Behaviour of Compressive Strength of M20 Grade Concrete using Ruber Crumb, Magnetized and Normal Water

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***Abstract*— Water plays an important role in the concrete preparation. It plays an important role in workability and strength of concrete. A new technology known as magnetized water is used to increase the workability and strength of concrete. At the same time, after pure water is magnetized, we should inject immediately the magnetized water into the sample baths of the instrument to measure their properties because the time, in which the magnetization effect can be retained, is finite. The experiments should be repeated about 2-3 times for their credibility. Hence normal water concrete with crumb rubber shows nearly same strength compared to normal water concrete, so waste can put to work. This paper aims to comparative study of M20 grade concrete with Crumb Rubber and magnetic water. The literature study showed that there can be improvement in compressive strength of concrete when it is used with magnetic water. the results here show the compressive strength of concrete can be considerably increased.**

Keywords: Magnetise Water, Rubber Crumb, Compressive strength.

INTRODUCTION

In this research study, the effect of magnetized water on compressive strength of concrete was studied, in order to obtain operative concrete with high resistance and at a lower cost. Data were collected from previous studies and research. Compressive strength tests were carried out and it was found out that concrete produced by the magnetic technology is easy to operate without affecting the compressive resistance of concrete. It was also found that magnetized water increases the compressive resistance of concrete while cement is reduced up to 25%. As considering the crumb rubber huge amount of waste can be brought into converting factor as comparing on going global wastages solution. Urbanization and the day-to-day exponential increase in the number of automobiles has increased the usage of rubber. As an attempt to reuse this waste, many experimental studies are carried out using it as a filler material in concrete industry. Water is an important ingredient of concrete as it actively participates in chemical reaction with cement. Since it helps to form strength giving cement gel, the quantity and quality of water is required to be studied. So, there is a need to do the necessary research on modification of water to increase the strength and quality of concrete.

Hence, it can be expected that partial replacement of natural fine aggregates with recycled fine aggregates might not decrease the strength to a larger extent. To overcome above problems with recycled aggregates concrete, now a day's electromagnetic water is used to manufacture the concrete by some researchers. Electro-magnetic water concrete has been recently developed by using electromagnetically treated water instead of potable water in concrete. Based on the literature survey, it is observed that, electro-magnetized water is found to increase compressive strength of concrete by 20% to 30% Based on the above scenario and literature study, present study is focused on the experimental investigation to check the effect of crumb rubber on concrete, comparison of normal water concrete and electromagnetic water concrete. Ultimately, it is expected that the use of rubber crumb and magnetic water will help to increase the strength of concrete and enhance the re-centring ability of concrete. Recycled fine aggregates will be used for re-using the demolished waste. While

electromagnetic water will be helpful for enhancing workability and strength properties of concrete

SCOPE OF MAGNETIZED WATER IN VARIOUSFIELDS

HEALTH BENEFITS OF MAGNETIZED WATER

Magnetized water reduces excess acidity and bile in the digestive system. It helps to regulate the movement of the bowels expelling all accumulations of poisonous matter. The use of magnetic water in treatment of urinary and kidney disorders like kidney stones have shown encouraging results. Magnetized water is also very beneficial for nervous disorders and treatment of blood pressure, especially low blood pressure. It gives a soothing and slightly sedative effect to the nerves, aids in clearing clogged arteries, and normalizes the circulatory system. Magnetized water is effective in the treatment of asthma, bronchitis, colds, coughs and certain types of fevers. Magnetized water has been used as an external aid for washing swollen and sore eyes, wounds, eczema spots, etc. for quicker healing. In all types of eye infections, north pole magnetized water has healing and anti-biotic type properties.

