EFFECT OF IRON SLAG AS MINERAL ADMIXTURE ON DURABILITY OF CONCRETE

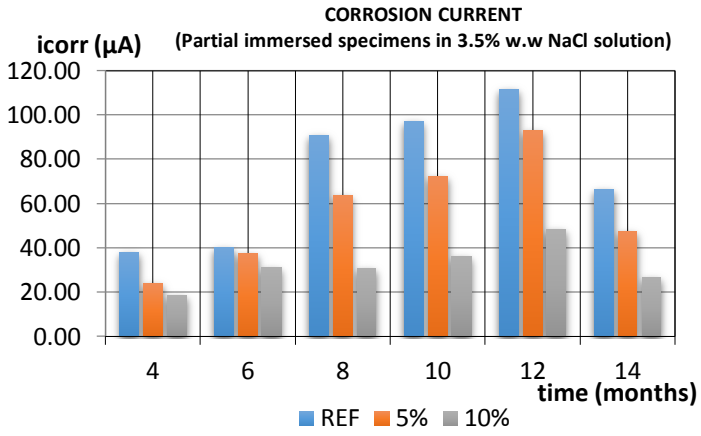
N. Chousidis, E. Rakanta, G. Batis
School of Chemical Engineering, National Technical University of Athens, Athens, Greece

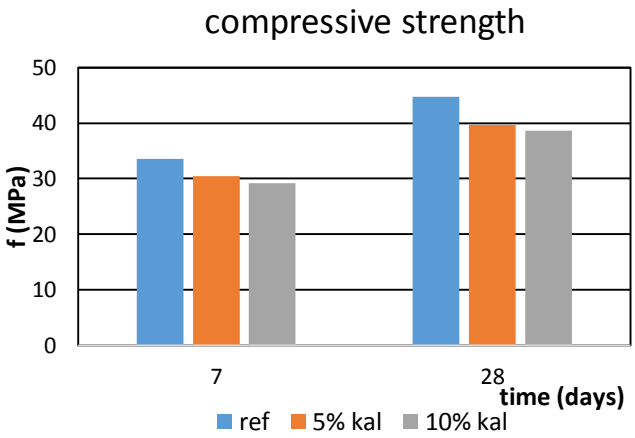
Keywords: *pitting corrosion, carbonation, mineral additives, Calamine, XRD.*

The present study investigated the durability of concrete by partial replacement of cement with iron slag known as calamine (95%w.w Iron Oxide). Specifically, the replacement of cement by the additive became in percentages 5% w.w and 10% w.w. cylindrical reinforcement mortar specimens with diameter 50mm and height 100mm were prepared. Steel rebars type B500C Tempcore were used with diameter 10mm (D10) and 100mm length.

Reinforced mortar specimens were partially immersed in 3.5%w.w NaCl solution and exposed in atmosphere for 15 months. The purpose of replacement, is the protection of steel rebars from corrosion by chlorine ions, and concrete from carbonation. Also, due to reduction of cement are reduced CO_2 emissions and reduce the cost of cement.

For the assessment of the concrete resistance, were measured the corrosion potential E_{corr}, corrosion current i_{corr}, the mass loss of reinforcement steel, the carbonation depth of cement mortars, the concentration of total Chloride ions, the compressive strength at 7 & 28 days, the slump of fresh concrete, and the density of fresh and hardened concrete.





Based on the up-to-now results of this study, the specimens with addition 10% of MnO_2 appear smaller corrosion currents and mass loss of steel than reference specimens. Also, the compressive strength with 5% & 10% addition is appeared to be slightly smaller from the reference specimens at 28 days.

It is concluded that calamine is suitable for the production of composite cements, having beneficial effect on reinforcement corrosion in the above corrosive environments.