Applied Mechanics and Materials Vol. 147 (2012) pp 3-8
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doi:10.4028/www.scientific.net/AMM.147.3

Using of Furfural to Modify the Ordinary Portland Cement

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Keywords: Furfural, cement paste, concrete mixes, flow table, compressive strength, splitting tensile strength.

Abstract. This study reported the results of adding furfural on mechanical properties of Ordinary Iraqi cement. Furfural was used at four different ratios (1%, 2%, 3%, and 5 %) by weight to the mix of Iraqi Portland cement (Um- Quasar factory cement). The effect on the plasticizing and fluidity by table flow test for cement paste and slump test of fresh concrete were studied. The obtained results showed that added furfural is acting as super plasticizer. Effective relation was found between fluidity and ratio of added through effecting time of flow where the most effect additive ratio was found to be 3% .The radius of cement paste circle is linearly dependence which is a indicate of high workability. Obtained results explained in term of electrical charges on cement particles. Also found that adding furfural increasing the dispersion work between cement paste particles and preventing coarse agglomerated. The using of furfural with concrete indicates two kinds of concrete behavior. These behaviors were strongly dependence on furfural ratio .The critical value of added furfural was 1% and after which a plasticizing effect obtained.

Splitting and flexural tensile test were conducted. Three types of curing methods include dry, moisture and water curing. The obtained results showed that the moisture curing was better than other curing methods due to good results obtained with splitting tensile (6.18 N/mm^2) for 5% ratio and water curing is preferred for flexural tensile (7.05 N/mm^2 at 2% wt% of furfural).

Finally, we compared our results with AL-Abraaj Kuwait cement and we found that the Iraqi cement (Um Quasar factory cement) was better.

Introduction:

The varying in chemical additives have a significant effect on concrete workability where these additives have direct or indirect affect interfere with ordinary Portland cement which causing accelerator or retarded on cement react with water, therefore any lack of used water in concrete or cement mix causing different changes on mechanical properties. The water retarder dispersed the cement particles lead to improved the workability and increase the consistence of mixes [1, 2], ACI code (American Concrete Institute) defined or describes workability as "that property of freshly mixed concrete or mortar that determines the ease with which it can be mixed, placed, consolidated, and finished to a homogenous condition [3]. The published researches in this field that the mineral additives or Portland material have a positive effect on mechanical properties of cement or concrete mixes. Such as compressive strength, flexural strength and splitting tensile strength [4, 5], while the fly ash (which generated from crashing the cold volcanic rocks) causing increase the workability[6], while the fume silica have negative effect on workability [7,8].

The most important advantage of the used plasticizer in concrete mixes or cement mixes is keep stable of workability especially in hot and dry regions , and any changing of this property causing most popular problem in fresh mixes which decrease the slump values which effect on the mechanical properties. Research recently towards to modify a mix with zero slump loss for more