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Synergistic Effect of Trisodium citrate (TSC) on the Inhibition Efficiency of *Sargassum swartzii* (SS) -Zn²⁺ System on Mild Steel in Aqueous Environment

S. Manimegalai

Assistant Professor, Post Graduate and Research Department of Chemistry,
Arulmigu Palaniandavar College of Arts & Culture, Palani-624601, Tamilnadu, India.

Abstract : The aquatic plant kingdom is a treasure of potential bioactive compounds. Aquatic plants contain some organic compounds that provide definite physiological actions on the human body. In the present study deals with the synergistic effect of Trisodium citrate (TSC) on the inhibition efficiency of methanolic extract of *Sargassum swartzii* (SS) and Zn²⁺ system on mild steel in aqueous environment. The corrosion monitoring techniques adopted in the study were weight-loss methods, electrochemical measurements, FT-IR and surface morphological techniques namely SEM and EDX. It has proved the formulation consisting of 100 ppm of Zn²⁺, 120 ppm of SS and 100 ppm of TSC has 95.77% IE. The high performance of SS - Zn²⁺- TSC system could be due to synergistic effect that covers a wide surface coverage area on the metal surface and thus retarding the corrosion. Polarization study reveals that this formulation functions as a mixed inhibitor. AC impedance spectra suggest the presence of protective film on the metal surface. FT-IR spectra reveals that the protective film consists of Fe²⁺-SS complex, Fe²⁺-TSC complex and Zn (OH)₂. SEM and EDX provide a pictorial representation on the nature of surface film in the absence and presence of inhibitors. Thus, it concluded that *Sargassum swartzii* - Zn²⁺- TSC inhibitor system acted as a good inhibitor in aqueous medium.

Keywords: *Sargassum swartzii*, Trisodium citrate, weight-loss method, Potentiodynamic polarization, EIS, FT-IR, SEM and EDX.

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