

C O N T E N T S

Chapter No.	Title	Page No.
CHAPTER - I INTRODUCTION TO FERRITES		
1.1	Introduction	1
1.2	Historical development	2
1.3	Crystal structure of spinel ferrite	4
1.3.1	Chemical structure of spinel ferrites	4
1.3.2	Lattice structure of spinel ferrites	5
1.3.3	Classification of ferrites	7
1.3.3a	Normal spinel ferrite	7
1.3.3b	Inverse spinel ferrite	9
1.3.3c	Random spinel ferrite	9
1.3.4	Magnetic interaction	10
1.3.5	Substitutional ferrites	10
1.4	Ferrimagnetism	12
1.5	Neel's theory of ferrimagnetism	12
1.6	Yafet-Kittel theory	18
1.7	Properties of ferrites	18
1.7.1	Electrical properties	20
1.7.1a	D.C electrical conductivity	20
1.7.1b	Dielectric behaviour	21
1.7.1c	Thermoelectric power	22
1.7.2	Magnetic properties	22
1.7.2a	Saturation magnetization	22
1.7.2b	Permeability	23
1.7.2c	Magnetostriction	23
1.7.2d	Hysteresis	24
1.8	Application of ferrites	24
1.9	Orientation of the present work	25

References

CHAPTER - II PREPARATION OF FERRITES AND CHARACTERIZATION

SECTION - A PREPARATION OF FERRITES

2A.1	Introduction	30
2A.2	Standard ceramic method of preparation	30
2A.3	Methods of preparation	31
2A.3a	Oxide method	33
2A.3b	Decomposition method	33
2A.3c	Hydroxide precipitation method	33
2A.3d	Oxalate precipitation method	34
2A.4	Pre-sintering	35
2A.5	Pressing	35
2A.6	Sintering	35
2A.7	Hot pressing	36
2A.8	Actual method used for preparation	36
2A.8.1	Preparation	36
2A.8.2	Pre-sintering and grinding	37
2A.8.3	Pellet formation	37
2A.8.4	Final sintering	38

SECTION - B X-RAY DIFFRACTION STUDIES

2B.1	Introduction	38
2B.2	Condition for x-ray diffraction	39
2B.3	X-ray diffraction methods	40
2B.3.1	Laue method	40
2B.3.2	Rotating crystal method	40
2B.3.3	Powder method	41
2B.4	X-ray diffractometer	41
2B.5	Experimental	44
2B.6	Results and discussion	45

SECTION - C INFRA-RED STUDIES

2C.1	Introduction	61
2C.2	Experimental	63
2C.3	Results and discussion	64

References

**CHAPTER-III ELECTRICAL PROPERTIES
D.C. ELECTRICAL CONDUCTIVITY**

3.1	Introduction	74
3.2	Conduction mechanism in metal oxide	75
3.3	Conduction in ferrites	76
3.4	Electron hopping and polarons	77
3.5	Experimental	79
3.6	Results and discussion	82

References

**CHAPTER -IV MAGNETIC PROPERTIES
SECTION - A
MAGNETIZATION STUDIES**

4A.1	Introduction	91
4A.2	Domain theory	93
4A.3	Hysteresis and coercivity	94
4A.4	Experimental	98
4A.5	Results and discussion	101

**SECTION - B
A.C. SUSCEPTIBILITY STUDIES**

4B.1	Introduction	107
4B.2	Experimental	108
4B.3	Results and discussion	112

**SECTION - C
CURIE TEMPERATURE MEASUREMENTS**

4C.1	Introduction	117
4C.2	Experimental	117
4C.3	Results and discussion	121

References

CHAPTER - V SUMMARY AND CONCLUSIONS 127

References