

Novel Poly Schiff Bases as Corrosion Inhibitors for Carbon Steel in Sour Petroleum Conditions

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Abstract : In this work, two novel Schiff base polymers (PSB₁ and PSB₂) with extra-high protective barrier features were facilely prepared via Polycondensation reactions. They were applied for the first time as effective corrosion inhibitors in the sour corrosive media of petroleum environments containing hydrogen sulfide (H₂S) gas. For studying the polymers' inhibitive action on the carbon steel, numerous corrosion testing methods including potentiodynamic polarization (PDP), open circuit potential, and electrochemical impedance spectroscopy (EIS) have been employed at various temperatures (298-328 K) in the oil wells formation water with H₂S concentrations of 100, 400, and 700 ppm as aggressive media. The activation energy (E_a) and other thermodynamic parameters were computed to describe the mechanism of adsorption. The corrosion morphological traits and steel samples' surfaces composition were analyzed by field emission scanning electron microscope and energy dispersive X-ray analysis. The PSB₂ inhibited sour corrosion more effectively than PSB₁ when subjected to electrochemical testing. The 100 ppm concentration of PSB₂ exhibited 82.18 % and 81.14 % inhibition efficiencies at 298 K in PDP and EIS measurements, respectively. While at 328 K, the inhibition efficiencies were 61.85 % and 67.4 % at the same dosage and measurements. These poly Schiff bases exhibited fascinating performance as corrosion inhibitors in sour environment. They provide a great corrosion inhibition platform for the sustainable future environment.

Keywords : schiff base polymers, corrosion inhibitors, sour corrosive media, potentiodynamic polarization, H₂S concentrations

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