e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:04/April-2022 Impact Factor- 6.752 www.irjmets.com

EFFECT OF MAGNETIC WATER ON CONCRETE PARAMETERS

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ABSTRACT

The most important challenge of construction industry is to increase the life of project/work. This can be possible by improving the quality of materials like steel bars, cement etc. But in this project, we particularly focus on concrete, what are possible ways to increase the properties of concrete. In the last decades new technology was invented in Russia and China called as magnetic water technology. This technology has been used in construction industry. The magnetic water was prepared by using electromagnetic field and permanent circular magnet. The water after passing through magnetic field is called magnetic water. In this magnetized water technology, a mechanism for magnetic water treatment was designed and its application on the ions contain in water has been investigated to examine the effect of magnetic water on concrete parameters by passing water through a magnetic field and physical properties of tends to change and results of such changes the number in the water cluster decrease from 13 to 5, which causes a decrease in the surface tension of water, with an improved strength of concrete. The benefits of using magnetized water In the curing have been found in recent studies. In this research study the effect of magnetized water on compressive strength and workability of concrete was studied in order to gain the strength with high resistance at lower cost. This Data were collected from past studies and researches. In this project four concrete mixed one without magnetized water and three with magnetized water have tested.as a result 12.5% and 25% cement reduction was imposed In last two concrete mixture with the use of magnetized water. In this project we have tested the concrete by using the slump cone test and compressive test these tests are carried out on all the four mix and was found that concrete produce by magnetic technology is easy or operate without affecting the compressive resistance.

Keywords: Magnetized Water, Magnetic Technology, Magnetic Field.

I. INTRODUCTION

As we know water is a very limited resource, it should be used efficiently. We also know that in construction industry use of water is done at higher level. We can optimize the water usage in construction industry by using magnetized water, so what is magnetized water? Magnetized water is a water which is passed through a magnetic field it is an inexpensive, ecofriendly water treatment and water charging method, it has very less installation charges and no energy requirement. The most important challenge for concrete technology is to improve the properties of concrete, to increase the compressive strength of concrete and to get more workable concrete at less water. Contents are the aims.so, with use of magnetized water usage of water will minimized with increasing concrete properties.

II. LITERATURE REVIEW

Taghried Isam Mohammed Abdel-Magid, Rabab Mohammed Hamdan- The aim of this paper is to the study of the effect of magnetized water on workability and compressive strength of concrete was studied, so on get operative concrete with high resistance and at a lower cost. Data were collected from previous studies and researches. The magnetized water was prepared using the magnetic treatment system. Four concrete mixes were prepared, one without magnetized water and three with. Cement reduction of 12.5 we attempt to 25 would it not absolutely was imposed on the last two mixes with magnetized water. Slump and compressive strength tests were distributed on all four mixes and it absolutely was revealed that concrete produced by the magnetic technology is easy to figure without affecting the compressive resistance of concrete. it absolutely was also found that magnetized water increases the compressive resistance of concrete while cement is reduced up to 25 %.

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Ashish Dagadu Amate, Sanika Sanjay Bhosale- The aim of this paper is to the study of the effect of magnetized water on workability and compressive strength of concrete was studied, in order to obtain operative concrete with high resistance and at a lower cost. The water after passing through magnetic flux is named magnetized water (MW). The magnetized water was prepared by using electromagnetic field (EMF) and permanent circular magnet. This is done by passing water through magnetic flux for 180 minutes. Some properties of magnetized water like conductivity, TDS, and pH were studied. This experiment was conducted at 25 gauss and 250 gauss magnetic flux strength.

M Gholizadeh, H Arabshahi- The aim of this paper is to look at the effect of magnetic water on concrete parameters. Strength parameters of concrete are studied for over 104 concrete samples, including the normal water and magnetic samples (made by magnetic water), with slump and compressive strength experiments. supported slump experiments, magnetic samples were 7 centimeters quite non-magnetic group and therefore the average compressive strength of samples made by magnetic water was 23% quite that of samples made by ordinary water. The experimental results show the advantages of magnetic samples in concrete industry thanks to increase in plasticity, the efficiency and quality of concrete boosts as compared with nonmagnetic samples.

Hassan Karam and Osama Al-Shamali- In this research they need studied the magnetic water has been utilized in different fields like agriculture, health care, constructions, dairy production, and oil industries. Concrete mixes designed were prepared using water (TW) and another set of concrete mixes designed of a similar proportion were also prepared using magnetized water (MW) within the laboratory to organize the testing specimens. Assessment of the Concrete strength was performed to figure out the effect of using magnetized water. The compression parameters included the mechanical properties and so the consistency of fresh concrete. The change in water natural phenomenon and thus the positive results of the concrete evaluation is evidence of the positive effect of using magnetized water in preparing concrete.

