

Corrosion Behavior of Mild Steel in Different Concentrations of Ethanol

Beverages

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Abstract

Corrosion behavior of mild steel was investigated in different blends of ethanol solution. Potentiodynamic polarization tests

and weight loss analysis were carried out to study the corrosion polarization tendency of the various blends of the solution

on mild steel using water as a control medium. Scanning electron microscope with energy-dispersive spectroscopy was

employed to characterize the surface morphologies as well as the elemental composition of each material subjected to cor-

rosion tests. The result of the potentiodynamic polarization curves showed that water contributed to the corrosion rate of

the material. Further to this, ethanol samples behaved passive against corrosion degradation. The result of the weight loss

indicated that corrosion of the mild steel actually took place. More so, the SEM/EDS revealed the microstructural behavior

of the surface oxides, spots, cracks and corrosive pits at the interface with the ethanol environment. This study will help in

improving the mechanical properties of mild steel material employed to produce spur gear that will reliably function in an

ethanol environment.

Keywords Spur gear · Corrosion · Production · Bottling plant · Mild steel