

1. Assessment of Environmental Factors on Corrosion in Reinforced Concrete with Calcium Chloride

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Abstract Corrosion of steel in reinforced concrete causes severe damage in durability as weakness support of reinforced elements. We investigate impacts of cement fraction and curing method on corrosion progression. Corrosion level is evaluated by measuring carbonation penetration and electrical conductivity in concrete plots as indicators of corrosion. Two types of cement were used, Normal and quick setting. For each cement type, two concrete mixes were used (3% and 8% C3A are designed). Six levels of CaCl₂ ranging from 0.5 % to 3% were used to simulate corrosion. Also, two curing methods are compared, liquid water and steam application are used. Chloride ion in low alumina cement mortar progressed faster than high alumina. The results show significant increase in carbonation depth for (less cement) compared to (more cement) mixes. Also, steam curing showed less penetration than normal water setting method. Variation in carbonation penetration for 0.5 and 1 % CaCl₂ is high close to double. Electrical potential of steel in cement mortar is negatively related with increasing calcium chloride content and with increasing cement content. Also, normal setting cement shows better corrosion protection as demonstrated by higher measured EC.

Keywords: Corrosion, Calcium Chloride, Carbonation, Electric Potential.