C O N T E N T S

			Page No
DECLARATION			i
ACKNOWLEDGEMENT			ii
SYNOPSIS			iii
CHAPTER - I		INTRODUCTION	1
	1.1	General Introduction	2
	1.2	Electroanalytical Chemistry in Fused Salts	3
	1.3	Electroanalytical Chemistry in Nitrate Melts	5
	1.4	Discrepancies in Redox Process of Metals in Nitrate Melts	13
	1.5	Scope of the Thesis	18
CHAPTER - II		ELECTROANALYTICAL TECHNIQUES	22
	2.1	General Introduction	23
	2.2	Chronopotentiometry	25
	2.2.1	Reversible Systems	29
	2.2.2	Irreversible Systems	30
	2.2.3	Consecutive and Stepwise Processes	31
	2.2.4	Electrode Kinetics	32
	2.2.5	Measurement of Transition Time and Quarter Wave Potential	34
	2.2.6	Current Reversal Chronopotentiometry	35
	2.2.7	Diagnostic Criteria and Potential - Time Relations for Various Kinetic Schemes	39

Page No

	2.3	Cyclic Voltammetry	42
	2.3.1	Reversible Systems	44
	2.3.2	Irreversible Systems	48
	2.3.3	Coupled Homogeneous Reactions	57
	2.3.4	Surface Processes	58
	2.3.5	Diagnostic Test	59
	2.4	Chronoamperometry	60
	2.4.1	Reversible Systems	61
	2.4.2	Irreversible Systems	63
	2.5	Sampled Current Voltammetry	65
	2.5.1	Reversible Systems	66
	2.5.2	Irreversible Systems	68
CHAPTER - III		EXPERIMENTAL	73
	3.1	General Introduction	74
	3.2	Preparation of Eutectic	74
	3.3	Apparatus	79
	3.3.1	Cell Design	79
	3.3.2	The Electrode System	82
	3.3.3	Working Electrodes	82
	3.3.4	Area of the Electrodes	86
	3.3.5	Reference Electrodes	87
	3.3.6	Preparation of Ag/Ag^+ Reference Electrode	91
	3.3.7	Control and Measurement of Temperature	92
	3.4	Laboratory Fabricated Programmable Potentiostat Waveform Generator	93

Page No

	3.4.1	Circuit Diagram	93
	3.4.2	The Voltage Sweep Generator	96
	3.4.3	The Reference Voltage Follower	96
	3.4.4	Initial Voltage Circuit	97
	3.4.5	Calibration of Initial Set Up	97
	3.4.6	Constant Current Source for Chronopotentiometry	99
	3.4.7	Measuring Circuit	99
	3.5	Procedure	100
CHAPTER -	IV	RESULTS	102
	4.1	General Introduction	103
	4.2	Chronopotentiometry	103
	4.2.1	Lead	103
	4.2.2	Cobalt	112
	4.2.3	Nickel	123
	4.2.4	Iron	132
	4.2.5	Copper	137
	4.3	Cyclic Voltammetry	152
	4.3.1	Lead	152
	4.3.2	Cobalt	164
	4.3.3	Nickel	167
	4.3.4	Iron	174
	4.3.5	Copper	185
	4.4	Chronoamperometry	195
	4.4.1	Lead	199
	4.4.2	Cobalt	207

Page No

	4.4.3	Nickel	214
	4.4.4	Iron	221
	4.4.5	Copper	222
	4.5	Sampled Current Voltammetry	235
	4.5.1	Lead	236
	4.5.2	Cobalt	241
	4.5.3	Nickel	245
	4.5.4	Iron	248
	4.5.5	Copper	253
CHAPTER -	V	DISCUSSION	267
	5.1	General Introduction	268
	5.2	Diffusion Coefficients	268
	5.3	Transfer Coefficients $\alpha_c n_\alpha$	274
	5.4	Kinetics and Calculation of Standard Electron Transfer Rate Constants	278
	5.5	Quarter Wave and Half Wave Potentials	284
	5.6	Review of the Results	286
	5.7	Conclusions	307
REFERENCES			313