

LIST OF FIGURES

Figure No.	Title	Page No.
PART I SYNTHESIS AND CHARACTERIZATION		
1.1	¹ Hnmr spectrum of I3YT2YMAPA	20
1.2	¹³ Cnmr spectrum of I3YT2YMAPA	21
1.3	Mass spectrum of I3YT2YMAPA	21
1.4	Structure of I3YT2YMAPA	22
1.5	Structures of metal complexes of I3YT2YMAPA	26
1.6	¹ Hnmr spectrum of T2YMABA	31
1.7	¹³ Cnmr spectrum of T2YMABA	31
1.8	Mass spectrum of T2YMABA	32
1.9	Structure of T2YMABA	33
1.10	Structures of metal complexes of T2YMABA	37
1.11	Synthetic strategy of arylated derivative (Meerwin arylation)	41
1.12	¹ Hnmr spectrum of CTHMT2YBA	43
1.13	¹³ Cnmr spectrum of CTHMT2YBA	44
1.14	Mass spectrum of CTHMT2YBA	45
1.15	Tautomeric forms of CTHMT2YBA	45
1.16	Structures of metal complexes of CTHMT2YBA	49
1.17	¹ Hnmr spectrum of PHMT2YBA	55
1.18	¹³ Cnmr spectrum of PHMT2YBA	55
1.19	Mass spectrum of PHMT2YBA	56
1.20	Structure of PHMT2YBA	56
1.21	Structures of metal complexes of PHMT2YBA	60
1.22	¹ Hnmr spectrum of CTHMT2YBA	65
1.23	¹³ Cnmr spectrum of CTHMT2YBA	66
1.24	Mass spectrum of CTHMT2YBA	67

Figure No.	Title	Page No.
1.25	Tautomeric forms of CTHMF2YBA	67
1.26	Structures of metal complexes of CTHMF2YBA	71
PART II THERMOANALYTICAL STUDIES		
2.1	Structure, TGA and DTA curves of $[\text{CrL}^1\text{Ac}_2(\text{H}_2\text{O})]_2$	97
2.2	Structure, TGA and DTA curves of $[\text{CrL}^2\text{Ac}_3(\text{H}_2\text{O})_2]$	98
2.3	Structure, TGA and DTA curves of $[\text{CrL}^3\text{Ac}_2(\text{H}_2\text{O})]_2$	98
2.4	Structure, TGA and DTA curves of $[\text{CrL}^4\text{Ac}_2(\text{H}_2\text{O})]_2$	99
2.5	Structure, TGA and DTA curves of $[\text{NiL}^1\text{Ac}(\text{H}_2\text{O})_3]$	114
2.6	Structure, TGA and DTA curves of $[\text{NiL}^2_2\text{Ac}_2(\text{H}_2\text{O})_2]$	114
2.7	Structure, TGA and DTA curves of $[\text{NiL}^3_2(\text{H}_2\text{O})_2]$	115
2.8	Structure, TGA and DTA curves of $[\text{NiL}^4_2(\text{H}_2\text{O})_2]$	115
2.9	Structure, TGA and DTA curves of $[\text{NiL}^5\text{Ac}(\text{H}_2\text{O})_3]$	116
PART III CORROSION INHIBITION STUDIES		
3.1	Equivalent circuit model	151
3.2	A Nyquist plot	152
3.3	Bode and impedance plots	153
3.4	Tafel extrapolation method	155
3.5	Linear polarization method	156
3.6	Variation of corrosion rates of MS with the concentration of Schiff base inhibitors I3YT2YMAPA, T2YMABA, PHMT2YBA, CTHMT2YBA and CTHMF2YBA in 1.0M HCl	160
3.7	Comparison of corrosion inhibition efficiencies ($\eta_w\%$) of Schiff base inhibitors I3YT2YMAPA, T2YMABA, PHMT2YBA, CTHMT2YBA and CTHMF2YBA on MS in 1.0M HCl	162
3.8	Optimized geometries of Schiff base molecules	163
3.9	Comparison of corrosion inhibition efficiencies ($\eta_w\%$) of Schiff base inhibitors I3YT2YMAPA, T2YMABA, PHMT2YBA, CTHMT2YBA, CTHMF2YBA and their parent amines in 1.0M HCl	165

