

Experimental Analysis of Magnetic Water Concrete

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Abstract: Rapid growth of world population and widespread urbanization has remarkably increased the development of the construction industry which caused a huge demand for sand and gravels. Environmental problems occur when the rate of extraction of sand, gravels, and other materials exceeds the rate of generation of natural resources; therefore, an alternative source is essential to replace the materials used in concrete. Now-a-days, electronic products have become an integral part of daily life which provides more comfort, security, and ease of exchange of information.

Water also causes major issues because it is highly complex to handle and often contains highly toxic chemicals such as lead, cadmium, mercury, beryllium, brominated flame retardants (BFRs), polyvinyl chloride (PVC), and phosphorus compounds. Hence, Magnetic Water can be incorporated in concrete to make a sustainable environment. This project also provides a detailed literature review on the behaviour of concrete with incorporation of Magnetic Water concrete.

In this project Magnetic Water is used, the research is carried out by using M20 grade concrete with replacement of 2.5%, 5%, 7.5%, 10% and is carried out to determine the optimum percentage of replacement at which maximum $C S$, $F S$ is achieved, the properties of the material are analyzed.

Keywords: Coarse aggregate, Fine aggregate, E-waste, Compressive strength, Split tensile strength and flexural strength

I. INTRODUCTION

1.1 General

As you know water is a limited resource, so it must be used effectively. This can be done by using magnetic water. What is magnetic water? Magnetic water is water passing through a magnetic field. It is an inexpensive, eco-friendly water treatment that has a small installation fee and does not require energy. The effect of magnetism on water is a matter of controversy. Improving the properties of concrete is one of the most important challenges for concrete technicians. The goal is to increase the compressive strength of concrete and to obtain a more efficient concrete with a lower water content, which most researchers are looking for using a variety of methods. The cost of these methods cannot be compared with their advantages. Therefore, it is necessary to focus on making economical concrete with high strength. Water is an important component of concrete as it is actively involved in chemical reactions with cement. As it helps in formation, it is necessary to carefully consider the strength cement gel, water quantity and quality. Compressive strength can be improved by using magnetic water and more efficient concrete can be obtained by reducing the amount of water and further cost. A magnetic water treatment device has a powerful magnet which is a source 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 12000 Gauss.

1.2 Magnetic Water

Magnetically treated water is the water obtained after passing through a specific magnetic field, or placing that magnet in or near this water for a period, thereby changing many of its properties due to exposure to the effect of those magnetic fields. The water that we drink or use during our daily lives loses many of its properties due to desalination processes by and environmental pollution by subjected to condensation high air pressure and the addition of many sterile substances. Therefore, the process of magnetic treatment of water works to revive many of the properties, which

lost under the influence of desalination and environmental pollution and strengthen it. The process of magnetic treatment correctly reorganizes water ions while the form of these ions randomly in the tap water.

Scientific research has shown that more than 14 properties change in water after passing through the magnetic field, including electrical conductivity, increase dissolved oxygen in water, increase the ability to dissolve salts and acids, crystallization, surface tension, change in the speed of reactions by, increasing permeability, etc and the water retains its magnetic strength for 8-12 hours and then starts in slow gradual decline, although some properties of water do not change even if this water passes for a long time in this field. The magnetically treatment of water was done using magnetic devices of certain intensity, and for a certain period, there are many factors influence in the process of the magnetization of water

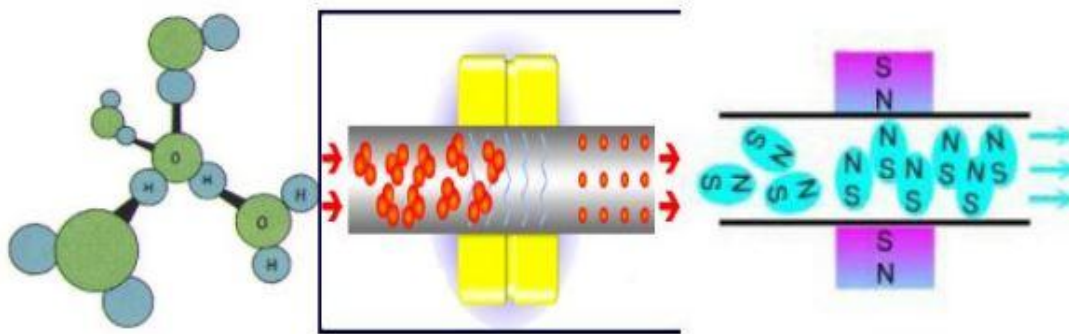


Fig-1: Mechanism of magnetic water: A. Water cluster; B. Breakage of cluster C. orientation.

