WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Study on Magnetized Water on Concrete by Partial Replacement of Cement

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A B S T R A C T

Concrete is constantly anticipated to be stronger and more durable than before, while also being less expensive and more energy efficient. Further- more, concrete's primary benefits over other construction materials must be preserved. The ability can be created almost anywhere, the ability to make the shape dictated by the shape of a mould, and inexpensive component and manufacturing costs. These factors have fueled advancements in concrete performance over the years, and they continue to do so. The desire to enhance concrete performance, as well as concerns about the environmental effect of rising concrete consumption, has resulted in a growth in the usage of alternative material components. When water passes through a magnetic flux, it becomes magnetised. The amount of magnetism is determined by the technology used and the quality of the water. Fly ash is a fine powder produced when crushed coal is ignited in electric generating plants. Fly ash is a pozzolan, which is a substance that combines aluminous and siliceous materials to form concrete when mixed with water. When fly detritus is combined with lime and water, a product that is almost comparable to Portland concrete is created. In this present study an experimental investigation was conducted to study the strength and workability of M30 and M40 grade concrete made with normal water and magnetic water. The percentage of fly ash used is 0% and 5% for both the case, the compressive, split tensile and flexural strength values are determined for the 7 days, 14 days and 28 days curing periods.

Keywords: Magnetic water, normal water, fly ash, workability, strength

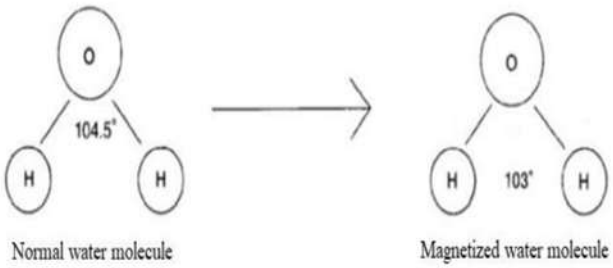
INTRODUCTION

1.1 General

Concrete is a material that is much of the time utilized in the structure of developments inferable from its unmistakable qualities when contrasted with different materials. Numerous analysts looked to foster substantial materials through examinations and exploration determined to arrive at reasonable structures with high opposition and proper financial expenses because of the attributes of concrete, for example, its obstruction and high capacity to oppose then compassing conditions, just as its lastingness. The nature of the water utilized in the substantial combination immensely affects the substantial's opposition, consequently pick the right water for blending. Due to the significance of water's effect on many elements of cement, it was important that this material be given consideration in exploration and study, prompting using attractive water in substantial combinations to expand their obstruction rather than utilizing costly added substances. When compared to other approaches, the cost of treated water was seen to be quite cheap. As a result, researchers' attention has been drawn to the manufacture of economical concrete with high resistance through the use of new philosophies and current technology in design processes that have no negative environmental impact. The magnetic field influence on water properties, which affects the various characteristics of concrete, is perhaps the most important of these strategies. The primary responsibility of concrete engineers is to enhance the qualities of concrete. Most researchers seek to improve concrete's compressive strength and make it more work able with less water, and they believe that adding magnetic water to the mix will help them do so. Concrete is the second most as often as possible utilized material on the earth, behind water, representing around 5 percentofworldwideCO2discharges.Thistroublingamountofdischargesproddeda.

Magnetized water

When exposed to a magnetic field, water's characteristics (physical and chemical) change. The differences in Macroscopic characteristics are caused by the presence of distinct anomalous features of water. Water is perceived as an everyday fluid, although the bulk of research studies incorporate it. As seen in Figure, water is a transparent material made up of a homogenous mixture of two hydrogen atoms and a single oxygen atom. When water is lowered to undetectable depths, it forms clusters of molecules, the size of which is determined only by the compulsion, potency, and temperature conditions that exist above the water. These molecular clusters are held together by Vander Waal forces and hydrogen bonds. When subjected to a magnetic field,.



