

**Corrosion monitoring of metal (Mild steel, Aluminium) / 1M
HCl interface in the presence of *Spathodea campanulata*,
Tecoma capensis leaf and flower extracts -
Chemical, Electrochemical and
Theoretical studies**

By

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A Thesis Submitted to

**Avinashilingam Institute for Home Science and Higher Education
for Women, Coimbatore- 641043**

In Partial Fulfilment of the Requirements for the Degree of

Doctor of Philosophy in Chemistry

March 2015

CERTIFICATE

This is to certify that the dissertation entitled “Corrosion monitoring of metal (Mild steel, Aluminium) /1M HCl interface in the presence of *Spathodea campanulata*, *Tecoma capensis* leaf and flower extracts- Chemical, Electrochemical and Theoretical studies” submitted to the Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore in partial fulfillment of the requirement for the award of the degree of **Doctor of Philosophy (Ph.D.) in Chemistry** by **Mrs A. Prithiba** during the period of her study in the Department of Chemistry , Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore under my supervision and guidance and the thesis has not formed the basis for the award of any Degree/ Diploma/ Associateship /Fellowship or similar titles to any candidate of any other University.

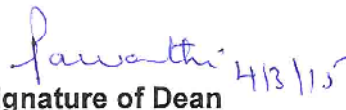


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DECLARATION

I hereby declare that the thesis entitled “**Corrosion monitoring of metal (Mild steel, Aluminium) /1M HCl interface in the presence of *Spathodea campanulata*, *Tecoma capensis* leaf and flower extracts–Chemical, Electrochemical and Theoretical studies**” submitted to the Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore in partial fulfillment of the requirement for the award of the degree of **Doctor of Philosophy (Ph.D.) in Chemistry** is the record of work carried out by me during the period from April 2010 to March 2015 under the guidance of **Dr. R.Rajalakshmi**, Professor, Department of Chemistry, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore and has not formed the basis for the award of any Degree/ Diploma/ Associateship /Fellowship or similar title to any candidate of any other University.


4.3.15
Signature of the Guide


Signature of the Candidate

ACKNOWLEDGEMENT

He fulfils His Purpose for me

- Psalms 138:8

An effort at any level is satisfactorily completed with the support and guidance of learned people. Therefore submitting my reverential gratitude on the feet of the Lord Almighty, I deem it a great privilege to thank one and all for permitting me to carry out this research.

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दिनांक/Date: 28 January 2013

सेवा में / To

Ms. A. Prithiba
Assistant Professor
Department of Chemistry
Avinashilingam University
Coimbatore - 641 043

महोदया / Madam,

The plant specimen sent by you for identification is identified as
Spathodea campanulata P. Beauv. - BIGNONIACEAE

धन्यवाद / Thanking you,

भवदीय / Yours faithfully,

(डॉ. जी.वी.एस. मूर्ति / Dr. G.V.S. Murthy)
वैज्ञानिक 'एफ' एवं कार्यालय अध्यक्ष /
Scientist 'F' & Head of Office

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दिनांक/Date: 28 January 2013

सेवा में / To

Ms. A. Prithiba
Assistant Professor
Department of Chemistry
Avinashilingam University
Coimbatore - 641 043

महोदया/Madam,

The plant specimen sent by you for identification is identified as
Tecoma capensis (Thunb.) Lindl. - BIGNONIACEAE

Synonyms of the species are: *Bignonia capensis* Thunb. And *Tecomaria capensis* (Thunb.) Spach.

धन्यवाद/Thanking you,

भवदीय/Yours faithfully,



(डॉ. जी.वी.एस. मूर्ति /Dr. G.V.S. Murthy)
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CONTENTS

S. No	Title	Page No
	List of Tables	
	List of Figures	
	List of Abbreviations	
1.0	Introduction	1
	1.1 Preamble	1
	1.2 Consequences Of Corrosion	2
	1.3 Electrochemical Principle Of Corrosion	2
	1.4 Forms Of Corrosion	4
	1.5 Strategic Impact Of Corrosion Damage	4
	1.6 Corrosion Control - A Universal Necessity	6
	1.7 Corrosion Mitigation	7
	1.8 Plant Description	10
	1.9 Objectives	11
2.0	Review Of Literature	12
	2.1 Introduction	12
	2.2 Plant Extracts As Corrosion Inhibitors For Mild Steel	14
	2.3 Plant Extracts As Corrosion Inhibitors For Aluminium	21
	2.4 Phytochemical Constituents As Corrosion Inhibitors	24
	2.5 Theory Behind Inhibition	28
	2.6 Correlation Between Molecular Structure And Corrosion Inhibition	31
	2.7 Phytochemical Investigation Of Selected Inhibitors	33
	2.8 Molecular Modelling	34

