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***Ricinus communis* – A green extract for the improvement of anti-corrosion and mechanical properties of reinforcing steel in concrete in chloride media**

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Abstract

Various Standard methods such as electrochemical impedance spectroscopy (EIS), potentiodynamic polarization study (PDS) and atomic force microscopy (AFM) have been utilized to study the corrosion characteristics of reinforcing steel in concrete in without and with various concentrations of *Ricinus communis* (*R. communis*) in NaCl media in different time intervals. The ability of the plant extract to produce protective layer on steel surface in concrete and mixed mode (anodic as well as cathodic) inhibitive action have been established from the findings of electrochemical measurements (EIS & PDS). Further, the formation of protective layer on the steel surface by plant extract has been supported by surface morphology analysis (AFM). The adsorption of *R. communis* extract on steel surface followed the Temkin adsorption isotherm. The results of density functional theory (DFT) analysis brought out the active centers of major ingredients responsible for adsorption of molecules present in *R. communis* over the steel surface that influenced the anti-corrosion potential of plant extract. The increase in compressive strength and splitting tensile strength of concrete has been observed. The inhibitive mechanism of the *R. communis* extract against reinforcing steel corrosion in concrete in 3.5% NaCl media has also been proposed.

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