Fly ash

Fly ash powder is a byproduct of the combustion of pulverised coal in hot power plants. Before the igniting gases are discharged into the environment, the clean collection framework expels the fly cinder as a fine particle accumulation. Fly fiery remnants particles are generally round, spanning distances ranging from 1m to 150m. The type of clean accumulation gear used greatly influences the range of molecule sizes in any particular fly powder. The fly slag from boilers at some older plants that rely only on mechanical gatherers is coarser than that produced by units that utilise electrostatic precipitators. The synthetic piece of fly cinder is determined by the types and relative amounts of incombustible materials in the coal utilised. Concoction mixtures and glasses framed by the components .

Objectives of the study

The following are the primary goals of this study project: 1. To demon- strate that by applying magnetic treatment to subsurface water, utilised water (hard water) may be used for concreting. 2. To find a solution to the effective utilisation of ground water in Hyderabad. 3. Determine the effect of magnetically treated ground water of various grades on concrete strength and workability (Slump and Compacting Factor). 4. Investigate the impact of magnetic therapy on water characteristics. 5. Using flyash to replace or reduce the cement content.

Summary

Substantial designers' most significant obligation is to work on substantial properties. Most examination expect to work on cement's compressive strength and create more useful cement with less water, and the strength can be accomplished by bringing attractive water into the substantial blend. Concrete is the second most habitually utilized material on the earth, behind water, representing around 5% of worldwide CO2 outflows. This troubling amount of discharges prodded a hurried quest for elective concrete materials. Fly debris is a result of nuclear energy offices. As the country's dependence on coal for power age develops, so will the creation of fly debris. This broadly open, unused material can be utilized in concrete as a halfway trade for concrete. This strategy might be utilized to tackle both the natural worries of concrete assembling and the ecological difficulties of fly debris. In an earlier report, attractive water was displayed to expand the strength of cement by generally half. This expanded strength accomplished through the utilization of charged water can be used to fulfill the need for less concrete in concrete. Fly debris, which has cementitious characteristics, is utilized to supplant a generous measure of concrete in concrete in this undertaking,

Literature Survey

Rabab Mohammed Hamdam, et al. (2017)

The effect of charged water on substantial functionality and compressive strength was inspected to foster more safe and practical cement. Information was assembled from past examinations and exploration. To make polarized water, an attractive treatment approach was used. We created four substantial mixes, one without polarized water and three with it. Concrete decreases of 12.5% and 25% were added to the last two charged water combinations. Droop and compressive strength tests were completed on every one of the four blends, and still up in the air that substantial made with attractive innovation is easy to work with and has a high compressive opposition.

Raad Hoobi Irzooki, et al. 7 (4.20) (2018) 194-199

The impact of the attractive field on the properties of faucet water and the attractive water impact on certain properties of the substantial utilized for water system channel covering will be examined, hence substantial ingestion and leakage attributes will be explored. Faucet water was taken care of

through three separate charged gadgets with three distinct qualities (3000, 5000, and 7000) Gauss for 120 minutes. The properties of charged water were examined, including surface strain, thickness, conductivity, TDS, and pH.

Saddam M. Ahmed Volno-17 (2009)

The impact of attractive water on the compressive strength and functionality of cement is examined (consistence). As per the review, the compressive strength of substantial examples made utilizing attractive water improves by 10-20% a bigger number of than that of regular water tests. Utilizing the electromagnetic impact, they produced an attractive field. Copper curls are wrapped one on top of the other to make the instrument. An attractive field is conformed to the loops.

Nan Su, Yeong-Hwa Wu, et al. (2000)

The compressive strength and usefulness of mortar and cement contain- ing granulated impact heater slag and blended in with attractive water were inspected (GBFS). The water's attractive strength, the measure of GBFS uti- lized instead of concrete, and the water-to-folio proportion (W/B) were totally utilized as test factors. As per the discoveries, the compressive strength of mortar tests blended in with 0.81.35 T attractive water was 91% more note- worthy than that of mortar tests blended in with regular water. Additionally, attractive water-arranged cement had a compressive strength that was 10.23% higher than faucet water tests.

Materials used

Calcareous rocks, like limestone or chalk, just as argillaceous minerals, like shale or waste, are needed for Portland bond. Contingent upon whether the crude parts are mixed and squashed wet or dry, there are two sorts of wet and dry techniques. The most frequent raw materials used in bond manufacturing are lime, silica, alumina, and iron oxide. In a high-temperature oven, these oxides mix to create even more strange combinations. Concrete hydration refers to the chemical.