Figure No.	Title	Page No.
3.10	Freundlich adsorption isotherm for I3YT2YMAPA on MS in 1.0M HCl	166
3.11	Langmuir adsorption isotherm for T2YMABA on MS in 1.0M HCl	166
3.12	Freundlich adsorption isotherm for PHMT2YBA on MS in 1.0M HCl	166
3.13	Freundlich adsorption isotherm for CTHMT2YBA on MS in 1.0M HCl	166
3.14	Freundlich adsorption isotherm for CTHMF2YBA on MS in 1.0M HCl	167
3.15	Arrhenius plots for the corrosion of MS in the absence and presence of I3YT2YMAPA in 1.0M HCl	169
3.16	Plots of $\log(K/T)$ vs $1000/T$ for the corrosion of MS in the absence and presence of I3YT2YMAPA in 1.0M HCl	169
3.17	Arrhenius plots for the corrosion of MS in the absence and presence of T2YMABA in 1.0M HCl	169
3.18	Plots of $\log(K/T)$ vs $1000/T$ for the corrosion of MS in the absence and presence of T2YMABA in 1.0M HCl	169
3.19	Arrhenius plots for the corrosion of MS in the absence and presence of PHMT2YBA in 1.0M HCl	170
3.20	Plots of $\log(K/T)$ vs $1000/T$ for the corrosion of MS in the absence and presence of PHMT2YBA in 1.0M HCl	170
3.21	Arrhenius plots for the corrosion of MS in the absence and presence of CTHMF2YBA in 1.0M HCl	170
3.22	Plots of $\log(K/T)$ vs $1000/T$ for the corrosion of MS in the absence and presence of CTHMF2YBA in 1.0M HCl	170
3.23	Arrhenius plots for the corrosion of MS in the absence and presence of CTHMF2YBA in 1.0M HCl	170
3.24	Plots of $\log(K/T)$ vs $1000/T$ for the corrosion of MS in the absence and presence of CTHMF2YBA in 1.0M HCl	170
3.25	SEM image of bare MS surface	172
3.26	SEM image of MS surface in 1.0M HCl (blank)	172
3.27	SEM image of MS surface in 1.0M HCl and I3YT2YMAPA(1.0mM)	172
3.28a	Nyquist plots of MS in the presence and absence of I3YT2YMAPA in 1.0M HCl	174

Figure No.	Title	Page No.
3.28b	Bode plots of MS in the presence and absence of I3YT2YMAPA in 1.0M HCl	174
3.29a	Nyquist plots of MS in the presence and absence of T2C3ABA in 1.0M HCl	174
3.29b	Bode plots of MS in the presence and absence of T2C3ABA in 1.0M HCl	174
3.30a	Nyquist plots of MS in the presence and absence of PHMT2YBA in 1.0M HCl	174
3.30b	Bode plots of MS in the presence and absence of PHMT2YBA in 1.0M HCl	174
3.31a	Nyquist plots of MS in the presence and absence of CTHMT2YBA in 1.0M HCl	175
3.31b	Bode plots of MS in the presence and absence of CTHMT2YBA in 1.0M HCl	175
3.32a	Nyquist plots of MS in the presence and absence of CTHMF2YBA in 1.0M HCl	175
3.32b	Bode plots of MS in the presence and absence of CTHMF2YBA in 1.0M HCl	175
3.33	Comparison of corrosion inhibition efficiencies ($\eta_{EIS}\%$) of Schiff bases, I3YT2YMAPA, T2YMABA, PHMT2YBA, CTHMT2YBA and CTHMF2YBA on MS in 1.0M HCl	177
3.34a	Tafel plots of MS in the presence and absence of I3YT2YMAPA in 1.0M HCl	180
3.34b	Linear polarization curves of MS in the presence and absence of I3YT2YMAPA in 1.0M HCl	180
3.35a	Tafel plots of MS in the presence and absence of T2YMABA in 1.0M HCl	180
3.35b	Linear polarization curves of MS in the presence and absence of T2YMABA in 1.0M HCl	180
3.36a	Tafel plots of MS in the presence and absence of PHMT2YBA in 1.0M HCl	180
3.36b	Linear polarization curves of MS in the presence and absence of PHMT2YBA in 1.0M HCl	180
3.37a	Tafel plots of MS in the presence and absence of CTHMT2YBA in 1.0M HCl	181
3.37b	Linear polarization curves of MS in the presence and absence of CTHMT2YBA in 1.0M HCl	181

