LIST OF CONTENTS

	Contents	Page No.
	List of Figures	xiii – xviii
	List of Tables	xix – xxi
	List of Abbreviations	xxii – xxvi
	Preface	xxviii – xxx
CHAPTER 1	INTRODUCTION	1-22
1.1	Introduction to ferrite	2
1.2	Classification of ferrite	3
	1.2.1 Classification based on the magnetic coercivity	4
	1.2.1.1 Soft ferrite	4
	1.2.1.2 Hard ferrite	4
	1.2.2 Classification based on the crystal structure	5
	1.2.2.1 Spinel ferrite	5
	1.2.2.2 Garnet	6
	1.2.2.3 Ortho-ferrite	6
	1.2.2.4 Hexaferrite	7
1.3	General properties of ferrite	7
1.4	Applications of ferrite	8
1.5	The structure, composition, and characteristics of hexagonal ferrite	9
	1.5.1 Types of hexagonal ferrite	11
	1.5.1.1 M-type hexagonal ferrite	12
	1.5.1.2 Y-type hexagonal ferrite	13
	1.5.1.3 U-type hexagonal ferrite	13
	1.5.1.4 W-type hexagonal ferrite	13
	1.5.1.5 X-type hexagonal ferrite	13
	1.5.1.6 Z-type hexagonal ferrite	14
	1.5.2 Applications of hexagonal ferrite materials	14
1.6	The structure, composition, and characteristics of Y-type	1.5
	hexagonal ferrite	15
	1.6.1 Cobalt-based Y-type hexagonal ferrite (Co ₂ -Y)	16

3.1	combustion process	56
2.1	Y-type barium hexaferrite synthesis through the sol-gel auto	5.0
CHAPTER 3	EXPERIMENTAL PROCEDURE	55-82
2.4	Objectives of the work	53
2.3	Summary of literature review	51
	agent	43
	shielding application 2.2.5 Utilization of ferrites as a biocompatible hyperthermia	
	2.2.4 Utilization of ferrites as a microwave absorber for EMI	40
	methyl orange contaminated wastewater	55
	2.2.3 Utilization of ferrites as a photocatalyst for treatment of	35
	reduction of toxic nitro-organic pollutants	31
	2.2.2 Utilization of ferrites as a heterogeneous catalyst for	21
	oxidation of styrene	28
	applications 2.2.1 Utilization of ferrites as a heterogeneous catalyst for	
2.2	Trends for utilization of ferrite materials in versatile	28
	barium hexaferrite	
	2.1.6 Substitution at all three sites (Ba, Co & Fe) in Co ₂ -Y	27
	hexaferrite	21
	2.1.5 Substitution at both Co & Fe- Site in Co ₂ -Y barium	27
	hexaferrite	27
	2.1.4 Substitution at both Ba & Fe- Site in Co ₂ -Y barium	
	2.1.2 Substitution at Fe- Site in Co ₂ -Y barium hexaferrite	26
	2.1.1 Substitution at Ba-site in Co₂-Y barium hexaferrite2.1.2 Substitution at Co-site in Co₂-Y barium hexaferrite	25 26
2.1	Introduction 2.1.1 Substitution at Parities in Car Whenison homefore its	24
CHAPTER 2	LITERATURE REVIEW	23-54
1.8	Organization of the thesis	21
1.7	Theme of the work	21
	1.6.3 Explorations of Y-type hexagonal ferrite (Co ₂ -Y)	19
	ferrite (Co ₂ -Y)	18
	1.6.2 Synthesis & properties of Y-type barium hexagonal	10

