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AN EXPERIMENTAL STUDY ON EFFECT OF MAGNETIC WATER ON COMPRESSIVE STRENGTH CONCRETE

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ABSTRACT
In this research study, the effect of magnetized water on compressive strength of concrete was studied. Data were collected from previous studies and researches. The magnetized water was prepared using the magnetic treatment system; it is device which called as magnetic water conditioner. This test was carried on three different grades of concrete which is M25, M30, and M35. Four concrete mixes were prepared, one without magnetized water and three with. Compressive strength tests were carried out on all four mixes and it was found out that concrete produced by the magnetic technology is easy to operate without affecting the compressive strength of concrete. It was also found that magnetized water increases the compressive strength of concrete up to 14%

KEYWORDS: Concrete mix; compressive strength; magnetized water; Different Grades i.e. M25, M30, M35

1. INTRODUCTION

The most important challenge for concrete technologists is to improve the properties of concrete. To increase the compressive strength of concrete and to get more workable concrete at less water content are the aims which most researchers are looking for using various methods.

1. Use of fiber reinforcement
2. Use of fly ash
3. Use of polymer concrete, Cement is replaced by epoxy
4. Use of high range of water reducing super plasticizers etc.

The cost of these methods is not comparable with their advantages. So it is required to concentrate on producing economical concrete with higher strength. Water is an important ingredient of concrete as it actively participates in chemical reaction with cement. Since it helps to form, the strength giving cement gel, the quantity and quality of water is required to look into very carefully.

If Magnetic water is used the compressive strength can be improved and more workable concrete can be achieved with less water content and further reduction in cost. The magnetic water treatment machine contains a powerful magnet which is the source of production of magnetic energy. This powerful magnet is fixed in a small tube with such high technology that can create a magnetic field reaching a high rate of about 6500 Gauss. Magnetically treated water (MTW) is water which has been passed through a magnetic field prior to use.

2 .EXPERIMENTAL WORK

A) OVERVIEW

For this investigation of effect of magnetic water on strength of concrete three different mix proportions are made which is M25, M30, and M35.For testing compressive strength four different combinations are made which are

i. Casting & Curing in Normal water
ii. Casting in Normal water & Curing in Magnetic water
iii. Casting in Magnetic water & Curing in Normal water
iv. Casting & Curing in Magnetic water

B) MATERIAL

The cement used is Ordinary Portland cement of 53 grade manufactured by J.K.Cement Company. Crushed granite stone of maximum size 20mm confirming to IS 383-1970 used as coarse aggregates. The fine aggregate used in this investigation was passing through 4.75mm sieve. The grading zone of fine aggregate was zone II as per Indian standard specification. Water is used for preparation of magnetic water is free from suspended particles and chemical substances

C) PREPARATION OF MAGNETIC WATER

Magnetic water was prepared by passing normal tap water through magnetic water conditioner. Magnetic Water Conditioner is a device which is used to treat water under the influence of magnetic field. The MWC device used in this experimental investigation was made up of two parts as follows.

- Permanent Magnet Instrument
- Electromagnetic Instrument

A high power bar magnet that can produce the magnetic field of around 12000 Gauss was used. This high power magnet is fitted in cylindrical pipe with half inches diameter inlet and outlet facility. The electromagnet is constructed from many coils of wire wrapped around a central iron core. The magnetic field is present only when electrical current is passed through the wire coils.

D) MIX PROPORTION

For this investigation, the concrete Grade M25, M30 &M35 for the samples was used. The detailed mix designs of different grads of concrete are given below.

Table 1.Mix proportion for 1m^3 M25 Concrete

W/C ratio	Water	Cement	Sand	Aggregate
0.41	231.56 kg	480.87 kg	645.87 kg	1161.44 kg

Table 2.Mix proportion for 1m^3 M30 concrete

W/C ratio	Water	Cement	Sand	Aggregate
0.40	231.25 kg/m^3	492.9 kg	639.23 kg	1159.38 kg

Table 3. Mix proportion for 1m^3 M35 concrete

W/C ratio	Water	Cement	Sand	Aggregate
0.38	230.78 kg	518.42 kg	624.68g	1152.34g

E) PREPARATION OF TEST SPECIMEN

To investigate the effect of magnetic water on the compressive strength of the concrete cubes of size 150x150x150 mm was used.