S. No	Title	Page No
3.0	Materials And Methods	39
	3.1 Module I: Identification and selection of Inhibitors, Metal samples, Test Media and Characterisation of the selected Inhibitors	39
	3.2 Module II: Assessment of Selected Inhibitors as Corrosion Inhibitors for Mild Steel and Aluminium Using Experimental and Surface Analytical Techniques	43
	3.3 Module III: Theoretical Studies Using Hyperchem 7.5	49
	3.4 Adopted Conceptual Framework For Methodology	51
4.0	Results And Discussion	52
	4.1 Characterization Of Selected Plant Extracts	52
	4.2 Electrochemical Measurements	63
	4.3 Mass Loss Method	114
	4.4 Adsorption Isotherm	131
	4.5 Kinetic Parameters For Inhibition Process	144
	4.6 Thermodynamic Adsorption Parameters	149
	4.7 Surface Analytical Techniques	151
	4.8 Quantum Chemical Calculation	175
	4.9 Mechanism Of Inhibition Process	188
5.0	Summary And Conclusion	195
	Bibliography	199
	Appendix I	226
	Appendix II Mullikken Charges	227
	Publications	230

LIST OF TABLES

TABLE NO	Titles	PAGE NO
2.1	Corrosion inhibition efficiency of some of the investigated plant species	15
2.2	Insight into the components and efficiency of the tested Natural oils	25
2.3	Recent research activity on MS and Aluminium corrosion	37
4.1	Preliminary phytochemical screening of the crude extracts of the investigated Plants	53
4.2	FT-IR spectral data of crude SC/ TC extracts	56
4.3	UV spectral data of crude SCL / SCF / TCL / TCF extracts	62
4.4	Potentiodynamic polarisation parameters for the corrosion of MS in the absence and presence of different concentrations of SCL / SCF in 1M HCl	64
4.5	Potentiodynamic polarisation parameters for the corrosion of MS in the absence and presence of different concentrations of TCL / TCF in 1M HCl	66
4.6	Potentiodynamic polarisation parameters for corrosion of MS in the absence and presence of different concentrations of SCL / SCF in 1M HCl at room temperature and higher temperatures	71
4.7	Potentiodynamic polarisation parameters for corrosion of MS in the absence and presence of different concentrations of TCL / TCF in 1M HCl at room temperature and higher temperatures	72
4.8	Electrochemical Impedance parameters for corrosion of MS in the absence and presence of different concentrations of SCL and SCF in 1M HCl	82
4.9	Electrochemical Impedance parameters for corrosion of MS in the absence and presence of different concentrations of TCL and TCF in 1M HCl	82
4.10	Electrochemical Impedance parameters for corrosion of MS in the absence and presence of different concentrations of SCL and SCF in 1M HCl at room temperature and higher temperatures	86
4.11	Electrochemical Impedance parameters for corrosion of MS in the absence and presence of different concentrations of TCL and TCF in 1M HCl at room temperature and higher temperatures	87
4.12	Potentiodynamic polarisation parameters for the corrosion of AA1100 in the absence and presence of different concentrations of SCL / SCF in 1M HCl	89