Magnetic water

Magnetized water is created when water flows through a magnetic flux. The level of magnetism is determined by the technology utilised and the quality of the water. The design of water is positioned one way after charging, and the atom sashizes differ when the security point changes, causing the thickness and surface region to rise by attraction, increasing the hydration rate. The appealing water test is seen in the image below.

EXPERIMENTAL INVESTIGATION

Table 4.1 No Blocks Required for the Experiment

Sl.No	Concrete Type	Compressive strength of concrete			Split tensile strength of concrete			Flexural strength of concrete		
		7days	14days	28days	7days	14days	28days	7days	14days	28days
1	Normal water	3+3	3+3	3+3	3+3	3+3	3+3	3+3	3+3	3+3
2	Normal water +5% Fly ash	3+3	3+3	3+3	3+3	3+3	3+3	3+3	3+3	3+3
3	Magnetic water	3+3	3+3	3+3	3+3	3+3	3+3	3+3	3+3	3+3
4	Magnetic water+5% Fly ash	3+3	3+3	3+3	3+3	3+3	3+3	3+3	3+3	3+3
Total		72 Cubes72			Cylinders			72 Prisms		

Preparation of magnetic water

Water is kept in a glass beaker above a circular magnet acquired from a scientific store to make magnetic water. In this case, the magnet is put beneath the glass beaker, which is then filled with potable water (IS: 3025- 1986) and set aside for the needed amount of time, such as 24 hours, as indicated in the diagram below. During this period, a magnetic field passes through the glass and into the water, which absorbs the magnetism and is utilised to make concrete. Water was exposed to the North Pole and the South Pole, and the water collected was utilised in our research on concrete strength

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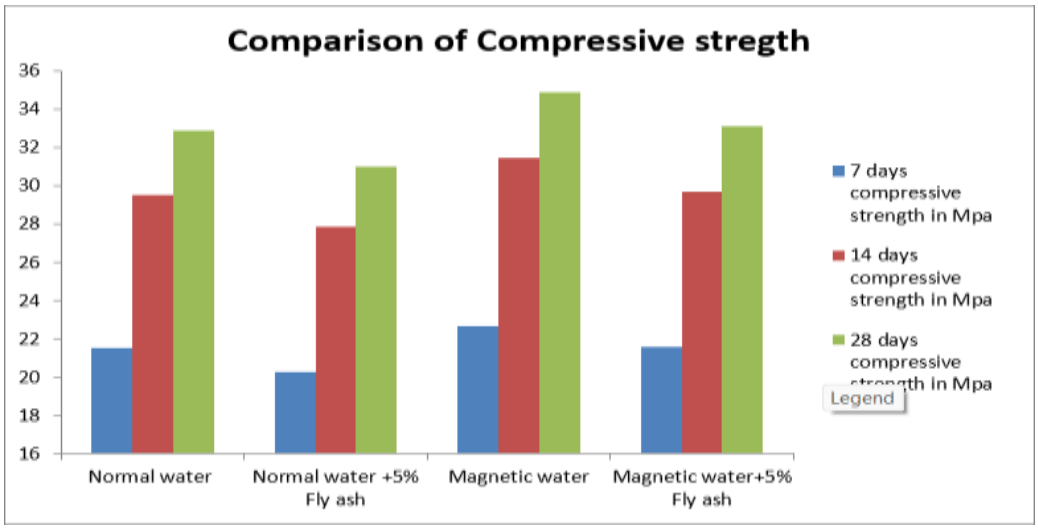