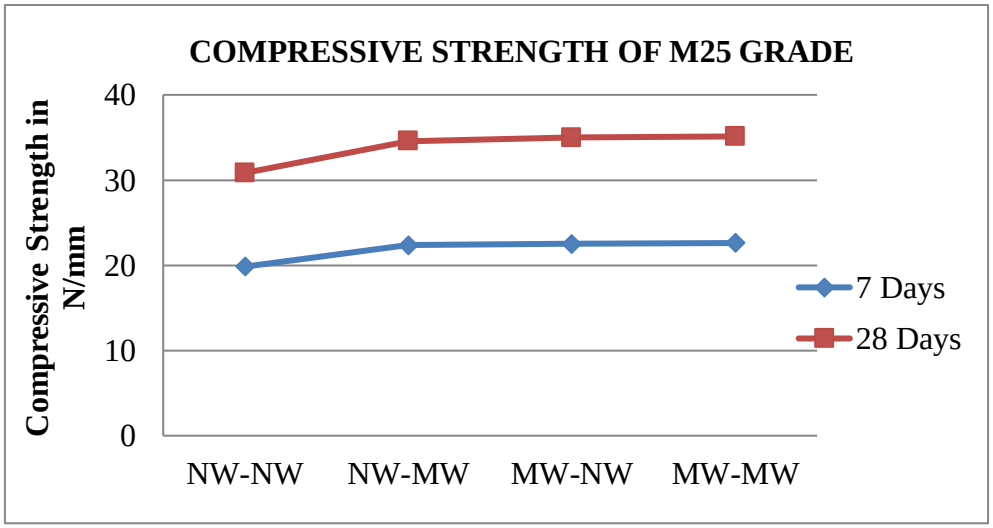
F) EXPERIMENT VARIABLES

The strength of concrete tested for different combinations of magnetic water. The age of curing of samples was 7 days and 28 days, for compressive strength test.

3. RESULT AND DISCUSSION

a) Comparison of Compressive Strength of Concrete Cubes of Grade (M25)

SR NO.	CURING PERIOD	CASTING	CURING	COMPRESSIVE STRENGTH(MPa)	% INCREASED
1	7 days	Normal water	Normal water	19.84	----------
2		Normal water	Magnetic water	22.37	12.8%
3		Magnetic water	Normal water	22.51	13.47%
4		Magnetic water	Magnetic water	22.61	**13.99%**
1	28 days	Normal water	Normal water	30.84	-------
2		Normal water	Magnetic water	34.55	12.03%
3		Magnetic water	Normal water	34.97	13.4%
4		Magnetic water	Magnetic water	35.12	**13.90%**

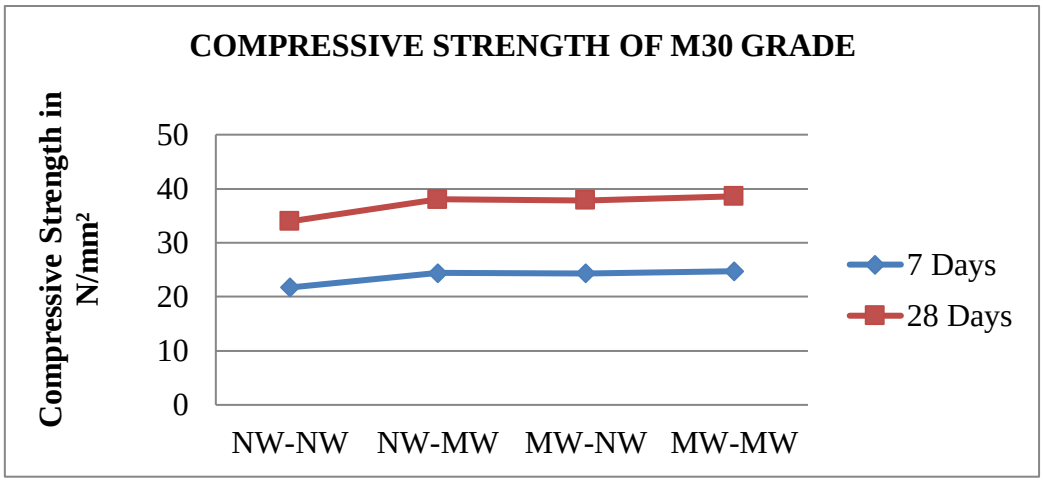


Comparison of Compressive Strength of M25 Grade for various Water Mixes

b) Comparison of Compressive Strength of Concrete Cubes of Grade (M30)