1.3 Principle of Magnet Therapy

All physical and mental functions are controlled by electromagnetic fields produced by the movement of electro chemicals (ions) within the body. When an injury occurs and tissue is damaged, positively charged ions move to the allocated area, causing pain and swelling. In order for healing to take place, the injured site must be restored to its natural negative electromagnetic charge. Pain and inflammatory related electro chemicals must be removed and oxygen and nutrients transferred to the area.

The application of a magnetic field to an injured area helps restore the normal electromagnetic balance. The magnetic field relaxes capillary walls as well as surrounding muscle and connective tissue, allowing for increased blood flow. More oxygen and nutrients are transferred to the injury site, while pain and inflammatory related electro chemicals are more efficiently removed. The overall process restores the normal electromagnetic balance of the area, relieving pain and inflammation, and promoting accelerated healing

1.4 Problem Statement

The demand of better concrete is increasing day by day. Improved quality of concrete will only perform better if concrete improves workability, durability, flow ability & resistance to chemical attack/corrosion and reduce w/c ratio, heat of hydration & segregation mainly. For the fulfilment of above properties Magnetic water are used for effective & efficient strength & durability of concrete with the addition of Magnetic Water.

1.5 Need of the Study

The objective of the current study is to identify the effect of water exposed to the magnetic field on some properties of concrete. Also, this study includes the effect of different intensities of magnetic field on some water properties such as pH, TDS and electrical conductivity (EC) and the effect of changing of these properties on the concrete.

II. LITERATURE REVIEW

Juan Carlos Leyva-Díaz et.al (2021) (1) Water pollution is a worldwide problem. Water consumption increases at a faster rate than population and this leads to a higher pollution rate. Sustainable Development Goals (SDG) include proposals aimed at ensuring the availability of clean water and its sustainable management (Goal 6), as well as the conservation and sustainable use of oceans and seas. The current trend consists in trying to reconcile economic growth with sustainability, avoiding the negative externalities for the environment generated by human activity. 0More specifically, the objective of this article is to present the evolution of the research regarding the removal of polluting pharmaceuticals that are discharged into Magnetic water. To do that, a bibliometric analysis of 2938 articles comprising the period 1979–2020 has been carried out. This analysis includes productivity indicators in the scientific field: journals, authors, research institutions and countries. In addition, keyword analysis allows the identification of four main axes of the research regarding the removal of pharmaceutical residues found in Magnetic water. The first group of articles is aimed at identifying the pharmaceuticals present in polluting effluents. The second and third groups of articles focus on presenting the procedures that enable the treatment of emerging contaminants, either from a biological point of view (second group) or a physicochemical point of view (third group). The fourth group refers to water quality and its possibilities to be reused. Finally, there is a growing trend of worldwide scientific publications, which justifies the importance of polluting residues management, especially those of pharmaceutical origin, in order to achieve a more sustainable society.

Jayalekshmi S J et.al (2021) (2) Magnetic water is the water that emanates from domestic sources, restaurants, establishment, industries, agriculture fields, etc. Around 80% of all Magnetic water is discharged into the world's waterways, and it creates health, environmental and climate-related hazards. The dissolved and suspended organic solids in Magnetic water are "putrescible" or biodegradable. It is important to treat the Magnetic water before discharging it. It is essential to reduce the impact created by the Magnetic water through different treatment methods and reuse the treated water for various purposes. The present study emphasis on various modern Magnetic water treatment technologies and compare their efficiency with traditional treatment methods, and also find the end-use possibility of treated water, It is estimated that out of the total water supplied around 70% to 80% becomes Magnetic water. The Magnetic water that is generated is released into the natural water stream. Disposal of Magnetic water into the surface water sources causes significant issues and harms people's health the only solution for this is to treat the Magnetic water to the standards

