



Impacts of Magnetic Water on Some Mechanical Properties of Normal and High-Strength Concrete

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ABSTRACT

One of the most important points which have been considered by scholars and those involved in concrete technology science is improvement of various concrete features. For achieving this goal, in two recent decades, very widespread studies have been performed and one of their most important studies is using magnetic water technology in concrete. By using this technology, the physical structure of water could be changed so that the number of molecules in a molecular association is reduced from 14 to 5 or 6 molecules and as a result, the water surface tension is decreased. Using magnetic water in concrete mixture causes consistency and reduction of water to cement ratio of concrete and also increasing of its durability and strength. In the present study, the impact of magnetic water on mechanical properties of normal concretes and high strength concretes such as consistency and compressive strength has been investigated. The tests results indicate that using magnetic water in concrete mixture increases its compressive strength by 17% and 465 respectively. Also, it accelerates the cement hydration reaction and increases concrete slump.

keywords: magnetic water, normal concrete, high strength concrete, compressive strength, consistency.

1. INTRODUCTION

In fact, concrete is one of the most important and commonly used materials of civil engineering which is used for construction of various civil projects. Therefore, recognition of concrete mechanical properties and research for improving its features has a very great significance. As yet most performed studies have focused on aggregates and cement and concrete additives and few studies have been conducted on quality of water consumed in concrete. In two recent decades, countries like China and Russia, very widespread studies have been performed on concrete consumed water. In the performed studies, by utilizing magnetic water and changing the molecular structure of water, concrete properties such as compressive strength and consistency have been improved. The technology used in these studies is based on interaction between a magnetic field and mobile electrical charges. Due to applying the magnetic field on water, magnetic force is imposed on ions. So, two positive and negative ions with the same charge which should form sediment can't become close to each other very much. Another feature of magnetic device is that by passing water through it, water surface tension is reduced and its pH is made normal and more oxygen is solved in it [3].

For the first time, in 1902 the impact of magnetic field on water was investigated by Danish physicist Anton Lorenz and he won noble prize for this activity. His tests results indicate the theory of water becoming light due to separation of its arrayed molecules. After that, widespread studies and tests were performed on application of magnetic fields in producing cement, ceramic and brick in 1963 in former Soviet Union. In October 1993, Soviet Union government published a regulation entitled application of magnetic field in international economy and Russia construction industry was required to use this new technology in producing cement and concrete.

In 1998, Gomes et.al investigated the impacts of magnetic water on concrete physical and mechanical properties. Also, in 2000 and 2003, Nansu et.al investigated the impact of magnetic water on concretes containing various Pozzolan.

2. Magnetic Water Production Machine

High-strength concretes have more consistency and compressive strength and better and more suitable performance comparing normal concretes. Concrete processed with magnetic water is one of various types of high-strength concretes. In this technology, by inducing a magnetic field to water and changing its physical structure, the number of molecules in molecular association and consequently the water surface tension are reduced. Besides