TABLE NO	Titles	PAGE NO
4.13	Potentiodynamic polarisation parameters for the corrosion of AA 1100 in the absence and presence of different concentrations of TCL / TCF in 1M HCl	90
4.14	Potentiodynamic polarisation parameters for corrosion of AA1100 in the absence and presence of different concentrations of SCL /SCF at room temperature and higher temperatures	96
4.15	Potentiodynamic polarisation parameters for corrosion of AA1100 in the absence and presence of different concentrations of TCL / TCF at room temperature and higher temperatures	97
4.16 -4.19	Electrochemical Impedance parameters for corrosion of AA1100 in the absence and presence of different concentrations of SCL in 1M HCl /SCF in 1M HCl / TCL in 1M HCl / TCF in 1M HCl	102,103
4.20	Electrochemical Impedance parameters for corrosion of AA1100 in the absence and presence of SCL / SCF in 1M HCl at room and higher temperatures	110, 111
4.21	Electrochemical Impedance parameters for corrosion of AA1100 in the absence and presence of different concentrations of TCL/TCF in 1M HCl at room and higher temperatures	112,113
4.22	Inhibition efficiency as a function of immersion time and concentration of SCL /SCF in 1M HCl	114
4.23	Inhibition efficiency as a function of immersion time and concentration for TCL/TCF /MS/1M HCl systems	118
4.24	Relationship between Inhibition efficiency and concentration for SCL / SCF /MS / 1M HCl systems at various temperatures	119
4.25	Relationship between Inhibition efficiency and concentration for TCL / TCF/ MS / 1M HCl systems at various temperatures	120
4.26	Inhibition efficiency as a function of immersion time and concentration of SCL / SCF on AA1100/1M HCl	121
4.27	Inhibition efficiency as a function of immersion time and concentration of TCL / TCF on AA1100/1M HCl	123
4.28	Relationship between Inhibition efficiency and concentration of SCL and SCF at various temperatures on AA1100/1M HCl	125
4.29	IE as a function of temperature in the presence and absence of different concentration of TCL / TCF extracts on AA1100 in 1M HCl	127
4.30	Comparison of Corrosion rate and IE of extracted and synthetic phytochemicals for MS and AA1100 with the investigated inhibitors	129

TABLE NO	Titles	PAGE NO
4.31-4.34	Adsorption parameters deduced from various adsorption isotherms –MS / 1M HCl / SCL , MS / 1M HCl / SCF, MS / 1M HCl / TCL , MS / 1M HCl / TCF	134-137
4.35-4.38	Adsorption parameters deduced from various adsorption isotherms – AA1100 / 1M HCl / SCL, AA1100 / 1M HCl / SCF, AA1100 / 1M HCl / TCL, AA1100 / 1M HCl / TCF	138-141
4.39	The results of Statistical SPSS 17 package on adsorption isotherms and the various adsorption models obeyed by the investigated inhibitors and their highest F values	142
4.40	Activation parameters for MS / AA 1100 corrosion in 1 M HCl in the absence and presence of different concentrations of SCL / SCF / TCL / TCF	147
4.41	Average values of activation parameters for MS / AA1100 corrosion in 1 M HCl in the absence and presence of different concentrations of SCL/SCF/TCL/TCF	148
4.42	Thermodynamic adsorption parameters for MS / AA1100 corrosion in 1 M HCl in the absence and presence of different concentrations of SCL/SCF/TCL/TCF	149
4.43	UV spectral details for crude plant extract and corrodent solution on MS in 1 M HCl	153
4.44	UV spectral details for crude plant extract, corrodent solution on AA1100 in 1 M HCl	154
4.45	FT-IR spectral details of SC for crude plant extract and corrosion product on MS in 1 M HCl	156
4.46	Observed IR Frequency , (cm^{-1}) and Peak assignment for TCL and TCF /MS / 1M HCl	158
4.47	Observed IR Frequency , (cm^{-1}) and Peak assignment for SCL / SCF / 1M HCl / AA1100	160
4.48	FT-IR spectral details of TC for crude plant extract, corrosion product on AA1100 in 1 M HCl	162
4.49	Quantum chemical parameters for the selected phytoconstituents using semiempirical approach PM3 and AM1	178
4.50	Derived Quantum chemical parameters for the selected phytoconstituents using semiempirical approach PM3 and AM1	180

