

## CONTENTS

LIST OF TABLES	i-iii
LIST OF FIGURES	iv-viii
<i>Chapter One</i>	
INTRODUCTION	1-7
<i>Chapter Two</i>	
STRUCTURE OF ALUMINA PHASES	8-13
2.1. <i>Structure of Gibbsite</i>	
2.2. <i>Structure of Boehmite</i>	
2.3. <i>Structure of Diaspore</i>	
2.4. <i>Structure of Bayerite</i>	
2.5. <i>Structure of Transition Alumina</i>	
2.6. <i>Structure of Alpha Alumina</i>	
<i>Chapter Three</i>	
LITERATURE REVIEW	14-51
3.1. Occurrence of Bauxite rock	
3.2. Composition of Bauxite rock	
3.3. Synthesis of alumina phases	
3.3.1. <i>Gibbsite</i>	
3.3.2. <i>Diaspore</i>	
3.3.3. <i>Boehmite</i>	
3.3.4. <i>Bayerite</i>	

**3.4. Sequence of thermal transition of hydrated aluminous minerals**

3.4.1 *Gibbsite*

3.4.2. *Bayerite*

3.4.3. *Boehmite*

3.4.4. *Diaspore*

**3.5. Qualitative and quantitative characterization of hydrated aluminous material**

**3.6. Beneficiation of naturally occurring hydrated aluminous material**

**3.7. Effect of additive on thermal decomposition of hydrated aluminous material**

**3.8. Dehydration-rehydration study of clay minerals**

**3.9. Kinetic study of hydrated aluminous material**

***Chapter Four***

**PLAN OF THE WORK 52-54**

***Chapter Five***

**EXPERIMENTAL 55-72**

**5.1. Starting materials**

5.1.1. *Selection of naturally occurring bauxite*

5.1.2. *Preparation of synthetic alumina hydrate precursor*

**5.2. Characterization**

5.2.1. *Chemical analysis of the starting material*

5.2.2. *Specific surface area measurement*

5.2.3. *Particle size analysis*

5.2.4. *Differential thermal analysis (DTA)*

5.2.5. *Dehydration-rehydration study under equilibrium condition*

5.2.6. *Fourier Transform Infra-red spectroscopy (FTIR) analysis*

5.2.7. *X-Ray diffraction analysis*

5.2.8. *Scanning electron microscopy (SEM) analysis*

5.2.9. *Kinetic studies*

## ***Chapter Six***

### **RESULTS AND DISCUSSION**

**73-111**

#### **6.1. Characterization of bauxite and synthetically prepared alumina hydrate**

6.1.1. *Chemical analysis*

6.1.2. *Specific surface area analysis*

6.1.3. *Fourier Transform Infra-red spectroscopy (FTIR) analysis*

6.1.4. *X-Ray diffraction analysis*

6.1.5. *Scanning electron microscopy (SEM)*

6.1.6. *Thermogravimetric analysis (TG) and Differential thermal analysis (DTA)*

#### **6.2. Dehydration-rehydration study under equilibrium condition**

#### **6.3. Isothermal kinetics studies**

#### **6.4. Nonisothermal kinetics studies**

#### **6.5. Thermal dehydration mechanism studies**

## ***Chapter Seven***

### **CONCLUSIONS**

**112-116**

### **REFERENCES**

**117-137**

### **LIST OF PUBLICATIONS**