Evaluation of the Modified Extracted Lignin from Wheat Straw as Corrosion Inhibitors for Aluminum in Alkaline Solution

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Extracted lignin from soda pulping of wheat straw agricultural waste is modified and characterized using spectroscopic and thermal analysis. Modified lignin compounds (LG-OH & LG-COOH) are investigated as corrosion inhibitors for aluminum in 1.0 M NaOH compared to their unmodified lignin (LG) using potentiodynamic polarization measurements and morphological characterization. Data show that the modified lignin compounds shift both the corrosion and the open circuit potentials of aluminum to more noble values as well as decrease its corrosion current density (I_{corr}) compared to its values in blank solution. The maximum inhibition efficiency is found to be in case of LG-COOH followed by LG-OH compared to LG. The higher inhibition efficiency of LG-COOH can be explained to its higher active adsorption sites compared to LG-OH and LG. Adsorption of modified lignin compounds on aluminum surface is confirmed using SEM-EDX analysis. The best fit adsorption isotherm is found to be Langmuir adsorption isotherm with physical nature. Thermodynamic parameters indicate endothermic nature of the corrosion process with higher ordered activated complexes in the presence of lignin compounds

Keywords: Modified Lignin, Aluminum, Adsorption, SEM-EDX, Alkaline Solution

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