

Evaluation of magnetic field on water hardness and some characteristics of concrete

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ABSTRACT: Origin of magnetic word is Magnesia zone that is situated in Asia, and knew mentioned above mineral stone on there that named Magnetic. Magnetic field is importing deviated force on portable electrical charge. The reported effects of magnetic water treatment are varied and often contradictory. In many cases, researchers report finding no significant magnetic treatment effect. In other cases, reasonable evidence for an effect is provided. Magnetic water is the water that results when it is passes through a magnetic field with the purpose of changing its structure (Nan Su, et al., 2000). After water passes through a magnetic field of a certain strength, it is called magnetic field treated water (MFTW) or magnetic water (MW). The estimated improvement to the concrete strength is 10 %, saving 5 % of the cement dosage in addition to improving other characteristics.

Key words: concrete, magnetic water, strength

INTRODUCTION

To take care of magnetic science, has started by observation some of mineral stones, that to be able attracting iron particles. Origin of magnetic word is Magnesia zone that is situated in Asia, and knew mentioned above mineral stone on there that named Magnetic. Magnetic field is importing deviated force on portable electrical charge (Alghabi et al, 1998). Indicated results of some research that, magnetic field, changing the process of sedimentation calcium carbonate (Fathi et al, 2006). Much research in recent years has been devoted to establishing the fundamental and engineering properties of high-strength concretes, as well as the engineering characteristics of structural members made with the material. Increasing the compressive strength of concrete is an aim which most researchers are looking for, using various methods to do so, as the use of fiber reinforcement in a concrete mixture to increase concrete strength (Rilem, 1978). Vipulanandan and Dharmarajan (1989) studied strength of both epoxy polymer and polymer concrete. When fiber comes from recycle fiber which is derived from recycling of waste paper (magazine) by dry mechanical processing, the improve stiffness (possible of filler action of fines in recycled fibers) are observed (Soroushian, 1995) the damage stiffness and all aspects of flexural performance are observed, to be enhanced through refinement of fiber. Certain admixtures including highrange water-reducing superplasticizers (Committee, 2002; Ramezaniapour, 1995) also are used to produce high-strength concrete.

Diamagnetism

The magnetic field can break down these water clusters and reduce the bond angle and hence increase solubility¹. It is believed that after applying a strong magnetic field, water will show diamagnetism. Diamagnetism refers to substances that are magnetized in a way opposite to the direction of magnetic field, having pair-up electrons which cancel each other's magnetic moment because the two electrons in a pair-up rotate opposite to each other. As a result, water molecules are 'directed' to have certain orientation (Joe, 2004).

Principles of Concrete

Concrete is essentially a blend of two components: aggregates and paste. The paste, comprised of portland cement and water, binds the aggregates (usually sand and gravel or crushed stone) into a rocklike mass as the paste hardens since of the chemical reaction of the cement and water. Complementary cementations materials and chemical admixtures may also be contained in the paste. The binding quality of portland cement paste is due to the chemical reaction between the cement and water, called hydration. Almost any normal water

that is potable and has no pronounced taste or odor can be used as mixing water for making concrete. Therefore, the strength at any particular age is both a function of the original water cement ratio and the degree to which the cement has hydrated. Hydration necessarily a specific quantity of water, where the water used in the concrete mixing is always much more than that required (Arabshahi, 2010). The addition water used to enhancement the elasticity of concrete and fill all mold corners and the areas encompassing the reinforcing bars. influencer of mix water impurities can be found in setting time and concrete strength, for example high chloride content in mixing water is mainly due to the possible adverse effect of chloride ions on the corrosion of reinforcing steel or pre-stressing strands. Therefore, tests should be done to ensure that impurities in the mixing water do not adversely shorten or extend the setting time of the cement and subordinate to acceptable criteria for used water in concrete (Arabshahi, 2010).

Magnetic field

More than one hundred relevant articles and reports are available in the open literature, so clearly magnetic water treatment has received some attention from the scientific community. The reported effects of magnetic water treatment are varied and often contradictory. In many cases, researchers report finding no significant magnetic treatment effect. In other cases, reasonable evidence for an effect is provided. The Australian Fluid Energy (1996) mentions that 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. Joshi et al (1996) 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.

Magnetic water

Magnetic water is the water that results when it passes through a magnetic field with the purpose of changing its structure (Nan Su, et al., 2000). After water passes through a magnetic field of a certain strength, it is called magnetic field treated water (MFTW) Or magnetic water (MW). The estimated improvement to the concrete strength is 10 %, saving 5 % of the cement dosage in addition to improving other characteristics (Nan Su and Chea-Fange Wu, 2002). The process of magnetizing water does change its mechanical properties. Only changes the trajectory of the charged particles movement, and not its energy (Nan Su and Chea-Fang Wu, 2002).