LIST OF FIGURES

FIGURE No	TITLES	PAGE No
1.1	Schematic representation of electrochemical corrosion process for Mild Steel and Aluminium	3
1.2	Classification of macroscopic and microscopic forms of corrosion	4
1.3	Factors affecting the costs of corrosion	5
1.4	NACE Assessment of growing cost of Corrosion	5
1.5	Losses due to Corrosion	6
2.1	Progression of research in the field of corrosion inhibitors	13
2.2	a) Competitive and b) Cooperative adsorption of green inhibitor in acid solutions	30
2.3	Proposed skeletal model of mode of adsorption of inhibitor on mild steel surface	30
2.4	Stable chelate model of Iron with Guar gum inhibitor	33
3.1	Chemical composition of metal specimens	40
3.2	Investigated Inhibitor systems -MS / AA1100 / Inhibitors / 1M HCl	41
3.3	Proposed framework of Methodology	51
4.1	Characterisation of SCL extract	58
4.2	Characterisation of SCF extract	59
4.3	Characterisation of TCL extract	60
4.4	Characterisation of TCF extract	61
4.5	Potentiodynamic polarisation curves for MS in 1 M HCl in absence and presence of (a)SCL (b) SCF (c) TCL (d) TCF extracts	67
4.6	Potentiodynamic polarisation plots of MS in 1 M HCl in absence and presence of SCL and SCF at (a) 303K (b) 313K (c) 323K and (d) 333K	69
4.7	Potentiodynamic polarisation plots of MS in 1 M HCl in absence and presence of TCL and TCF at (a) 303K (b) 313K (c) 323K and (d) 333K	70
4.8	Nyquist and Bode diagrams for MS Electrode in 1M HCl in the absence and presence of (a)SCL (b) SCF	75
4.9	Nyquist and Bode plots of MS Electrode in 1M HCl in the absence and presence of (c)TCL (d) TCF	76

FIGURE No	TITLES	PAGE No
4.10	Proposed equivalent circuit model for MS/Inhibitors/1M HCl	78
4.11	Impedance plots of MS in 1 M HCl in the absence and presence of SCL and SCF at (a) 303K (b) 313K (c) 323K and (d) 333K	84
4.12	Impedance plots of MS in 1 M HCl in the absence and presence of TCL and TCF at (a) 303K (b) 313K (c) 323K and (d) 333K	85
4.13	Potentiodynamic polarisation plots of AA1100 in 1 M HCl in absence and presence of (a) SCL (b) SCF (c) TCL (d) TCF extracts	92
4.14	Potentiodynamic polarisation plots of AA1100 in 1M HCl in absence and presence of SCL and SCF at (a) 303K (b) 313K (c) 323K and (d) 333K	94
4.15	Potentiodynamic polarisation plots of AA1100 in 1M HCl in absence and presence of TCL and TCF at (a) 303K (b) 313K (c) 323K and (d) 333K	95
4.16	Impedance response of AA1100 Electrode in the absence and presence of (a) SCL (b) SCF in Nyquist and Bode format	100
4.17	Nyquist and Bode plots of AA1100 Electrode in the absence and presence of (a) TCL (b) TCF	101
4.18	Proposed equivalent circuit model for AA1100 / Inhibitors /1M HCl	105
4.19	Impedance plots of AA1100 in 1 M HCl in absence and presence of SCL and SCF at (a) 303K (b) 313K (c) 323K and (d) 333K	108
4.20	Impedance plots of AA1100 in 1 M HCl in absence and presence of TCL and TCF at (a) 303K (b) 313K (c) 323K and (d) 333K	109
4.21	Inhibition efficiency as a function of time and concentration of SCL /SCF/ TCL/ TCF extracts on MS in 1M HCl	116
4.22	Impact of temperature on the corrosion inhibition of SCL /SCF/ TCL/ TCF extracts on AA1100 in 1M HCl	126
4.23	Comparison of IE of studied inhibitors using mass loss and electrochemical techniques for SCL /SCF /TCL /TCF /MS and AA 1100 / 1M HCl	128
4.24		
4.25	Pictorial representation of durability of investigated inhibitors a) MS / SCL / SCF / TCL / TCF / 1M HCl b) AA1100 / SCL / SCF / TCL / TCF / 1M HCl at room temperature for a period of 3 years	130
4.26	Langmuir Adsorption Isotherms for MS, AA1100 / SCL / SCF / TCL / TCF / 1M HCl systems	143
4.27	Arrhenius plots and Transition state plots for MS / SCL / SCF / TCL / TCF /1M HCl systems	145

