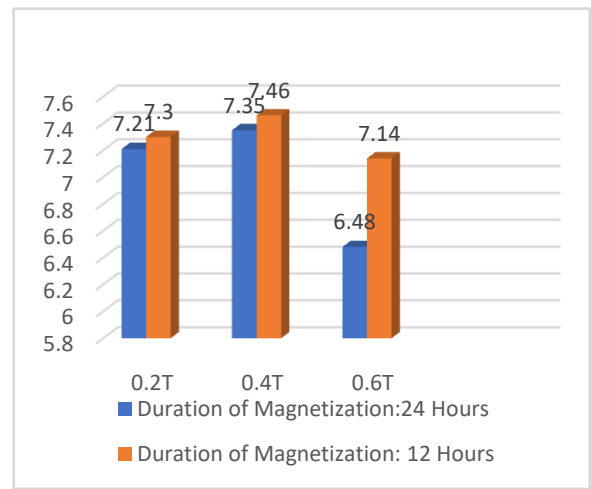
TABLE:V

Flexural Strength of concrete cast with magnetic water subjected to 12 Hours of magnetization and cured with normal water

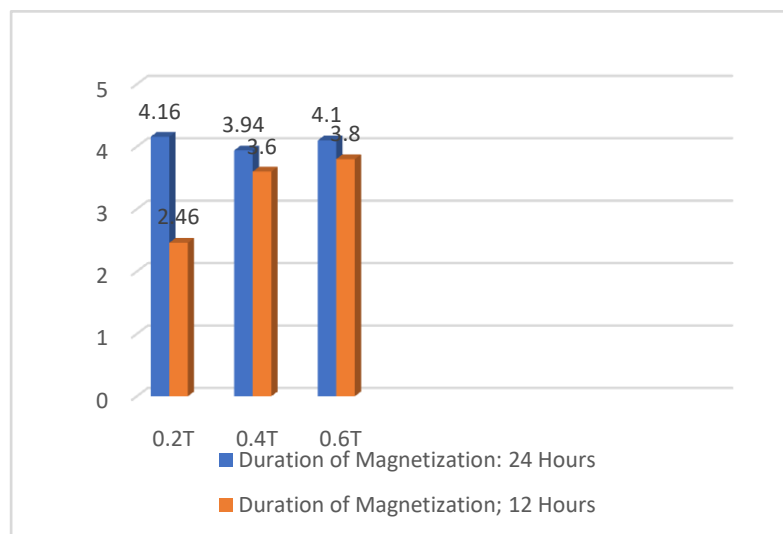
s.no	Type of mix	Average value
1	0.2T	4.16
2	0.4T	3.94
3	0.6t	4.10



Graph.1 Average Compressive strength of cubes cast with magnetic water of different intensities subjected to 12 Hours and 24 Hours of Magnetization



Graph.1 Average Split Tensile strength of cylinders cast with magnetic water of different intensities subjected to 12 Hours and 24 Hours of Magnetization



Graph.1 Flexural strength of Beams cast with magnetic water of different intensities subjected to 12 Hours and 24 Hours of Magnetization

IV. DISCUSSIONS AND CONCLUSION

- It was observed that the concrete cast with magnetic water of higher intensity i.e; 0.6Tesla showed an increase in compressive strength , split tensile strength and Flexural strength for 24 Hours duration of magnetization
- The compressive strength of concrete increased by 50.2% when cast with 0.6Tesla magnetic water subjected to 24 Hours of magnetization when compared to conventional concrete.
- The compressive strength of concrete increased by 48.52% when cast with 0.6Tesla magnetic water subjected to 12Hours of magnetization when compared to conventional concrete.
- With the use of magnetic water of intensity 0.6Tesla subjected to 24 ours of magnetization shows an increase in split tensile strength up to 31.5% when compared to conventional concrete ,
- The maximum flexural strength is increased by 34.5% with magnetic water of intensity 0.6Tesla subjected to 24 Hours
- As the intensity of magnetization and duration of time increases the mechanical properties of concrete also increased.

LITERATURE REVIEW

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