PHYSICAL BENEFITS OF MAGNETIZED WATER

PH:

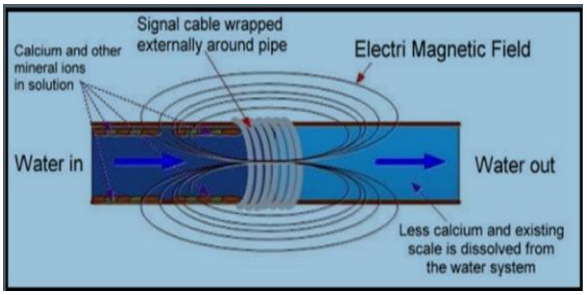
Joshi and Kamat (1966) and Busch et al. (1985) have observed pH changes with the application of a magnetic field to water. Parsons et al. (1997) confirmed a decrease in pH in a study using sodium hydroxide to stabilize pH at 8.5 then applying magnetic treatment to the solution. In this study, the magnetically treated water required up to 2.5 times more sodium hydroxide compared to the controls to stabilize pH. pH has been shown to decrease from 9.2 to 8.5 after magnetic treatment in a system with Ca (OH)2 (Ellingsen and Kristiansen, 1979), where the degree of the reduction was dependent on the strength of the magnetic treatment. Busch et al. (1985) showed an initial decrease in pH from 7.0 to 6.5, that was followed by an increase in pH with time from 7.5 – 8.0.

SCOPE OF CRUMB RUBBER IN VARIOUS FIELD

Due to rapid growth of automobile sector, disposal of waste rubber is becoming a major issue. In this study, effort has been made to reduce this problem by utilizing waste rubber in the form of crumb rubber in Portland pozzolana cement concrete as a substitute of fine aggregates in varied percentages. Experimental work has been conducted to evaluate compressive strength, flexural strength, density and durability properties like water absorption and abrasion resistance for the different proportions (0%, 4%, 4.5%, 5% and 5.5%) of crumb rubber in concrete. Micro-structural study using XRD, SEM and optical microscopy have also been carried out in the present study. It has been observed that with an increment of crumb rubber, workability of concrete decreases. The output of compressive and flexural strength shows slight decrease with 4% replacement of fine aggregates by crumb rubber. Water absorption and abrasion resistance were also marginally affected at the same substitution level of crumb rubber in concrete. Hence, it can be concluded that 4% of fine aggregates can be replaced by crumb rubber to manufacture concrete for non-structural elements.

MAGNETIZED WATER

Electromagnetic water is the water that passes through an electromagnetic device for a particular period of time until its physical properties are changed. When the water passes through a certain electromagnetic field it becomes electromagnetic water. It is found that an increase of about 10% in strength when the water is electro magnetized does not change any of its mechanical properties it only changes the trajectory of the charged particles movement



Magnetic liquids can be made in several ways. Water can be magnetized as it moves through the water pipe or by applying a magnet to a container of liquid. If water is treated while moving through the pipe it will be fully magnetized as it comes out of the pipe. If a large container of still water is treated with magnets it will require several hours to become full magnetize. As the whole layers of water or all the molecules of

water require time to come in contact with magnetic field. The molecule groups of magnetic water differ from molecule groups of ordinary water in having lower degree of consolidation, and the molecules volume is more uniform. Proposed magnetic field effect on hydrogen bonds between water molecules and found some exchange which happened in the properties of water such as light absorption, surface tension and pH. The activation of water treatment using magnetic field depends on three conditions.

1. Magnetic flux density.
2. Duration of exposing water to magnetized field (velocity of water current).
3. The amount of exposing water to the field.

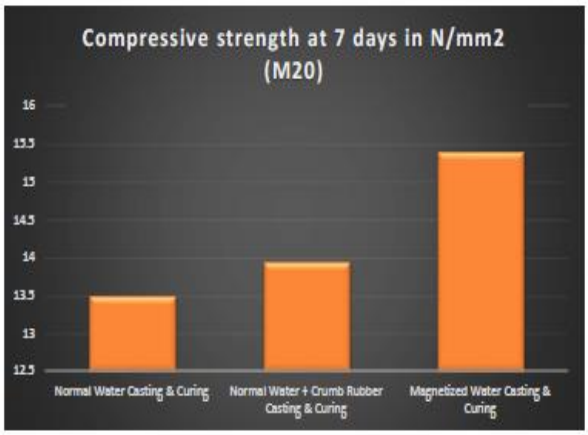
CRUMB RUBBER

Crumb rubber is recycled rubber produced from automotive and truck scrap tires. During the recycling process, steel and tire cord (fluff) are removed, leaving tire rubber with a granular consistency. Continued processing with a granulator or cracker mill, possibly with the aid of cryogenics or by mechanical means, reduces the size of the particles further. The particles are sized and classified based on various criteria including color (black only or black and white). The granulate is sized by passing through a screen, the size based on a dimension (1/4 inch) or mesh (holes per inch 10, 20, etc.). Crumb rubber is often used in artificial turf as cushioning, and concrete also.

