

CONTENTS

Title page	i
Certificate by Supervisor (A.K. Banthia)	ii
Certificate by Supervisor (D.N. Tibarewala)	iii
Declaration by the scholar	iv
Acknowledgements	v
List of abbreviations and Symbols	vi
List of Figures	viii
List of Tables	xi
Abstract	xiii
Contents	xiv

Chapter 1 **1-28**

Introduction

1.1 Background	3
1.2 Iontophoresis	7
1.3 Hydrogels	12
1.4 Development of the technology of Iontophoresis	13
1.5 Commercial devices applying iontophoresis	20
1.6 Motivation	21
1.7 Scope and Objectives	21
References	23

Chapter 2 **29-42**

Instrumentation

2.1 Circuit I	31
2.2 Circuit II	34
2.2.1 Operational amplifier (Opamp)	34
2.2.1.1. Multivibrator	35
2.2.1.2. Summing Amplifier	38
2.2.2. IC 7555	38
2.3 Circuit III	39
2.4 Power supply	41
References	42

Chapter 3 **43-62**

PVA corn starch hydrogel membranes

3.1 Background	45
3.2 Materials and Methods	47
3.3 Results and discussions	49

3.3.1 Physico-chemical factors.	49
3.3.1.1 Effect of drug concentration	49
3.3.1.2 Effect of presence of competitive ions	50
3.3.2 Electrical factors.	51
3.3.2.1 Effect of applied current density.	52
3.3.2.2 Effect of type of current used.	53
3.3.2.2.1 Effect of pulsed DC square-wave.	54
3.3.2.2.2 Effect of different current wave-shapes.	56
3.3.2.2.3. Effect of frequency of pulsed DC.	58
3.3.2.3 Effect of duration of current application	59
3.4 Conclusion	60
References	62

Chapter 4 **65-82**

Iontophoretic delivery of Lidocaine

4.1 Background	67
4.2 Materials and Methods	68
4.3 Results:	69
4.3.1 Effect of drug concentration in donor solution.	69
4.3.2 Effect of competitive ions.	69
4.3.3 Effect of electrode material:	70
4.3.4 Effect of current density:	71
4.3.5 Effect of different current wave-shapes	74
4.3.6 Effect of frequency of square-wave:	75
4.3.7 Effect of skin permeation enhancer:	75
4.4 Conclusion	77
References:	79

Chapter 5 **83-96**

Iontophoretic delivery of Glycine

5.1 Background	85
5.2 Materials and Methods	85
5.3 Results:	87
5.3.1 Effect of donor drug concentration:	87
5.3.1.1 Passive delivery of glycine	87
5.3.1.2 Iontophoretic delivery of glycine	88
5.3.2 Effect of ionic strength of the donor solution	90
5.3.3 Effect of applied current density	91
5.3.4 Effect of applied current profile	92
5.3.5 Effect of electrode material	93
5.4 Conclusion	94

References	95
Chapter 6	97-111
Pectin-PVP and PVA Gelatin Hydrogels	
6.1 Pectin-PVP Hydrogels	99
6.1.1 Background:	99
6.1.2 Materials and methods	100
6.1.3 Results	101
6.1.3.1 Membrane characteristics:	101
6.1.3.1.1 Swelling study of hydrogel	101
6.1.3.1.2 Water vapour permeability through the membrane.	102
6.1.3.2 Iontophoretic drug release studies	103
6.1.3.2.1 Effect of current density	103
6.1.3.2.2 Effect of duration of current application	106
6.2 PVA-Gelatin Hydrogel membrane	109
6.2.1 Background	109
6.2.2 Materials and methods	109
6.2.3 Results	110
6.2.3.1 Effect of concentration of drug (SA)	110
6.2.3.2 Effect of various waveforms	110
6.2.3.3 Effect of electrode material	111
6.3 Conclusion	112
References	114
Chapter 7	117-124
Cost Benefit analysis	
Chapter 8	125-131
Summary & future scope of work	
List of Publications	132
Resume	133