

Study of the Corrosion Inhibition Reaction of Admixed Plant Distillates on Mild Steel

262



Abstract:

The corrosion inhibition reaction of plant distillates and their synergistic combination effect was studied. Atlas cedarwood distillate (ACW), and admixture of sage and Jojoba distillates (SJA), and admixture of jojoba and lavender distillates (JLD) were evaluated at minimal concentrations to for their corrosion inhibition effect on mild steel in 1 M H₂SO₄ solution. Results showed ACW reacted poorly at 1% and 2% inhibitor concentration. However, from 3% - 6% ACW concentration the final corrosion rate of 94.73%, 94.77% and 95.61% was attained at 240 h signifying effective inhibition performance. SJA inhibitor compound exhibited optimal performance at all concentrations (1% - 6% SJA) with maximum inhibition value of 98.44% at 5% SJA concentration. JLD exhibited optimal performance at all concentrations studied after 2% JLD with maximum inhibition value of 91.07% at 3% JLD concentration and 240 h exposure time. The mean values for ACW and JLD inhibition efficiency appreciated with increase in inhibitor concentration while the value for SJA compound was generally constant. Results shows the extent of variation from mean values (standard deviation) for ACW and JLD was significantly high compared to the values obtained for SJA compound where the deviation from mean value is below 2. The Margin of error values for ACW and JLD compound shows that 65% and 60% of inhibition efficiency data have values above 70% inhibition efficiency compared to SJA where 100% of its inhibition efficiency data have values above 70% inhibition at +12.07%, +13.58% and +0% and +13.58%. Statistical analysis ANOVA only inhibitor concentration of the compounds significantly influenced their inhibition performance with values of 66.61%, 70.29% and 93.07% (ACW, SJA and JLD compound) compared to exposure time which had no influence.

However, confirmation comparison of the mean square ratio of the compounds with the theoretical statistical tables shows the inhibitor concentration for JLD only is statistically relevant.

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