

Data and statistical analysis on the corrosion inhibition effect of four organic chemical compounds on carbon steel in dilute H₂SO₄ and HCl solutions

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ABSTRACT

Data on the protection performance of n,n dimethylaminoethanol (DAE), 2-amino-5-ethyl-1,2,3-thiadiazole (TDZ), p-phenylenediamine (PDM) and n,n diphenylthiourea (THO) on mild steel in 0.5M H₂SO₄ and HCl solution were studied. The compounds were more effective in H₂SO₄ solution. N, n dimethylaminoethanol displayed the most effective performance at all concentrations studied with optimal value of 97.901% in H₂SO₄ and 90.671% in HCl. P-phenylenediamine compound exhibited weak performance at most concentrations studied in both acids with optimal values of 69.995% at 1% concentration (H₂SO₄) and 83.131% at 0.5% HCl. The highest TDZ inhibition efficiency is 80.671% in H₂SO₄ and 95.796% in HCl. Inhibition performance varied differentially in HCl. In H₂SO₄, values increased with increase in concentration. Similar observation occurred for THO compound. At 0.25% and 0.5% concentrations (H₂SO₄) the inhibition efficiency values were above 90%. In HCl, THO concentrations with effective inhibition performance are 0.5%, 0.75% and 1% with observed values generally above. Statistical data showed the standard deviation, mean and margin of error values for the inhibition performance data of the compounds. Analysis through (ANOVA) was performed to assess the statistical relevance of exposure time and inhibitor concentration (sources of variation) on the inhibition performance of the organic fluids in both acids.