Figure No.	Title	Page No.
3.38a	Tafel plots of MS in the presence and absence of CTHMF2YBA in 1.0M HCl	181
3.38b	Linear polarization curves of MS in the presence and absence of CTHMF2YBA in 1.0M HCl	181
3.39	Comparison of corrosion inhibition efficiencies ($\eta_{\text{pol}}\%$) of Schiff bases I3YT2YMAPA, T2YMABA, PHMT2YBA, CTHMT2YBA and CTHMF2YBA on MS in 1.0M HCl	182
3.40	Mechanism of corrosion inhibition by Schiff base inhibitor molecules on MS surface	183
3.41	Variation of corrosion rates of MS with the concentration of Schiff base inhibitors I3YT2YMAPA, T2YMABA, PHMT2YBA, CTHMT2YBA and CTHMF2YBA in 0.5M H ₂ SO ₄	185
3.42	Comparison of corrosion inhibition efficiencies ($\eta_{\text{w}}\%$) of Schiff base inhibitors I3YT2YMAPA, T2YMABA, PHMT2YBA, CTHMT2YBA and CTHMF2YBA on MS in 0.5M H ₂ SO ₄	186
3.43	Langmuir adsorption isotherm for I3YT2YMAPA on MS in 0.5M H ₂ SO ₄	187
3.44	Freundlich adsorption isotherm for T2YMABA on MS in 0.5 M H ₂ SO ₄	187
3.45	Freundlich adsorption isotherm for PHMT2YBA on MS in 0.5M H ₂ SO ₄	187
3.46	Freundlich adsorption isotherm for CTHMT2YBA on MS in 0.5 M H ₂ SO ₄	187
3.47	Langmuir adsorption isotherm for CTHMF2YBA on MS in 0.5M H ₂ SO ₄	188
3.48	SEM image of the bare MS	189
3.49	SEM image of MS surface in 0.5M H ₂ SO ₄ after 24 h	190
3.50	SEM image of MS surface in 0.5M H ₂ SO ₄ and I3YT2YMAPA after 24 h	190
3.51a	Nyquist plots of MS in the presence and absence of I3YT2YMAPA in 0.5M H ₂ SO ₄	192
3.51b	Bode plots of MS in the presence and absence of I3YT2YMAPA in 0.5M H ₂ SO ₄	192
3.52a	Nyquist plots of MS in the presence and absence of T2YMABA in 0.5M H ₂ SO ₄	192