RESULTS

Sr. No.	Casting & Curing Techniques	Avg. Compressive Strength [MPa]	% Increase Compared with Normal Water
1	Normal Water Casting &Curing	13.50	
2	Normal Water + Crumb Rubber	13.95	3.33 %
3	Magnetized Water Casting & Curing	15.40	14.07 %

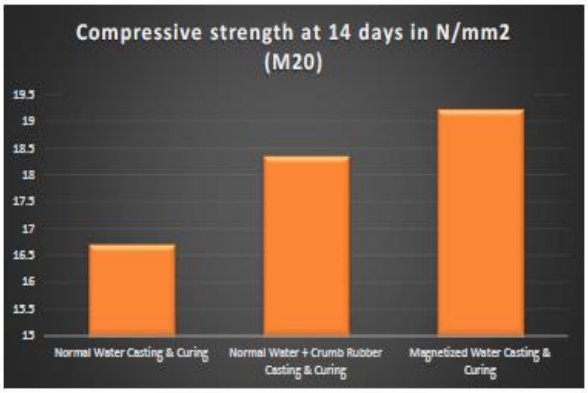
(Table: Compressive strength test results for cubes of 7-day strength (M20))



(Fig: Graphical comparative for compressive strength of cubes for 7 days)

Sr. No.	Casting & Curing Techniques	Avg. Compressive Strength [MPa]	% Increased Compared With Normal Water
1	Normal Water Casting & Curing	16.70	
2	Normal Water + Crumb Rubber	18.35	9.88 %
3	Magnetized Water Casting & Curing	19.22	15.08 %

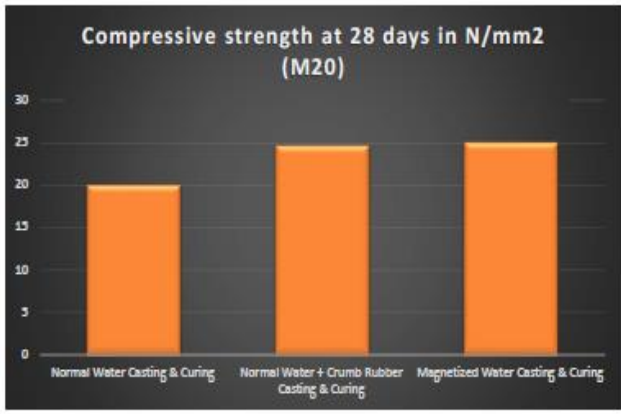
Table no.5.4 Compressive strength test results for cubes of 14-day strength (M20)



(Fig: Graphical comparative for compressive strength of cubes for 14 days)

Sr. No.	Casting & Curing Techniques	Avg. Compressive Strength [MPa]	% Increased Compared With Normal Water
1	Normal Water Casting & Curing	16.70	
2	Normal Water + Crumb Rubber	18.35	9.88 %
3	Magnetized Water Casting & Curing	19.22	15.08 %

(Table: Compressive strength test results for cubes of 28-day strength (M20))



(Fig: Graphical comparative for compressive strength of cubes for 28 days)

CONCLUSION

After magnetic treatment favourable changes occur in magnetically treated water it is observed that:

1. Magnetic treatment on water increases the pH of water by 9.06 %
2. Hardness of water: Magnetic treatment on water decreases hardness of water by 16.24 %.
3. With the help of Crumb Rubber we can get more workable M20 concrete at lower water cement ratio. Compressive strength of concrete at 7 days increases by 3.33%, 14 days increases by 9.88%, and that of 28 days increases by 23.28% when treated and cured with normal water.
4. With the help of Magnetized water we can get more workable M20 concrete at lower water cement ratio. Compressive strength of concrete at 7 days increases by 14.07%, 14 days increases by 15.08%, and that of 28 days increases by 25.07%when treated and cured with normal water.

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