3.2	Characterization of hexaferrite samples	59
	3.2.1 X-ray diffraction analysis	59
	3.2.2 Fourier–transform infrared spectroscopy	62
	3.2.3 Surface area analysis using BET	64
	3.2.4 Nuclear magnetic resonance spectroscopy	65
	3.2.5 Scanning electron microscopy (SEM) with EDS analyzer	67
	3.2.6 Magnetic property measurement system (MPMS) analysis	69
	3.2.7 Magnetothermal analysis	72
	3.2.8 Dynamic light scattering analysis	74
	3.2.9 UV–Vis Spectroscopy	75
	3.2.10 Density measurement	76
	3.2.11 X-ray photoelectron spectroscopy	77
	3.2.12 Vector network analyzer	79
	3.2.13 Fluorescence microscopy	81
	RESULTS & DISCUSSION	
CHAPTER 4	Cerium substituted Y-type barium hexaferrite (Co2-Y);	83-106
CHAPTER 4	Cerium substituted Y-type barium hexaferrite (Co ₂ -Y); as a heterogeneous catalyst for oxidation of styrene	83-106
CHAPTER 4 4.1	· · · · · · · · · · · · · · · · · · ·	83-106
	as a heterogeneous catalyst for oxidation of styrene	
4.1	as a heterogeneous catalyst for oxidation of styrene Introduction	84
4.1 4.2 4.3	as a heterogeneous catalyst for oxidation of styrene Introduction Results and discussion	84 85
4.1 4.2	as a heterogeneous catalyst for oxidation of styrene Introduction Results and discussion Summary	84 85
4.1 4.2 4.3	as a heterogeneous catalyst for oxidation of styrene Introduction Results and discussion Summary Cerium substituted Y-type barium hexaferrite (Co ₂ -Y); as a heterogeneous catalyst for reduction of toxic nitro- organic pollutants	84 85 106 107-136
4.1 4.2 4.3	as a heterogeneous catalyst for oxidation of styrene Introduction Results and discussion Summary Cerium substituted Y-type barium hexaferrite (Co ₂ -Y); as a heterogeneous catalyst for reduction of toxic nitro- organic pollutants Introduction	84 85 106 107-136
4.1 4.2 4.3 CHAPTER 5 5.1 5.2	as a heterogeneous catalyst for oxidation of styrene Introduction Results and discussion Summary Cerium substituted Y-type barium hexaferrite (Co ₂ -Y); as a heterogeneous catalyst for reduction of toxic nitro- organic pollutants Introduction Results and discussion	84 85 106 107-136 108 110
4.1 4.2 4.3 CHAPTER 5 5.1	as a heterogeneous catalyst for oxidation of styrene Introduction Results and discussion Summary Cerium substituted Y-type barium hexaferrite (Co ₂ -Y); as a heterogeneous catalyst for reduction of toxic nitro- organic pollutants Introduction Results and discussion Summary	84 85 106 107-136
4.1 4.2 4.3 CHAPTER 5 5.1 5.2	as a heterogeneous catalyst for oxidation of styrene Introduction Results and discussion Summary Cerium substituted Y-type barium hexaferrite (Co ₂ -Y); as a heterogeneous catalyst for reduction of toxic nitro- organic pollutants Introduction Results and discussion Summary Titanium substituted Y-type barium hexaferrite (Co ₂ -Y);	84 85 106 107-136 108 110 135
4.1 4.2 4.3 CHAPTER 5 5.1 5.2 5.3	as a heterogeneous catalyst for oxidation of styrene Introduction Results and discussion Summary Cerium substituted Y-type barium hexaferrite (Co ₂ -Y); as a heterogeneous catalyst for reduction of toxic nitro- organic pollutants Introduction Results and discussion Summary Titanium substituted Y-type barium hexaferrite (Co ₂ -Y); as a photocatalyst for the treatment of methyl orange	84 85 106 107-136 108 110
4.1 4.2 4.3 CHAPTER 5 5.1 5.2 5.3 CHAPTER 6	as a heterogeneous catalyst for oxidation of styrene Introduction Results and discussion Summary Cerium substituted Y-type barium hexaferrite (Co ₂ -Y); as a heterogeneous catalyst for reduction of toxic nitro- organic pollutants Introduction Results and discussion Summary Titanium substituted Y-type barium hexaferrite (Co ₂ -Y); as a photocatalyst for the treatment of methyl orange contaminated wastewater	84 85 106 107-136 108 110 135
4.1 4.2 4.3 CHAPTER 5 5.1 5.2 5.3	as a heterogeneous catalyst for oxidation of styrene Introduction Results and discussion Summary Cerium substituted Y-type barium hexaferrite (Co ₂ -Y); as a heterogeneous catalyst for reduction of toxic nitro- organic pollutants Introduction Results and discussion Summary Titanium substituted Y-type barium hexaferrite (Co ₂ -Y); as a photocatalyst for the treatment of methyl orange	84 85 106 107-136 108 110 135

6.3	Summary	161
CHAPTER 7	Lanthanum & magnesium substituted Y-type barium	
	hexaferrite (Co2-Y); as a microwave absorber for EMI	163-189
	shielding application	
7.1	Introduction	164
7.2	Results and discussion	165
7.3	Summary	189
CHAPTER 8	Chromium substituted Y-type barium hexaferrite (Co2-	190-209
	Y); as a biocompatible hyperthermia agent	
8.1	Introduction	191
8.2	Results and discussion	194
8.3	Summary	209
CHAPTER 9	CONCLUSIONS AND FUTURE WORK	210-215
9.1	Conclusions	211
9.2	Future scope	215
	References	217-246
	Annexure	247-250
	List of Publications	251-253