CONTENTS

CHAPTER I
GENERAL INTRODUCTION
1.1 Overview of the proposed work 1
1.2 Radioactive waste management 2
1.3 Role of inorganic ion exchangers 6
1.4 Ion exchange 8
1.5 Profile of silicate phases 13
1.6 (a) Calcium silicate hydrates 14
1.6 (b) Fluorophlogopite gel 18
1.7 Structure of tobermorites and xonotlite 20
1.8 Scope of the present study 23
References 26

CHAPTER II
INSTRUMENTAL TECHNIQUES USED IN PRESENT STUDY
2.1 Atomic absorption spectrophotometry 34
2.2 Electron microscopy 35
2.3 Radiometric measurements 37
2.4 Thermoanalytical techniques 38
2.5 X-ray diffraction 40
2.6 Energy dispersive spectrometry 42
References 44

CHAPTER III
EXPERIMENTAL METHODS AND DATA
3.1 Materials and methods of synthesis 48
3.2 Characterisation of phases 52
3.3 Cation sorption and equilibrium studies 54
3.4 Leach rate behaviour of cations in cement based materials 57
3.5 Experimental data 61
References 99

CHAPTER IV
RESULTS AND DISCUSSION
4.1 General remarks 102
4.2 Calcium silicate hydrates 103
4.3 Potassium fluorophlogopite (KFP) gel 121
References 125

CHAPTER V
SUMMARY AND CONCLUSIONS
129-136

APPENDIX-I LIST OF RESEARCH PUBLICATIONS 137
APPENDIX-II LIST OF PAPERS CONTRIBUTED IN CONFERENCES 137