



The effects of curing methods on the properties of cement concrete mixes in the presence of optimum coarse aggregate size under the humid climate conditions of Babol

Samadvand, Hojjat¹, Batebi, Yadollah²

¹Graduate student of Industrial University of Babol samadvand@stu.nit.ac.ir

²Assistant professor of Industrial University of Babol y.batebi@nit.ac.ir

Abstract

This paper reports result of a study conducted to investigate the effects of curing methods on the properties of the cement concrete mixes in the presence of optimum coarse aggregate size under the humid climate conditions of Babol city. The concrete specimens were prepared with Type II cement concrete. They were cured either by covering with wet burlap or by applying two types of curing methods namely water-pond and sand dune methods. The effect of curing methods on the properties of cement concrete was assessed by measuring the compressive and tensile strength. Study results indicated that the strength development in the concrete specimens cured by covering with wet burlap under the humid climate conditions of Babol, was more than that in the specimens cured by applying the other two methods. Among the three curing methods investigated, curing with wet burlap is estimated to perform better than the other curing methods, in addition it could be utilized in situations where curing with water is difficult.

Keywords: curing methods, plain cement concrete, optimum coarse aggregate, Babol climate, wet burlaping

1. Introduction

Coarse aggregate is one of the factors that have a significant influence on the strength of concrete. The aggregates, which form more than 60% of the volume of concrete, play a main role in affecting its fresh as well as hardened properties, so the aggregate should be chosen carefully. This paper presents the coarse aggregate properties such as maximum size, texture and type of coarse aggregate that have a direct effect on concrete strength. It was found that by increasing the maximum size of coarse aggregate, flowability and passing ability reduced. In addition, lower maximum size of coarse aggregate leads to higher strengths compared to higher maximum size of coarse aggregate in concrete mixes.

As the study of aggregate characteristics is considered very necessary, many researchers have examined coarse aggregate properties and their effect in the fresh and hardened states. The aggregates' characteristics should be taken into consideration for the performance required for fresh and hardened concrete (Neuwald, 2004 and Janssen, and Kuosa, 2001). Crushed aggregate tends to reduce flow because of the interlocking of the angular particles, whilst rounded aggregate improves the flow because of lower internal friction (Alexander and Prosk 2003). The second parameter is the shape of the coarse aggregate, whether it's crushed or rounded, where a higher content of rounded shape leads to increased possibility of using a high coarse aggregate content (EFNARC 2002) [1].

2. Materials and methods

In this study, the used cement was ordinary Portland cement Type (II). Since performing wide investigational projects on different cement constituents in recent years have caused appearance of concretes which not only produce high resistance, but also contain other properties such as high durability, impermeability, efficiency, and durability against harmful factors like fire, water, corroding factors, etc. Natural sand was used with the fineness modulus being 2.47. The type of coarse aggregate was crushed gravel with a maximum size of 12.5 mm and specific gravity 1500 kg/cm³.

It was noticed that the compressive and flexural strength and modulus of elasticity of the mixes made with the 12.5mm maximum size of coarse aggregate is higher than the values of the mixes made with the greater maximum size of coarse aggregate [1]. This is due to the smaller maximum size of coarse aggregate that has the larger surface area that