

CONTENTS

ACKNOWLEDGEMENT.....	•
LIST OF FIGURES.....	•
LIST OF TABLES.....	•
AIM OF WORK.....	•

1- INTRODUCTION

1.1. Introductory Outline.....	1
1.2. Ion Exchange Materials.....	2
1.3. Types of Ion Exchangers.....	3
1.3.1. Organic Resins.....	3
1.3.2. Inorganic Ion Exchangers.....	3
1.3.2.1. Natural Inorganic Ion Exchangers.....	3
1.3.2.2. Synthetic Inorganic Ion Exchangers.....	4
1.3.2.2.1. Hydrous Oxides.....	4
1.3.2.2.2. Salts of Hetero Polyacids.....	7
1.3.2.2.3. Acidic Salts of Multivalent Metals.....	7
1.3.2.2.4. Acidic Salts of Quadrivalent Metals.....	8
1.3.2.2.5. Insoluble Ferrocyanides.....	10
1.3.2.2.6. Alumino Silicates.....	11
1.3.2.2.7. Miscellaneous Ion Exchangers.....	12
1.4. General Properties of Synthetic Ion Exchange Materials...	13
1.4.1. Chemical Stability.....	13
1.4.2. Radiation Stability.....	13
1.4.3. Ion Exchange Capacity.....	15
1.4.4. Selectivity of Ion Exchangers.....	15
1.4.4.1. Ion Sieve Effect.....	16
1.4.4.2. Steric Effect.....	16
1.4.5. Stoichiometry of Exchange.....	17
1.4.6. The Physico-Chemical Nature of the Sorption Phenomenon ..	18
1.4.6.1. Physical Adsorption.....	19
1.4.6.2. Chemisorption.....	19
1.4.6.3. Electrostatic Adsorption.....	20
1.5. Ion Exchange.....	20
1.5.1. Ion Exchange Kinetics.....	21
1.5.1.1 Film Diffusion.....	22
1.5.1.2. Particle Diffusion.....	23
1.5.1.3. Adsorption As a Chemical Phenomenon.....	24

1.6. Distribution Coefficient (K_d).....	25
1.7. Sorption Isotherms.....	27
1.8. New Developments in Ion Exchange Materials.....	29

2- EXPERIMENTAL

2.1. Materials.....	34
2.1.1 Chemical Reagents.....	34
2.2. Preparation and Analysis of Silico(IV)titanate (SiTi)	34
2.3. Chemical Stability.....	38
2.4. Capacity of Silico(IV)titanate	38
2.5. Kinetic Measurements.....	39
2.6. Distribution Studies.....	40
2.7. Sorption Isotherm.....	41
2.8. Column Operation.....	42

3- RESULTS AND DISCUSSION

3.1. preparation of Silico(IV)titanate(SiTi).....	44
3.2. Chemical Stability.....	45
3.3. Characterization of the Prepared (SiTi).....	48
3.3.1. Infrared Spectra.....	48
3.3.2. DTA and TG for Silicotitanate.....	50
3.3.3. XRD Analysis.....	50
3.3.4. Surface Area Measurements.....	53
3.4. Ion Exchange Behavior of (SiTi).....	53
3.4.1. Apparent Capacity Measurements.....	53
3.5. Kinetic Studies.....	56
3.6. Distribution Studies.....	88
3.7. Sorption Isotherms.....	118
3.8. Column Operation.....	123
CONCLUSION.....	129
SUMMARY.....	130
REFERENCES.....	136
ARABIC SUMMARY.....	