

الآية

قال تعالى:

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﴿إِن فِي خُلُقِ السَّمَاوَاتِ وَالْأَرْضِ وَاخْتِلَافِ اللَّيْلِ وَالنَّهَارِ وَالْفُلْكِ الَّتِي تَجْرِي فِي الْبَحْرِ بِمَا يَنْفَعُ النَّاسَ وَمَا أَنْزَلَ اللَّهُ مِنَ السَّمَاءِ مِنْ مَّاءٍ فَأَحْيَا بِهِ الْأَرْضَ بَعْدَ مَوْتِهَا وَبَثَّ فِيهَا مِنْ كُلِّ دَابَّةٍ وَتَصْرِيفِ الرِّيَّاحِ وَالسَّحَابِ الْمُسَخَّرِ بَيْنَ السَّمَاءِ وَالْأَرْضِ لَآيَاتٍ لِّقَوْمٍ يَعْقِلُونَ﴾

صدق الله العظيم

سورة البقرة الآية (١٦٤)

DEDICATION

To my father..

To my mother..

To my husband..

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In preparing this thesis, I was in contact with many people, researchers, academicians, and practitioners. They have contributed towards my understanding and thoughts.

*In particular, I wish to express my sincere appreciation to my main Thesis supervisor, **Dr. Ali EltomHassaballa** for encouragement, kind help and guidance.*

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ABSTRACT

This research aims to study the effect of superplasticizer, when mixed with local materials, on both fresh and hardened concrete properties to achieve the demands of engineers and contractors.

The methodology adopted to achieve the objectives of the research focuses mainly on a collection of data from different sources, an extensive review of previous studies, designing concrete mixes and implementing a lot of laboratory experiments using different ratios of super plasticizer with low water contents. The ratios of superplasticizer added were 0.0 (as a reference mix), 0.4, 0.8, 1.2 and 1.5 Litre/ 50Kg cement for concrete ages of 3, 7 and 28 days by preparing 12 cubes for each sample. Local ordinary Portland cement (OPC) and graded natural coarse and fine aggregate were used for all concrete mixes conducted in this research.

From the experimental results obtained it has been found that the ratio of (0.8 litres per 50 kg of cement) superplasticizers with a reduction of 15% (w/c) showed a clear and significant effect on improving the workability and compressive strength of concrete mixes. Also the ratios of 1.5L per 50 kg of cement with a 30% reduction of (w/c) and 0.4L per 50 kg of cement with a reduction of 10% (w/c) superplasticizer have resulted in high workability and good compressive strengths. The results have shown substantial improvement in the properties of concrete after use of the superplasticizers for achieving the lowest possible water/cement ratio while maintaining a high workability and an increasing compressive strength of concrete.

الملخص

يهدف هذا البحث إلى دراسة تأثير الملدنات الفائقة عند مزجها مع مواد الخرسانة المحلية، على كل من خواص الخرسانة الطازجة والمتصلدة لتحقيق مطالب المهندسين والمقاولين.

المنهجية المتبعة لتحقيق أهداف البحث تركز أساساً على جمع البيانات من مصادر مختلفة، مراجعة شاملة للدراسات السابقة، تصميم الخلطات الخرسانية وتنفيذ الكثير من التجارب المعملية باستخدام نسب مختلفة من الملدنات الفائقة مع محتويات الماء المنخفضة. وكانت نسب الملدن المتفوق المضافة ٠.٠ (الخلطة المرجعية)، ٠.٤، ٠.٨، ١.٢ و ١.٥ لتر/ ٥٠ كجم الاسمنت لأعمار محددة من ٣ و ٧ و ٢٨ يوم، بإعداد ١٢ مكعب لكل عينة. استخدم الأسمنت البورتلاندي العادي المحلي (OPC) والركام الخشن الطبيعي المتدرج والركام الناعم لجميع الخلطات الخرسانية التي أجريت في هذا البحث. من النتائج التجريبية التي تم الحصول عليها فقد وجد أن نسبة (٠.٨ لتر لكل ٥٠ كجم من الأسمنت) ملدنات فائقة مع تخفيض ١٥٪ (م/س) أظهرت تأثير واضح وكبير على تحسين قابلية التشغيل وقوة الضغط للخلطات الخرسانية. كما أن نسب ١.٥ لتر لكل ٥٠ كجم من الاسمنت مع تخفيض ٣٠٪ (م/س) و ٠.٤ لتر لكل ٥٠ كجم من الاسمنت مع تخفيض ١٠٪ (م/س) وتخفض ١٠٪ اسمنت ملدن متفوق نتجت في قابلية تشغيل عالية ومقاومة ضغط جيدة. وقد أظهرت النتائج تحسناً كبيراً في خصائص الخرسانة بعد استخدام الملدنات الفائقة لتحقيق أدنى تخفيض ممكن لنسبة الماء/الأسمنت مع الحفاظ على القابلية وقوة الضغط العالية والمتزايدة من الخرسانة.

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