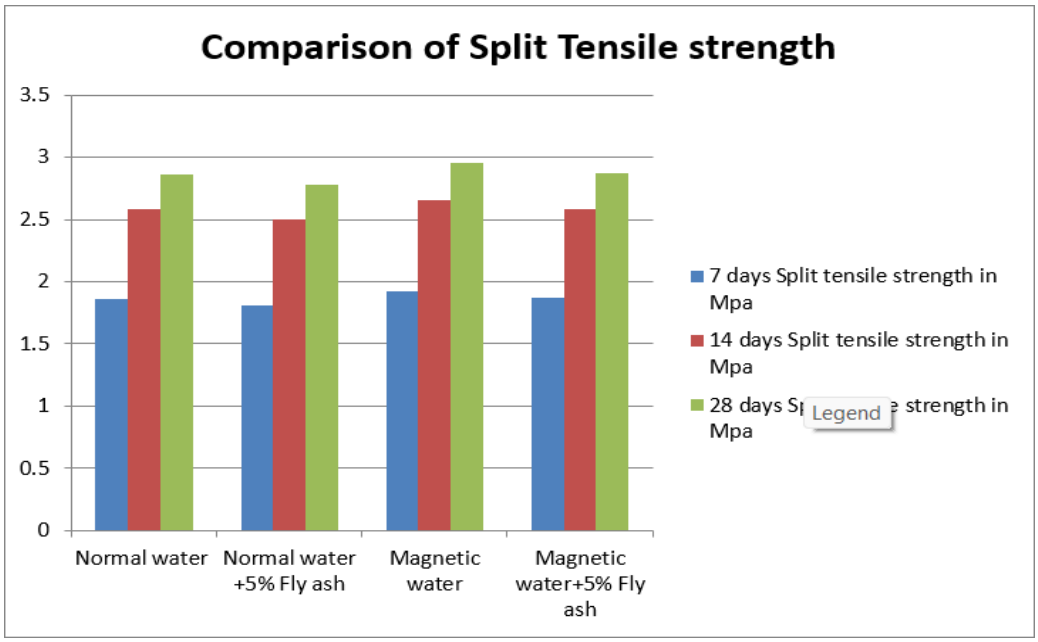

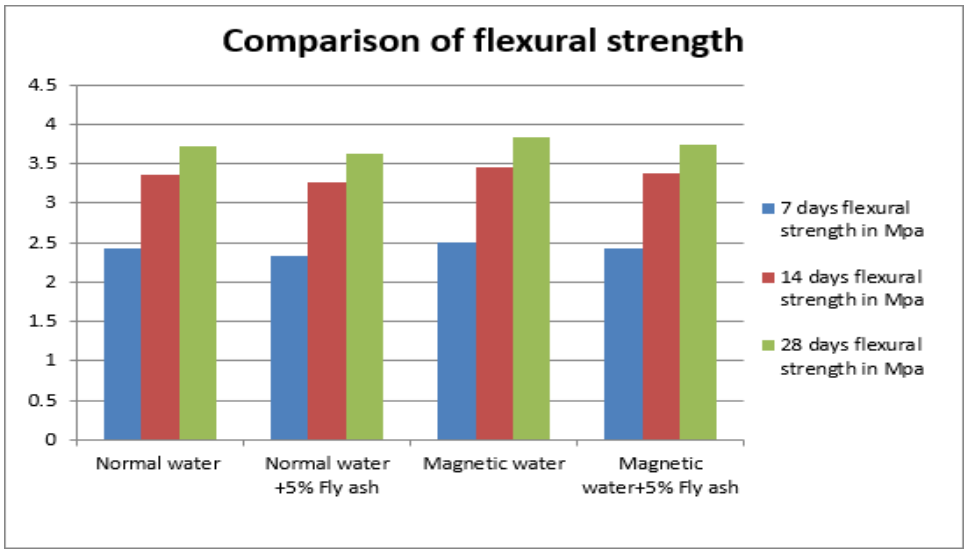

Conclusions and Future Scope

1. From conventional water curing to magnetic water curing with fly ash cases, the slump cone test and compaction factor test rises.

2. For conventional curing and magnetic curing with 5% fly ash case, compressive strength, split tensile strength, and flexural strength are almost same.

3. This allows us to save 5% of the cement in both M30 and M40 grade concrete mixtures.

4. When compared to other examples, the highest value of strength is attained at 0% fly ash with magnetic curing.

5. Curing in magnetically treated water has a higher success rate than casting in magnetically treated water.

6. In the construction business, magnetic water is recommended for concrete casting and curing.

7. Magnetic treatment can also be used to soften brackish subterranean water, making it appropriate for building.

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