Leticia Gallego-Valero et.al (2021) (3) Given the problem of water scarcity and the importance of this resource for the sustainability of the planet, Magnetic water treatment and its costs have become a key issue for proper water management. Using bibliometric analysis of publications in the Web of Science database, this study presents an overview of the research on Magnetic water treatment costs in the period 1950–2020. The worldwide search returned 22,788 articles for Magnetic water treatment costs, which compares poorly to the results for research on Magnetic water treatment, accounting for only 12.34% of the total output on Magnetic water treatment. The findings of this study reveal the leading countries in this field of research (China, USA, India, Spain and the UK), with the articles being published in a wide range of high impact journals. Similarly, there are very few results on UV and chlorination costs, despite the importance of these two treatments for Magnetic water disinfection and reuse. This study is aimed at researchers in this field, helping them to identify recent trends, and at the main institutions in the scientific community working on this subject

Naef A. A. Qasem et.al (2021) (4) Removal of heavy metal ions from Magnetic water is of prime importance for a clean environment and human health. Different reported methods were devoted to heavy metal ions removal from various Magnetic water sources. These methods could be classified into adsorption-, membrane-, chemical-, electric-, and photocatalytic-based treatments. This paper comprehensively and critically reviews and discusses these methods in terms of used agents/adsorbents, removal efficiency, operating conditions, and the pros and cons of each method. Besides, the key findings of the previous studies reported in the literature are summarized. Generally, it is noticed that most of the recent studies have focused on adsorption techniques. The major obstacles of the adsorption methods are the ability to remove different ion types concurrently, high retention time, and cycling stability of adsorbents. Even though the chemical and membrane methods are practical, the large-volume sludge formation and post-treatment requirements are vital issues that need to be solved for chemical techniques. Fouling and scaling inhibition could lead to

further improvement in membrane separation. However, pre-treatment and periodic cleaning of membranes incur additional costs. Electrical-based methods were also reported to be efficient; however, industrial-scale separation is needed in addition to tackling the issue of large volume sludge formation. Electric- and photocatalytic-based methods are still less mature. More attention should be drawn to using real Magnetic waters rather than synthetic ones when investigating heavy metals removal. Future research studies should focus on eco-friendly, cost-effective, and sustainable materials and methods.

Rana Zeeshan Habib et.al (2021) (5) Microplastics, plastic pieces of ≤ 5 mm in size, are ubiquitous in their environment and can be found in both terrestrial and aquatic ecosystems. This manuscript reviews the literature on the fate of microplastics in Magnetic water treatment and briefly highlights novel developments in the removal of microplastics from aqueous systems. A major share of the microplastics entering the environment does so through sewage water. Some of the main contributors are microbeads from cosmetic formulations and microtires and road wear particles (TRWP)

III. METHODOLOGY

3.1 Test to be Performed

3.1.1 Compressive Strength

The compressive strength assessments have been done holding a compression testing machine as a IS: 516-1959. The cubes 150mm measurement had been subjected to testing in the ages 7 days, 28 days, 56 days or weeks as well as 90 days. For every concrete composition 3 specimens have been analyzed. Typical importance of 3 samples was found as compressive strength

3.1.2. Flexural Strength

Concrete examples of dimension 100mm x 100mm x 500mm have been subjected to testing less than standard four factors bending within flexural assessment machine. Specimens have been tested during ages that are different. The flexural strength was estimated as the typical of three examined specimens