FIGURE No	TITLES	PAGE No
4.28	Arrhenius plots and Transition state plots for AA1100 / SCL / SCF/ TCL / TCF /1M HCl system	146
4.29,4.30	Best fit curves of $-\Delta G^{\circ}_{ads}$ Vs T for MS / SCL/ SCF/TCL/TCF / 1M HCl ; AA1100 / SCL/ SCF/TCL/TCF / 1M HCl	150
4.31	UV spectra for crude plant extracts SCL /SCF /TCL /TCF and corrodent solution on MS in 1 M HCl	153
4.32	UV spectra for crude plant extracts SCL /SCF /TCL /TCF, corrodent solution on AA1100 in 1 M HCl	155
4.33	FT-IR Spectrum of (a) SCL and corrosion products in the presence of SCL (b) SCF and corrosion products in the presence of SCF (c) TCL and corrosion products in the presence of TCL (d) TCF and corrosion products in the presence of TCF	159
4.34	FT-IR Spectrum of (a) SCL and SCL / AA1100 (b)SCF and SCF / AA1100 (c)TCL and TCL / AA1100 (d) TCF and TCF / AA1100 in 1M HCl	161
4.35	SEM images of MS corrosion in absence and presence of (c) SCL (d) SCF (e) TCL (f) TCF in 1M HCl	165
4.36	SEM images of AA1100 corrosion in absence and presence of (c) SCL (d) SCF (e) TCL (f) TCF in 1M HCl	166
4.37	EDX images of MS corrosion in absence and presence of (c) SCL (d) SCF (e) TCL (f) TCF in 1M HCl	168
4.38	EDX images of AA1100 corrosion in absence and presence of (c)SCL (d) SCF (e) TCL (f) TCF in 1M HCl	170
4.39	XRD spectrum of a) MS b) AA1100 corrosion in presence and absence of investigated inhibitors in 1M HCl	171
4.40	3D Optical Profiler images of MS in absence and presence of (c) SCL (d) SCF (e) TCL (f) TCF in 1M HCl	173
4.41	3D Optical Profiler images of AA1100 in absence and presence of (c) SCL (d) SCF (e) TCL (f) TCF in 1M HCl	174
4.42-4.48	Optimised structures and Frontier molecular orbital distribution of selected phytochemicals	181-187
4.49	Schematic illustration of selected phyto constituents on MS surface	191
4.50	Schematic illustration of selected phyto constituents on AA1100 surface	193

LIST OF ABBREVIATIONS

<p>SC - <i>Spathodea campanulata</i></p> <p>TC - <i>Tecoma capensis</i></p> <p>SCL - <i>Spathodea campanulata</i> leaves extract</p> <p>SCF - <i>Spathodea campanulata</i> flower extract</p> <p>TCL - <i>Tecoma capensis</i> leaves extract</p> <p>TCF - <i>Tecoma capensis</i> flower Extract</p> <p>MS - Mild Steel</p> <p>AA1100 - Aluminium alloy 1100</p> <p>CR - Corrosion Rate</p> <p>HCl - Hydrochloric acid</p> <p>IE - Inhibition Efficiency</p> <p>θ - Surface Coverage</p> <p>E_{corr} - Corrosion Potential</p> <p>I_{corr} - Corrosion Current density</p> <p>b_a - Anodic Tafel Slope</p> <p>b_c - Cathodic Tafel Slope</p> <p>R_p - Polarisation Resistance</p> <p>R_{ct} - Charge Transfer Resistance</p> <p>C_{dl} - Double Layer Capacitance</p> <p>R_s - Solution resistance</p> <p>CPE - Constant Phase Element</p> <p>n - CPE exponent</p>	<p>Y₀ - CPE constant</p> <p>τ - Interface Time constant</p> <p>f_{max} - frequency at Z' value maximum</p> <p>mV - milli Volt</p> <p>mpy - miles per year</p> <p>eV - electron volt</p> <p>E_a - Activation energy</p> <p>ΔH_a - Enthalpy of activation</p> <p>ΔS_a - Entropy of activation</p> <p>ΔG°_{ads} - Free energy of adsorption</p> <p>ΔH°_{ads} - Enthalpy of adsorption</p> <p>ΔS°_{ads} - Entropy of adsorption</p> <p>E_{HOMO} - Energy of the highest occupied molecular orbital</p> <p>E_{LUMO} - Energy of the lowest unoccupied molecular orbital</p> <p>μ - Dipole moment</p> <p>ΔE - Energy gap</p> <p>ΔN - Number of electrons</p> <p>EA - Electron Affinity</p> <p>IP - Ionization Potential</p> <p>η - Global Hardness</p> <p>σ - Global Softness</p> <p>χ - Electronegativity</p> <p>ω - Electrophilic Index</p>
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