

MECHANICAL PROPERTIES AND CORROSION BEHAVIOR OF REINFORCING STEEL IN DIFFERENT CEMENT WITH ADDITION OF NANO-SILICA ON BLENDED CEMENTIN TAP WATER

**WAFAA A. GHANEM¹, AMAL S. I. AHMED², AZZA E. EL- SHENAWY³, WALAA A. HUSSEIN⁴ &
GHALIA A. GABER⁵**

¹Central Metallurgical Research and Development Institute (CMRDI), Cairo, Egypt

^{2,3,4}Chemistry Department, Faculty of Science (Girls), Al-Azhar University, Nasr City, Cairo, Egypt

⁵Ghalia A. Gaber, Assistant lecture, Chemistry Department, Faculty of Science (Girls), Al-Azhar University,
Nasr City, Cairo, Egypt

ABSTRACT

The effect of Nano-silica on blended cement was studied in tap water by using mechanical properties such as compressive strength and different electrochemical technique studied on reinforcing steel in addition of Nano-silica. Different electrochemical techniques namely: open circuit potential, Tafel polarization and EIS. The results refer to an increase in Nano-silica by 7 % leads to an increase in the compressive strength and its further increase leads to reducing the compressive strength. The study is also tackling the tap water effects up to 90 days on ordinary Portland cement and both slag cement. It is also tackled the continuous hydration in the presence of slag cement which indicates an increase in compressive strength with long interval time. Furthermore, the presence of water as a medium never had a negative effect on all hydrated cements. These results have been confirmed through the IR and SEM. The polarization resistance in all cement types increases with time, except in OPC and SRC. The increase in polarization resistance has shown the formation of stable passive layer and reduction of pores during the hydration.

KEYWORDS: Mechanical Properties, Corrosion Behavior, Reinforcement Nano-Silica, Electrochemical Techniques, Tap Water