R. Malathy and N. Karuppasamy- In this paper they investigated the influence of magnetic water on the workability and compressive strength of concrete. The water is initially magnetized with the assistance of 0.5hp motor having a 0.8 T magnet at its inlet pipe. Both the physical and chemical properties oh water is to be studied. Concrete samples are then prepared and cured with magnetic water and ordinary water in four different cases. About 48 concrete cubes are casted for M25 grade and tested for 7, 14, 21 and 28 days respectively. the foremost scope of the study is to boost the qualities of water as per standards and reduce the water cement ratio thereby reducing the consumption of cement content and curing days.

S. Bharath1 and S. Subraja- In this paper they researched the advantages of using magnetized water within the production of concrete are found significant within the present study. This paper describes the experimental study conducted by casting 150 copper slag concrete samples prepared with water and magnetized water to research the influence of magnetized water on the compressive strength, flexural strength and split durability of concrete which contained copper slag. Water used for mixing the concrete was felt a flux of 1 Tesla. The decrease within the physical phenomenon of water after magnetization was found to be 7.77%. the share of replacement of cement with copper slag was 0%, 10%, 15%, 20% and 30%. The results indicate that there was a rise within the compressive strength of concrete by 4-18% when mixed with magnetized water compared with the concrete mixed with tap water. Similarly, the split tensile and also the flexural strength of concrete mixed with magnetized water was increased 6-17% and 5-10% respectively over that of control mix. it absolutely was also determined that workability of magnetized water concrete containing copper slag was increased up to 50%. The microstructure of copper slag concrete prepared with magnetized water have great deal of C-S-H compared with water. it had been observed that concrete with 85% cement + 15% copper slag shows the most strength parameters as compared with other concrete mixes.

Saddam M. Ahmed- In this paper they investigated the influence of magnetic water on compressive strength and workability (consistence) of concrete. Results show that the compressive strength of concrete samples prepared with magnetic water increases 10-20% over that of the faucet water samples. within the present study, increasing in compressive strength of concrete is achieved when the magnetic strength of water is 1.2 T, and velocity of water current that passes through flux is of 0.71 m/s. it's also found that magnetic water improves the workability (consistency) of fresh concrete.

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E. Poornima and P. Sivakumar- In this research they need studied the magnetic treatment of water increases the ion solubility and pH. this system is usually used for the softening of water and, for the primary time during this research, it's been adopted by the scientists for the assembly of concrete with improved strength. Some researchers hypothesize that magnetic treatment affects the character of hydrogen bonds between water molecules which increases the pH and softens the water. it's been observed that the concrete made with magnetic water has higher slump values. Also in some cases, the compressive strength of the magnetic concrete samples was beyond that of the control concrete samples (up to18%). The cement content are often reduced by 28% within the case of magnetic concrete. results of our project shows increase in compressive strength of concrete around 20% for non-recirculated magnetic water specimen and it ranges 25% just in case of recirculated magnetic water specimens. Similarly, the test conducted on recirculated magnetic water shows change in pH value from 7.8 to 8.7 with increase in recirculation time. The hardness also reduced from 310 to 190 mg/lit because of recirculation of magnetic water.

Arihant Jain1 and Aakash Laad- In this paper they investigated the effect of magnetic water also referred to as field of force treated water (MFTW) on compressive strength, water absorption, porosity and sorptivity on samples prepared with magnetic water. MFTW was obtained by passing through a field of force. Test variables included the magnetic strength of water and curing age. Results show that the compressive strength of concrete samples mixed with magnetic water is over those prepared with normal water. The compressive strength increase of concrete prepared with magnetic water is more significant at early age. the most effective result achieved for water absorption and porosity were obtained at magnetic strength of treated water is of 1T.

S Venkatesh1 and P Jagannathan- This experimental study involves the examination of magnetized water on the workability and strength properties of the concrete. The water is magnetized in static treatment process with two different strengths of magnets with 0.986 and 2 Tesla. The water exposed to magnetic flux is employed in concrete on replacing ordinary water it results to extend the workability and mechanical properties of the concrete. The compressive, split tensile and flexural strength tests was carried using 24hour magnetized water in production of concrete. Concrete made with magnetized water possess higher strength than concrete made with ordinary water. The extent of the study is to boost the character of the water in line with the standards and reduce the water-cement ratio thereby reduce the use of cement content and porosity of the concrete.

