

**CORROSION MITIGATION PERFORMANCE OF NATURAL AND
SYNTHETIC INHIBITORS ON MILD STEEL, REBAR AND
Ti ALLOY**

**Thesis submitted to the Bharathiar University in partial fulfillment
of the requirements for the award of the Degree of**

DOCTOR OF PHILOSOPHY IN CHEMISTRY

By

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a doctoral fellow

Under the guidance of

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PSGR Krishnammal College for Women



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DECLARATION

I, **R. ANITHA** hereby declare that the thesis, entitled “**CORROSION MITIGATION PERFORMANCE OF NATURAL AND SYNTHETIC INHIBITORS ON MILD STEEL, REBAR AND Ti ALLOY**”, submitted to the Bharathiar University, in partial fulfillment of the requirements for the award of the Degree of **DOCTOR OF PHILOSOPHY IN CHEMISTRY** is a record of original and independent research work done by me during 2016-2019 under the supervision and guidance of **Dr. (Mrs) SUBRAMANIAN CHITRA, M.Sc., M.Phil., Ph.D.**, Associate Professor and Head, Department of Chemistry, PSGR Krishnammal College for Women, Coimbatore and it has not formed the basis for the award of any Degree / Diploma / Associateship / Fellowship or other similar title to any candidate in any University

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R. ANITHA

ABBREVIATIONS AND SYMBOLS

FT-IR	-	Fourier transform - infrared spectroscopy
GC-MS	-	Gas chromatography- mass spectrometry analysis
NMR	-	Nuclear magnetic resonance
v/v%	-	Volume/Volume %
mM	-	Millimole
CR	-	Corrosion rate
mpy	-	Mils per year
θ	-	Degree of surface coverage
E_a	-	Activation energy
ΔH°	-	Enthalpy of activation
ΔS°	-	Entropy of activation
$\Delta G^\circ_{\text{ads}}$	-	Free energy of adsorption
IE	-	Inhibition efficiency
OCP	-	Open circuit potential
EIS	-	Electrochemical impedance spectroscopy
Z', Z''	-	Real part and imaginary part of cell impedance
R_t	-	Charge transfer resistance
C_{dl}	-	Double layer capacitance
b_a and b_c	-	Anodic and cathodic Tafel slope
E_{corr}	-	Corrosion potential
I_{corr}	-	Corrosion current density
XRD	-	X-ray diffraction pattern
XPS	-	X-ray photoelectron spectroscopy

SEM	-	Scanning electron microscopy
EDS	-	Energy dispersive X-ray spectroscopy
AFM	-	Atomic force microscopy
DFT	-	Density functional theory
$\mu\text{A}/\text{cm}^2$	-	Microamperes/ cm^2
$\mu\text{F}/\text{cm}^2$	-	Microfarad/ cm^2
m/z	-	Mass- to- charge ratio
Kohm cm^2	-	Kiloohm cm^2
R_s	-	Solution resistance
$\Omega \text{ cm}^2$	-	Ohm cm^2
R_o	-	Outer porous layer resistance
C_o	-	Outer porous layer capacitance
R_{in}	-	Inner compact layer resistance
C_{in}	-	Inner compact layer capacitance
mV	-	Millivolt
E_{HOMO}	-	Energy of the highest occupied molecular orbital
E_{LUMO}	-	Energy of the lowest unoccupied molecular orbital
amu	-	Atomic mass unit
eV	-	Electron volt