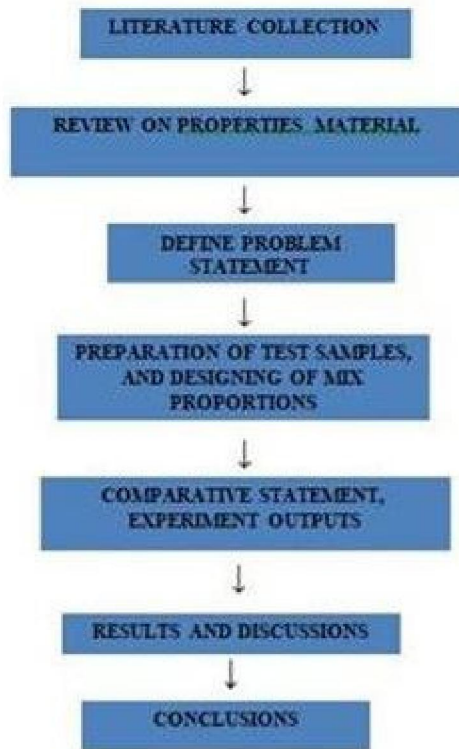
3.1.3. Modulus of Elasticity

Cylindrical specimens of size 150mm diameter as well as 300mm height had been used for the dedication of modulus of elasticity as a IS: 516- 1959. Concrete mixes with 10 % latex content offered the typical strength improvement for equally compression as well as flexural strength. Thus flexible modulus check done for selected incorporate just. Specimens have been packed uniaxial inside a compression assessment printer as well as deformations have been captured utilizing switch gauge of 0.01mm very least matter in an interval of 10kN until finally the good load. Stress strain curves from cylinder compressive strength test

3.1.4. Rapid Chloride Permeability Test

To verify the great level of resistance to chloride penetration on the SBR Magnetic water concrete as well as comparability with typical concrete. This particular check spreads over the dedication of electrical conductance of concrete to offer indications of the resistance of its to chloride ions. Disc shaped test examples of dimension 100 mm dia x 50mm thickness cut via the 100mm x 200mm cylinder had been employed for chloride diffusion studies as per ASTM C1202.

The strategy pushed to obtain the above mentioned talked about objectives are generally as follows:



IV. RESULT AND DISCUSSION

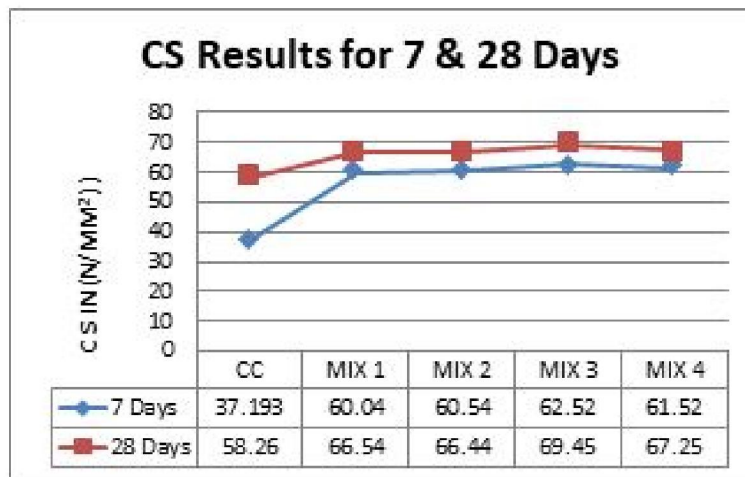


Fig Shows 7 & 28 days C T results with various mixes of E-Waste

V. CONCLUSION

The literature shows that Magnetic Waterin concrete plays a major role in the construction sector. Some important points are given below-

1. The use of Magnetic Waterin concrete reduces environmental pollution and unriddle the problem of disposal. Which indirectly protect our natural resources like groundwater and air.
2. Both coarse and fine aggregates can be replaced through Magnetic Waterup to a certain percentage depends on the quality and properties of material. Which leads to an eco-friendly structure.

3. Lightweight concrete can be prepared through e-waste.
4. It was seen that, by using Magnetic Water the workability of concrete increases, which concludes that using casting, decreases the cost of admixture.
5. Magnetic Water can also be used as an admixture in concrete. By using it as an admixture the hardened properties show an increasing trend up to a certain percentage.
6. Magnetic Water is a potentially viable material used in low-cost construction as structural and nonstructural members.
7. It can also be used as a replacement of cement up to certain percentages.
8. Using Magnetic Water in concrete gives better resistance to sulphate attack and chloride attack.
9. Due to less density of concrete and intermolecular voids, Magnetic Water concrete is more permeable than conventional concrete.
10. By infusion of Magnetic Water in concrete, the ductility of concrete increases. Due to which the concrete deforms before failure. So, can be used in harsh weather conditions

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