

SPECIMEN FORMAT FOR THESES OF MONTH

Faculty : Dr.S.Subhashini

Department : Chemistry

Branch/ Area: : Chemistry

Sub Subject Heading: : Corrosion Inhibition

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Title of the thesis : Corrosion Mitigation Effect of Synthesized Water
Soluble Acryl Terpolymers on Mild Steel in HCl and
Preliminary Investigation as Oil Field Inhibitors on
N80 Steel

(i) In Roman Script -
(ii) In roman Script -

Nomenclature of Degree: : Ph.D

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Name of Supervisor : Dr.S.Subhashini

Designation of Supervisor : Dr.S.Subhashini

Centre/department/school in : Avinashilingam Institute for Hoe Science and Higher
which research was conducted Education for Women

University's Name & Address : Avinashilingam Institute for Hoe Science and Higher
Education for Women

Abstract within 300 words:

Five different water soluble terpolymers based on Polyvinyl alcohol: PVA-AAm-VSA, PVA-AA-VSA, PVA-AAm-PVBS, PVA-AA-PVBS and PVA-VSA-PVBS have been developed and tested for their efficacy to control mild steel corrosion in 1 M HCl. The grafted terpolymers were characterized by UV spectroscopy, FTIR spectroscopy and ^1H NMR spectroscopy. The thermal stability of the terpolymers was tested using thermo gravimetric analysis and differential scanning calorimetric analysis. The corrosion inhibition measurements were carried out by weight loss techniques and electrochemical techniques by varying time, temperature and concentration. Weight loss studies were conducted at 303 K for 1, 3, 6, 9 and 12 hours immersion time, and at 303-313 K for half-an-hour immersion time. All the terpolymers under investigation were found to provide a maximum inhibition efficiency around 90 % at 6-12 hours of immersion time at 0.45 wt.% concentration. At optimum inhibitor concentration, the terpolymers provided inhibition efficiency around 90 % at 333 K. The data obtained from temperature studies were fitted to various adsorption isotherms and the best fit was selected. The nature of the isotherm provided detailed insight into the nature of the adsorption. In this study, Temkin isotherm was found to provide a best fit and the thermodynamic parameters of adsorption indicates the chemical nature of adsorption of the terpolymers. The effect of inhibitors on the corrosion process was analyzed by constructing Arrhenius plot and Transition plot. The kinetic parameters were also determined. A suitable mechanism for the inhibitive action was proposed. To test the terpolymers as corrosion inhibitors for the oil field, corrosion studies were performed using N80 steel in 10 % HCl, 3.5 % NaCl and simulated well water. The inhibitors were assessed by potentiodynamic and impedance techniques. The best inhibitor concentration from the electrochemical studies was selected and tested in static and dynamic conditions at 55-60°C for 6 hours immersion time. The results provided a preliminary validation of the inhibitor such that they can be optimized and used for corrosion in oil and gas industries.

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