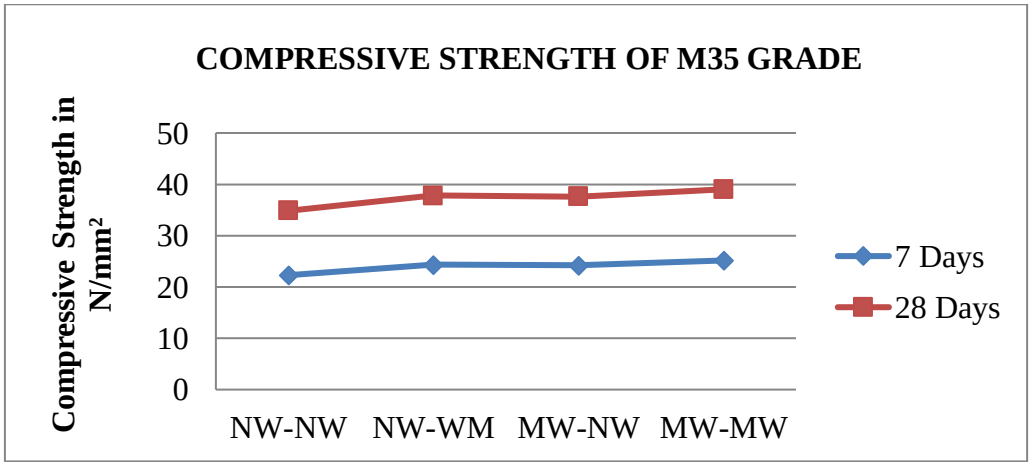
SR NO.	CURING DAYS	CASTING	CURING	COMPRESSIVE STRENGTH(MPa)	% INCREASED
1	7 Days	Normal water	Normal water	21.72	--------
2		Normal water	Magnetic water	24.38	12.26%
3		Magnetic water	Normal water	24.34	12.09%
4		Magnetic water	Magnetic water	24.73	**13.89%**
1	28 days	Normal water	Normal water	33.95	-----
2		Normal water	Normal water	38.01	11.97%
3		Magnetic water	Magnetic water	37.82	11.40%
4		Magnetic water	Magnetic water	38.59	**13.67%**

SR NO.		CASTING	CURING	COMPRESSIVE STRENGTH(MPa)	% INCREASED
1	7 Days	Normal water	Normal water	22.29	------
2		Normal water	Magnetic water	24.30	9.05%
3		Magnetic water	Normal water	24.22	8.68%
4		Magnetic water	Magnetic water	25.16	**12.89%**
1	28 Days	Normal water	Normal water	34.84	-----
2		Normal water	Magnetic water	37.81	8.55%
3		Magnetic water	Normal water	37.64	8.05%
4		Magnetic water	Magnetic water	39.02	**12.02%**



Comparison of Compressive Strength of M30 Grade for Various Water Mixes

c) Comparison of Compressive Strength of Concrete Cubes of Grade (M35)



Comparison of Compressive Strength of M35 Grade for Various Water Mixes

DISCUSSION

i. Increase in compressive strength was observed when magnetically treated water was used either for casting, curing or both in case of concrete M25.
ii. Increase in compressive strength is highest 13.99% in case of cube cast and cured in magnetically treated water.
iii. Increasing compressive strength observed when magnetically treated water was used either for casting, curing or both in case of concrete of grade M30
iv. Increasing in compressive strength is highest 13.67% in case of cube caste is cured in magnetically treated water
v. Increasing compressive strength observed when magnetically treated water was used either for casting, curing or both in case of concrete of grade M35
vi. Increasing in compressive strength is highest 12.02% in case of cube caste is cured in magnetically treated water

4. CONCLUSION

1. From result it is conclude that compressive strength of concrete of various grades has been increased for various combinations of casting and curing.
2. Increase in compressive strength is more, when both casting & curing is done by using magnetically treated water for all grade of concrete.
3. Improvement in compressive strength is more for M25 (13.9%).

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