

C O N T E N T S

CHAPTER NO. T I T L E PAGE NO.

L I S T O F T A B L E S.	..	V
L I S T O F F I G U R E S.	..	VI

CHAPTER: I:

1-1	INTRODUCTION.	1
1-2	DEFINITIONS.	2
1-2.1	Luminescence.	2
1-2.2	Fluorescence and Phosphorescence.	3
1-3	PHOSPHORS.	3
1-3.1	Phosphors in Pure form.	4
1-3.2	Impurity Activated Phosphors.	4
1-4	THE TERMS.	4
1-4.1	Luminescence Centres.	4
1-4.2	Traps.	4
1-5	MECHANISM OF PHOTOLUMINESCENCE.	5
1-5.1	Excitation and Emission.	5
1-5-2	Energy Transfer.	8
1-5.3	Energy Storage.	10
1-6	STATEMENT OF THE PROBLEM.	14
1-7	REFERENCES.	16

II

CHAPTER NO.	T I T L E	PAGE NO.
<u>CHAPTER: II: PREPARATION OF PHOSPHORS AND</u>		
<u>EXPERIMENTAL ASPECTS.</u>		
2-1	PREPARATION OF PHOSPHORS.	24
2-1.1	Phosphors in Microcrystalline Form.	24
	a) Basic Ingredients of Phosphors.	24
	b) Preparative Parameters of a Phosphor.	26
2-1.2	Preparation of Alkaline Earth Sulphide Phosphors.	28
2-1.3	Details of the Method Followed.	28
2-1.4	Prepared Phosphors.	31
2-2	EXPERIMENTAL ASPECTS.	31
2-2.1	Phosphorescence Decay Measurements.	32
2-2.2	Thermoluminescence Measurements.	34
2-3	REFERENCES.	37
<u>CHAPTER III: STUDY OF PHOSPHORESCENCE DECAY.</u>		
3-1	INTRODUCTION.	42
3-2	THEORETICAL BACKGROUND.	42
3-2.1	Decay Laws.	42
	a) Exponential Decay.	43
	b) Hyperbolic Decay.	44
3-2.2	Effect of Steady Excitation of a Phosphor on filling of Electron Traps.	45
3-2.3	The Effect of Excitation Intensity on the filling of Traps with Complex distribution.	47

III

CHAPTER NO.	T I T L E	PAGE NO.
3-3	RESULTS AND DISCUSSION.	49
3-3.1	Decay Curves.	49
3-2.2	Decay Constant.	50
3-3.3	Variation of Decay Constant.	50
3-3.4	Variation of Starting Contribution I_0 with Ca.	50
3-3.5	"Peeling Off" of the Decay Curves.	51
3-3.6	Activation Energies.	52
3-3.7	Variation of Activation Energies with Concentration of Ca.	52
3-3.8	Rate Constants and Life Times.	53
3-3.9	Kinetics of Decay Process.	53
3-3.10	Effect of Activator (S)	54
3-3.11	Distribution of Trapping Levels.	54
3-4	SUMMARY.	56
3-5	REFERENCES.	59
 <u>CHAPTER IV: THERMOLUMINESCENCE BEHAVIOUR.</u>		
4-1	INTRODUCTION.	75
4-2	THEORETICAL ASPECTS.	76
4-2.1	Theory of the Thermoluminescence.	
a)	Randall and Wilkins Theory.	76
b)	Garlick and Gibson Theory.	77
4-2.2	Methods of Determine Trap Depth.	78
A)	Methods based on T_m (peak temperature)	78
B)	Methods based on the shape of the Glow curves.	80
C)	Methods Depending on both shape & T_m .	82

IV

CHAPTER NO.	T I T L E	PAGE NO.
4-3	RESULTS AND DISCUSSIONS.	
4-3.1	Glow Curves.	87
4-3.2	Activation Energies of the glow peaks	88
4-3.3	Effect of Variation in Concentration of C_a on activation energy.	89
4-3.4	Escape Frequency Factor.	90
4-3.5	Variation of Peak Intensity with Heating P rate.	90
4-3.6	Kinetics of Luminescence.	90
4-4	SUMMARY.	91
4-5	REFERENCES.	96
<u>CHAPTER V: GENERAL DISCUSSION & CONCLUSIONS.</u>		
5-1	INTRODUCTION	107
5-2	NATURE OF DECAY.	107
5-3	DISTRIBUTION OF TRAPS.	108
5-4	ACTIVATION ENERGIES FROM DECAY CURVES.	109
5-5	KINETICS.	110
5-6	ACTIVATION ENERGIES FROM GLOW CURVES.	111
5-7	ESCAPE FREQUENCY FACTOR.	111
5-8	EFFECT OF ADDITION OF C_a ON DISTRIBUTION OF TRAPPING STATES THE NATURE AND ORIGIN OF TRAPS.	112
5-9	KINETICS OF T.S.L.	112
5-10	MECHANISM OF ENERGY TRANSFER.	113
5-11	EFFECT OF ADDITION OF S ON DISTRIBUTION OF TRAPPING STATES.	114
5-12	CONCLUSIONS.	115
5-13	REFERENCES.	117