Figure No.	Title	Page No.
3.52b	Bode plots of MS in the presence and absence of T2YMABA in 0.5M H ₂ SO ₄	192
3.53a	Nyquist plots of MS in the presence and absence of PHMT2YBA in 0.5M H ₂ SO ₄	193
3.53b	Bode plots of MS in the presence and absence of PHMT2YBA in 0.5M H ₂ SO ₄	193
3.54a	Nyquist plots of MS in the presence and absence of CTHMT2YBA in 0.5M H ₂ SO ₄	193
3.54b	Bode plots of MS in the presence and absence of CTHMT2YBA in 0.5M H ₂ SO ₄	193
3.55a	Nyquist plots of MS in the presence and absence of CTHMF2YBA in 0.5M H ₂ SO ₄	193
3.55b	Bode plots of MS in the presence and absence of CTHMF2YBA in 0.5M H ₂ SO ₄	193
3.56	Comparison of corrosion inhibition efficiencies ($\eta_{EIS}\%$) of Schiff base inhibitors I3YT2YMAPA, T2YMABA, PHMT2YBA, CTHMT2YBA and CTHMF2YBA on MS in 0.5M H ₂ SO ₄	194
3.57a	Tafel plots of MS in the presence and absence of I3YT2YMAPA in 0.5M H ₂ SO ₄	199
3.57b	Linear polarization curves of MS in the presence and absence of I3YT2YMAPA in 0.5M H ₂ SO ₄	199
3.58a	Tafel plots of MS in the presence and absence of T2YMABA in 0.5M H ₂ SO ₄	199
3.58b	Linear polarization curves of MS in the presence and absence of T2YMABA in 0.5M H ₂ SO ₄	199
3.59a	Tafel plots of MS in the presence and absence of PHMT2YBA in 0.5M H ₂ SO ₄	199
3.59b	Linear polarization curves of MS in the presence and absence of PHMT2YBA in 0.5M H ₂ SO ₄	199
3.60a	Tafel plots of MS in the presence and absence of CTHMT2YBA in 0.5M H ₂ SO ₄	200
3.60b	Linear polarization curves of MS in the presence and absence of CTHMT2YBA in 0.5M H ₂ SO ₄	200
3.61a	Tafel plots of MS in the presence and absence of CTHMF2YBA in 0.5M H ₂ SO ₄	200
3.61b	Linear polarization curves of MS in the presence and absence of CTHMF2YBA in 0.5M H ₂ SO ₄	201

Figure No.	Title	Page No.
3.62	Comparison of corrosion inhibition efficiencies ($\eta_{\text{pol}}\%$) of Schiff base inhibitors I3YT2YMAPA, T2YMABA, PHMT2YBA, CTHMT2YBA and CTHMF2YBA on MS in 0.5M H ₂ SO ₄	201
PART IV ANTITUMOUR STUDIES		
4.1	Structure of cisplatin	220
4.2	Structures of antitumour drugs, cyclophosphamide and Cu(II) complexes of Schiff bases	234
4.3	Microscopic view of a) live DLA tumour cells (control) b) dead tumour cells subjected to <i>in vitro</i> cytotoxic studies with 200 μ g/ml concentration of Cu-I3YT2YMAPA complex	239
4.4	<i>In vitro</i> cytotoxicity data of I3YT2YMAPA and T2YMAPA and their Cu(II) complexes on DLA cell lines	241
4.5	<i>In vitro</i> cytotoxicity data of CTHMT2YBA and PHMT2YBA and their Cu(II) complexes on DLA cell lines	241
4.6	<i>In vitro</i> cytotoxicity data of CTHMF2YBA and P3YEHCTA and their Cu(II) complexes on DLA cell lines	241
4.7	<i>In vitro</i> cytotoxicity data of PHEP and A9Y3APA and their Cu(II) complexes on DLA cell lines	242
4.8	<i>In vitro</i> cytotoxicity data of A9Y3IMPA and A9Y3PPA and their Cu(II) complexes on DLA cell lines	242
4.9	Cytotoxic action of I3YT2YMAPA, T2YMABA, CTHMT2YBA and their copper(II) complexes	243
4.10	<i>In vivo</i> ascites tumour reduction studies on Swiss albino mice	249
4.11	Effect of copper complexes and the standard drug cyclophosphamide, on the growth inhibition of Dalton's lymphoma ascites tumour cells (<i>in vivo</i>)	250