



Fayoum University  
Faculty of Science  
Chemistry department

## **Durability of the Slag Rich Cement Pastes in Qaron's Lake Water (Fayoum)**

By  
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B.Sc. in Chemistry (Special Chemistry), Fayoum University, 2008.

A thesis submitted in partial fulfillment  
Of  
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In  
**Inorganic Chemistry**

**Chemistry Department**  
**Faculty of Science, Fayoum**

**FAYOUM UNIVERSITY**

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## Approval Sheet

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## **Abstract**

In this work different mixes of sulfate resisting cement (SRC) with granulated slag with up to 75wt.% granulated slag were prepared. The hydration and durability of cement pastes were studied in tap water up to 90 days and in Qaron's lake water, Fayoum, up to one year. It was found that, SRC is more hydraulic than the blended slag cement pastes as shown from the results of the combined water and free lime contents as well as pH values. The free lime contents of SRC increase up to 90 days whereas those of blended cement decreases up to 90 days, due to the partial consumption of some of the free lime with granulated slag. Also, the bulk density and compressive strength of SRC are higher than those of blended cements. The free lime contents of the immersed SRC pastes in the aggressive water decrease up to 3months, then increases up to one year. Whereas, the free lime contents of blended cement pastes decrease linearly up to one year. On the other side, the compressive strength of SRC mortars increases up to 6months and then decreases, due to the activation of cement pastes with  $\text{Cl}^-$  and  $\text{SO}_4^{2-}$  at the early ages of hydration and accumulation of excess amounts of ettringite and chloroaluminate hydrates at later ages, which decrease the strength. The results of the physico-chemical characteristics of cement pastes are in a good agreement with those of thermal analysis (DSC and DTA), infrared (IR) and X- ray diffraction (XRD) of cured samples in tap water or in aggressive media (Qaron's lake water).

**It can be concluded that, the blended cements containing 45-55wt.%, granulated slag showed the higher hydration characteristics as well as chemical durability against Qaron's lake water.**