V.S.S.Kaushik and V.R.N.V.D.Pavan- In this paper they investigated the feasibility of magnetized water in concrete mixes. Concrete is that the most vital engineering material and therefore the addition or replacement of a number of materials may change the strength parameters of the concrete. In recent years lots of research work has been allotted so as to get more durable and long-term performance of concrete structures within the dynamic environment. An experimental program is about up to check the effect of magnetized water with variation of your time period of water placed in flux. The laboratory investigation included measurement of compressive strength and flexural strength. The results of this investigation indicates a general improvement in mix properties with the introduction of magnetized water within the concrete mix.

III. METHODOLOGY

There is long history of the promotion of magnets to alleviate the “hardness” of minerals-containing waters and particularly to control the deposition of scale in teapots, plumbing systems, evaporators and boilers. There are now a large variety of the devices on the market that clam to reduce scale deposition, and some claim soften the water as well. The earlier devices mostly employed permanent magnet, but now use alternating magnetic or magnetic field. The magnetic field surrounds the pipe at some point and penetrates it from all side. This obviously limits its use to non-ferrous pipes such copper or plastic.

Although magnetic water treatment (MWT) products have been promoted since the 1930’s, they have not received very wide acceptance within the engineering community, and the question whether or not they are effective is still very much open. The widespread marketing of MWT products over the internet has done little to resolve the issue.

The effects of magnetic fields on running water have been known for years. Patents on using magnets to treat water appeared as early as the 1950’s. Long-term use of magnets resulted in less scale deposit. The effects were described as appearing as the mineral content of the water had been lowered. The technology was used mainly

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in countries which have very little chemical industry, like Russia, China, Poland and Bulgaria, who all reported the successful use of magnets in treating water for irrigation, industry and home use. Magnetic water treatment developed more slowly in the west, where measuring the magnetic effect of flowing water was somewhat suspect. Nevertheless, they citied improvements in taste and drying time.

2.1 PREPARATION OF MAGNETIC WATER (MFTW)

Magnetic water was prepared by passing normal tap water through magnetic field generated by electromagnets in physics lab. Water was rotating in electromagnetic field for 120 minutes for 3 liters water. The materials are used in preparation of MFTW electromagnets, gauss meter, a 9V toy motor, a propeller and plastic straws.

2.2 MIX PROPORTION

For this investigation, the concrete Grade M30 for the samples was used. The detailed mix design procedure of M30 Grade of concrete is given Table 1.

Table. 1. Trial mix proportion for 1m3 of concrete

MATERIAL	QUANTITY IN KG
Cement	412.33
Fine Aggregates	654.67
20mm Aggregates	664.15
10mm Aggregates	455.1
Water	185

2.3 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. For Water Absorption, Porosity and Sorptivity of the concrete cubes size of 150x150x150 mm was used.

2.4 EXPERIMENT VARIABLES

The magnetic strength of treated water is 0.8 T, 0.9 T and 1T. The age of curing of samples were 7 days and 28 days, for compressive strength test. The age of curing was 28 days for Water Absorption, Porosity and Sorptivity Test.

2.5 RESULT AND DISCUSSIONS

Compressive Strength

Table 2. Compressive strength of concrete

Magnetic Strength of Treated water	Compressive Strength (MPa)	
	7 Days	28 Days
0 Tesla	18.67	33.16
0.8 Tesla	20.1	34.20
0.9 Tesla	22.05	34.43
1.0 Tesla	22.23	35.91

2.6 Water absorption Table

Table 3. Water Absorption of Sample

Magnetic Strength of Treated Water	Water Absorption (%)
0 Tesla	5.618
0.8 Tesla	6.344
0.9 Tesla	6.914
1.0 Tesla	5.519

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2.7 Porosity

Table 4. Porosity of Concrete Sample

Magnetic Strength of Treated	Water Porosity (%)
0 Tesla	13.4
0.8 Tesla	15.32
0.9 Tesla	16.21
1.0 Tesla	13.11

IV. CONCLUSION

From the above study it can be concluded that usage of magnetic field water treatment can increase the properties of water where pH value was increase. The treatment of water by magnetization improves the mechanical properties of concrete such as increasing the compressive strength and workability of concrete.

It was found that the percentage of concrete samples cast and cured with magnetized water is 20% higher than the conventional samples. The compressive strength of concrete increase with the use of magnetized water and the increase in strength is due the cluster concept. As more water is available for the hydration, the greater number of cement particles are hydrated and this results in increase in hydration that may lead to increase in compressive strength of concrete. This phenomena increases the efficiency of cement used in concrete. The results from water absorption and porosity shows increasing trend in 0.8 Tesla and 0.9 Tesla but finally decrease in 1 Tesla which comes out less than 0 Tesla. The best result of sorptivity shows increasing trend upto 0.9 Tesla which is less than 0 Tesla sorptivity results. The process of magnetizing water thus changes the mechanical and durability properties of concrete.

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