

C O N T E N T S

<u>CHAPTER I</u>	<u>Page</u>
<u>INTRODUCTION</u> ..	1
1.1 Luminescence : Historical	
1.2 Definations	
1.2.1 Luminescence ..	2
1.2.2 Fluorescence and Phosphorescence ..	3
1.3 Phosphors	
1.3.1 Phosphor in pure form ..	4
1.3.2 Impurity activated phosphors ..	4
1.4 Localised Energy Levels in forbidden gap	5
1.5 Mechanism of Photoluminescence ..	6
1.5.1 Excitation and emission ..	7
1.5.2 Energy Transfer ..	10
1.5.3 Energy storage ..	11
1.6 Mechanism of electroluminescence ..	13
1.6.1 Excitation ..	13
1.6.2 Energy transfer ..	15
1.6.3 Recombination ..	16
1.7 Kinetics of Luminescence ..	18
1.8 Some important Luminescent materials reported ..	19
1.9 Statement of Problem ..	21
1.9.1 Phosphorescence decay ..	22
1.9.2 Thermoluminescence ..	22
1.9.3 Electroluminescence ..	22
1.9.4 Thermally Stimulated Conductivity	
References ..	23
 <u>CHAPTER II</u>	
<u>PREPARATION OF PHOSPHORS & EXPERIMENTAL ASPECTS</u>	
2.1 Introduction	
2.2 General Consideration during preparation of Phosphors ..	32
2.2.1 Basic Ingredients of a Phosphor ..	32
2.2.2 Preperative Parameters of Phosphors	35
2.3 Details of method followed to obtain CaS:Mn:Dy and CaS:Bi:Tb Phosphors ..	37
2.3.1. Method of calculation of Bismuth percentage ..	38
2.3.2 Procedure followed in preparation of phosphors ..	39
2.3.3 Phosphor preparation ..	42

	<u>Page</u>
2.4 Instrumentation & Experimental aspects ..	43
2.4.1 Instruments used for preparation of phosphors ..	43
2.4.2 Phosphorescence decay measurement ..	43
2.4.3 Thermoluminescence measurement ..	46
2.4.4 Instruments used for EL measurement ..	47
2.4.5 Conductivity measurement ..	49
2.4.6 X-ray diffraction studies ..	50
References ..	55
 <u>CHAPTER III</u>	
<u>PHOTOLUMINESCENCE</u>	
3.1 Introduction ..	66
3.2 Theory of Phosphorescence ..	66
3.2.1 Decay Laws ..	67
3.2.2 Effect of Steady excitation of phosphor on the filling of electron traps ..	69
3.2.3 Phosphorescence decay for different trap distribution ..	72
3.2.4 Retrapping of electrons during phosphorescence ..	74
3.3 Results & Discussion ..	75
3.3.1 Decay Curve ..	75
3.3.2 Co-relation Coefficient ..	75
3.3.3 Decay Constant ..	76
3.3.4 Variation of decay constant with activator concentration ..	76
3.3.5 Kinetics of Luminescence ..	78
References ..	82
 <u>CHAPTER IV</u>	
<u>THERMOLUMINESCENCE</u>	
4.1 Introduction ..	96
4.2 Theory of glow curves ..	96
4.2.1 TL-glow curves parameters ..	96
4.2.2 Randall & Wilkins Theory ..	98
4.2.3 Garlick and Gibson Theory ..	99
4.2.4 General Order Kinetics ..	100
4.3 Method for determining trap depth ..	103
4.3.1 Method Making use of shape of glow curve ..	103
4.3.2 Method making use of various heating rates ..	107
4.3.3 Other methods ..	108
4.4 Methods for determination of frequency factor ..	111
4.4.1 Method due to Randall and Wilkins ..	112
4.4.2 Method due to Garlick & Gibson ..	112
4.4.3 Isothermal decay method ..	112
4.4.4 Method due to Aramu & Maxia ..	113
4.4.5 Method due to Curie ..	113
4.5 Determination of size of trap ..	113

	<u>Page</u>
4.6 Results & Discussion ..	114
References ..	122
 <u>CHAPTER V</u>	
<u>ELECTROLUMINESCENCE</u>	
5.1 Introduction ..	137
5.2 Theoretical background ..	137
5.2.1 Relation between brightness and applied voltage ..	137
5.2.2 Relation between brightness & frequency ..	140
5.2.3 Brightness Waves ..	142
5.2.4 Efficiency of electroluminesce ..	143
5.3 Results & Discussion ..	144
5.3.1 Voltage Dependence of EL-brightness	144
5.3.2 Frequency dependence of EL-brightness	146
5.3.3 Brightness waves ..	147
5.3.4 Mechanism of electroluminescence ..	147
References ..	149
 <u>CHAPTER VI</u>	
<u>THERMALLY STIMULATED CONDUCTIVITY</u>	
6.1 Introduction ..	176
6.2 Experimental Procedure ..	176
6.3 Results & Discussion ..	177
References ..	181
 <u>CHAPTER VII</u>	
<u>RESULTS AND DISCUSSION</u>	
7.1 Nature of decay ..	186
7.2 Activation energies from decay curves ..	187
7.3 Distribution of trapping states ..	187
7.4 Glow Curves ..	187
7.5 Activation energies from glow curves ..	188
7.6 Size of trap ..	189
7.7 Dose dependence ..	189
7.8 EL-brightness voltage dependence ..	189
7.9 Brightness frequency dependence ..	190
7.10 Effect of activator addition of EL-brightness	190
7.11 Brightness Waves ..	191
7.12 Mechanism of Electroluminescence ..	191
7.13 Kinetics of Luminescence ..	191
7.14 Thermally Stimulated electrical conductivity	192