Ion solubility

Starmer (1996) found that the magnetic treatment of water increased the ion solubility in the water, and pH. Kronenberg (1985) reported that magnetic treatment changed the mode of calcium carbonate precipitation such that circular disc-shaped particles are formed rather than the dendritic (branching or tree-like) particles observed in nontreated water. Chechel and Annenkova (1972); Martynova et al (1967), have found that magnetic treatment affects the structure of subsequently precipitated solids, because scale formation involves precipitation and crystallization. These studies imply that magnetic water treatment is likely to have an effect on the formation of scale. Some researchers hypothesize that magnetic treatment affects the nature of hydrogen bonds between water molecules. They report changes in water properties such as light absorbance, surface tension, and pH (e.g., Joshi and Kamat (1996); Bruns et al.; Klassen 1966).

Effect of magnetic field on slump test

Ali Shynier et al., can interpret the increasing of slump of concrete made with magnetized water that the phenomenon of magnetically activated water, produces a lot of the same polarity as the ingredients of concrete mix, and a lot more of the smaller water clusters.

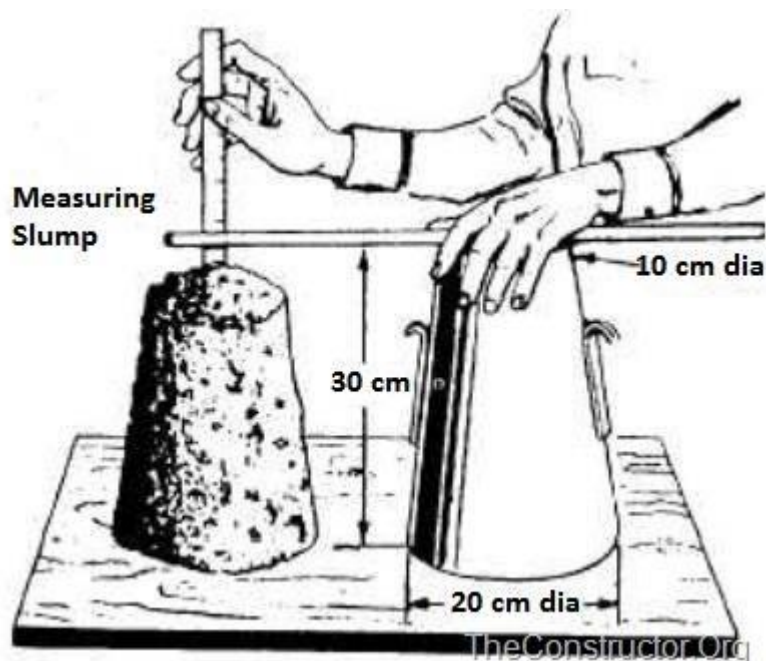


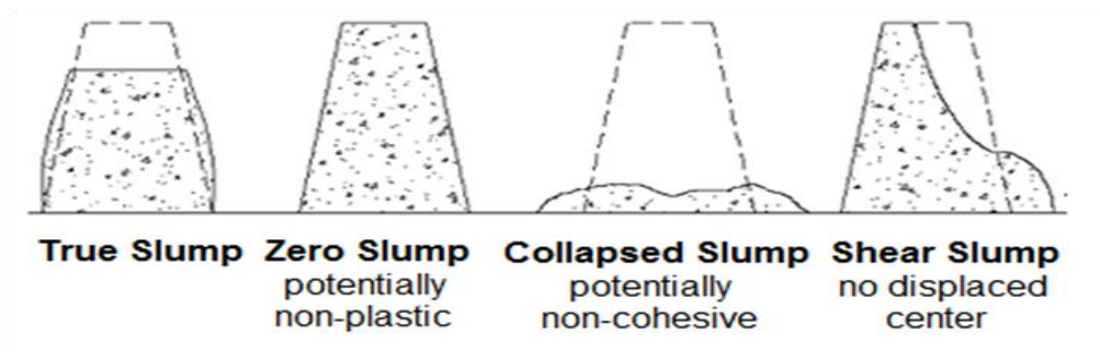
Figure 1. Measurement of slump

These can cause better dispersion of fine cement particulates. Hence, lumps of cement particulates are broken down and provide maximum surface contact area. This has two effects on fresh concrete:

- a. Broken down cement particles provide a "ball bearing" effect on the concrete mix, hence improving the workability and slump better in fresh state measurements (mm).
- b. Broken down cement particles have maximum contact surface area with water for maximum cement hydration process to take place and therefore the concrete compressive strength is higher in the hardened state.



Figure2. Responses to "Concrete Workability Measurements: The Slump Test



Source: ACI 238 State of the Art Report

Figure 3. Shear slump concrete

Bond angle and size of molecules

When water is subjected to a magnetic field, the water molecules will arrange in one direction. This mode of arrangement is caused by relaxation bonds, and then the bond angle decreases to less than 105° , leading to a decrease in the consolidation degree between water molecules, and increase in size of molecules. For these reasons, the viscosity of magnetic water is less than viscosity of normal water. This change in water molecules composite causes a change in permeability pressure, surface tension, pH and electric conduction (Fluid, 1996).

Flexural Strength (Ductility of Concrete)

Concrete prepared with MW, shows brittle behavior as can be clearly seen. This implies that it is advantageous to use MW to enhance the quality of concrete. This is further supported by the fact that mixes which contained more minerals like Fly Ash displayed higher split tensile strength than other mixes. The introduction of MW to concrete was found to increase its ability to resist flexural strength (10 to 22 %) (Karam and Al-Shamali, 2003).

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