Chapter 1

Introduction

1.1 Introduction
   (A) Brief history of magnetism
   (B) Introduction to ferrites

1.2 Aim and outline of the present work

References

Chapter 2

Crystal structure and magnetism in spinel ferrite

2.1 Crystal structure and chemistry

2.2 Magnetic interactions in spinel ferrites

2.3 Magnetic ordering in a substituted ferrites

2.4 Neel's model, Random Canting of Spin model

References

Chapter 3

Synthesis and characterization techniques

3.1 Synthesis of spinel ferrites

3.2 Structural and micro-structural characterization
   (A) Energy dispersive analysis of X-rays
   (B) X-ray powder diffractometry
   (C) Scanning Electron Microscopy

3.3 Elastic properties
   Ultrasonic pulse echo overlap technique

3.4 Magnetic properties
   (A) Physical properties measurement system (PPMS)
   (B) Low field ac Susceptibility

References
3.5 Electrical properties

(A) D.C. resistivity

(B) Thermo electric power

References

Chapter 4

Slow cooled CuAl\textsubscript{x}Fe\textsubscript{2-x}O\textsubscript{4} system

4.1 Structural parameters and x-ray Debye temperature determination study on copper-ferrite-aluminates

(A) Introduction

(B) Experimental details

(C) Results and discussion

(D) Conclusions

References

4.2 Effect of Al\textsuperscript{3+} - substitution on the transport properties of copper ferrite

(A) Introduction

(B) Experimental details

(C) Results and discussion

(D) Conclusions

References

4.3 Al\textsuperscript{3+} - modified elastic properties of copper ferrite

(A) Introduction

(B) Experimental details

(C) Results and discussion

(D) Conclusions

References

4.4 Negative magnetization, magnetic anisotropy and magnetic ordering studies on Al\textsuperscript{3+}-substituted copper ferrite

(A) Introduction

(B) Experimental details

(C) Results and discussion
Chapter 5

Quenched CuAl$_x$Fe$_{2-x}$O$_4$ system

5.1 Structural analysis, cation distribution and structural parameters determination
   (A) X-ray powder diffraction patterns analysis 5.2

5.2 Microstructural Characterization 5.12

5.3 Magnetic properties of quenched CuAl$_x$Fe$_{2-x}$O$_4$ system
   (A) M-H loop characteristics and dc magnetization studies 5.14
   (B) Low field ac susceptibility measurements 5.22

5.4 Variation of dc resistivity ($\rho_{dc}$) as a function of Al$^{3+}$ - content (x) and temperature (T) 5.25

5.4 Conclusions 5.29

References