

CONTENTS

	Page No.
LIST OF CONTENTS	... (i)
LIST OF TABLES	... (iv)
LIST OF FIGURES	... (v)
 <u>CHAPTER - I : INTRODUCTION</u>	
1.1 Solid state luminescence	... 1
1.2 Definitions	... 3
1.2.1 Luminescence	... 3
1.2.2 Fluorescence and phosphorescence	... 4
1.3 Phosphors	... 5
1.3.1 Phosphors in pure form	... 5
1.3.2 Impurity activated phosphors	... 5
1.4 Localised energy levels in forbidden gap	... 6
1.5 Criterion for occurrence of luminescence	... 7
1.6 Recombination processes	... 8
1.6.1 Radiative recombination processes	... 8
1.6.2 Non-radiative recombination processes	... 11
1.7 Irradiation damage, defect structure and luminescence	... 12
1.8 Mechanism of luminescence	... 12
1.8.1 Photoluminescence	... 12
1.8.2 Thermoluminescence	... 16
1.9 Sensitization phenomenon and concentration quenching	... 17
1.10 Kinetics of luminescence	... 18
1.11 Emission and absorption spectra	... 19
1.12 Statement of the problem	... 21
References	... 23

ContentsCHAPTER - II : PREPARATION OF PHOSPHORS AND
EXPERIMENTAL ASPECTS

2.1	Preparation of phosphors	...	33
	(A) Basic ingredients of a phosphor	...	33
	(B) Preparative parameters of a phosphor	...	35
2.2	Preparation of calcium oxide phosphors	...	37
	2.2.1 First stage	...	38
	2.2.2 Second stage	...	39
	2.2.3 Prepared phosphors	...	40
2.3	Experimental Aspects	...	40
	2.3.1 Thermoluminescence measurements	...	40
2.4	Optical emission measurements	...	42
	2.4.1 Experimental arrangement	...	42
	2.4.2 Experimental procedure	...	43
	References	...	46

CHAPTER - III : THERMOLUMINESCENCE

3.1	Introduction	...	55
3.2	Theory	...	56
	3.2.1 Theory of thermoluminescence	...	56
	3.2.2 Methods for determining the trap depths	...	58
	3.2.3 Methods for determining the escape frequency factor	...	68
3.3	Results and discussions	...	71
	3.3.1 Glow curves	...	71
	3.3.2 Activation energies of glow peaks	...	73
	3.3.3 Escape frequency factor	...	75
	3.3.4 Variation of the activation energy with activator concentration	...	75
	3.3.5 Kinetics of thermoluminescence process	...	76
3.4	Summary	...	77
	References	...	85

ContentsCHAPTER - IV : EMISSION SPECTRA

4.1	Introduction	...	93
4.2	Theoretical background	...	93
4.2.1	Luminescence spectra	...	93
4.2.2	The spectra of free ions	...	94
4.2.3	Interaction of the ions with the lattice	...	95
4.3	Results and discussions	...	97
4.4	5890 A° band	...	100
4.5	Concentration quenching effect	...	101
4.6	Summary	...	101
	References	...	105

CHAPTER - V : GENERAL DISCUSSION AND CONCLUSIONS

5.1	Glow curves	...	112
5.2	Activation energy from glow peaks	...	113
5.3	Escape frequency factor	...	113
5.4	Effect of activators on trap parameters	...	113
5.5	Nature and origin of traps	...	114
5.6	Kinetics of thermoluminescence	...	114
5.7	Emission characteristics - origin of spectral bands and nature of luminescence centres	...	115
5.8	Origin of 5890 A° band	...	117
5.9	Position of Bi ³⁺ and Ce ³⁺ in CaO lattice	...	118
5.10	Concentration quenching	...	118
5.11	Conclusions	...	119
	References	...	121
