LIST OF FIGURES

Fig. 1: Structure of Gibbsite

Fig. 2: Structure of Bayerite

Fig. 3: Structure of Boehmite

Fig. 4: Structure of Transition alumina

Fig. 5: The basal plane of α-alumina showing the hexagonal close packed anion sublattice (large open circles) and cations occupying two-thirds of the octahedral interstices (small filled circles); small open circles are empty octahedral interstices (after Kronberg,1957)

Fig. 6: The cation sublattice in of α-alumina. Filled circles are Al, open circles are empty octahedral interstices (after Kronberg,1957)

Fig. 7: Thermal dehydration sequences of hydrated alumina in air

Fig. 8: FTIR spectra of bauxite sample

Fig. 9: FTIR spectra of synthetic alumina hydrate sample

Fig. 10: XRD pattern of bauxite sample a) dried at 110°C b)calcined at 300°C and c) calcined at 500°C

Fig. 11: XRD pattern of synthetic alumina hydrate sample dried at 100°C

Fig. 12: SEM micrograph of bauxite sample dried at 110°C

Fig. 13: SEM micrograph of synthetic alumina hydrate sample dried at 110°C

Fig. 14: TG-DTGA curve of bauxite sample at three heating rates (5.00, 7.50 and 10.00 $Kmin^{-1}$)

Fig. 15: TG-DTGA curve of synthetic alumina hydrate at three heating rates (5.00, 7.50 and 10.00 $Kmin^{-1}$)

Fig. 16: Equilibrium dehydration curve of bauxite sample on progressive heat treatment

Fig. 17: Equilibrium dehydration curve of synthetic alumina hydrate sample on progressive heat treatment

Fig. 18: Mass gain due to rehydration of the dehydrated bauxite sample at different relative humidities

Fig. 19: Mass gain due to rehydration of the dehydrated synthetic alumina hydrate sample at different relative humidities

Fig. 20: Mass loss vs time plot during dehydration of bauxite sample of -20+50 mesh size fraction at different temperatures

Fig. 21: Mass loss vs time plot during dehydration of bauxite sample of -50+80 mesh size fraction at different temperatures

Fig. 22: Mass loss vs time plot during dehydration of bauxite sample of -80+120 mesh size fraction at different temperatures

Fig. 23: log(ΔL) plot of bauxite sample of -20+50 mesh size fraction at different temperatures

Fig. 24: log(ΔL) plot of bauxite sample of -50+80 mesh size fraction at different temperatures

Fig. 25: log(ΔL) plot of bauxite sample of -80+120 mesh size fraction at different temperatures

Fig. 26: Plot of $\log((L_\infty - L)/L_\infty)$ against time for bauxite sample of -20+50 mesh size fraction at different temperatures

Fig. 27: Plot of $\log((L_\infty - L)/L_\infty)$ against time for bauxite sample of -50+80 mesh size fraction at different temperatures

Fig. 28: Plot of $\log((L_\infty - L)/L_\infty)$ against time for bauxite sample of -80+120 mesh size fraction at different temperatures

Fig. 29: Arrhenius plot for bauxite sample of -20+50 mesh size fraction for initial and final stage dehydration

Fig. 30: Arrhenius plot for bauxite sample of -50+80 mesh size fraction for initial and final stage dehydration

Fig. 31: Arrhenius plot for bauxite sample of -80+120 mesh size fraction for initial and final stage dehydration

Fig. 32: Plot of $\ln t_{\alpha,i}$ vs $1/T_i$ for dehydration of bauxite sample of -20+50 mesh size fraction

Fig. 33: Plot of $\ln t_{\alpha,i}$ vs $1/T_i$ for dehydration of bauxite sample of -50+80 mesh size fraction

Fig. 34: Plot of $\ln t_{\alpha,i}$ vs $1/T_i$ for dehydration of bauxite sample of -80+120 mesh size fraction

Fig. 35: Mass loss vs time plot during dehydration of synthetic alumina hydrate sample of -80+120 mesh size fraction at different temperatures

Fig. 36: log(ΔL) plot of synthetic alumina hydrate sample of -80+120 mesh size fraction at different temperatures

Fig. 37: Plot of $\log((L'_\infty - L)/L'_\infty)$ against time for synthetic alumina hydrate sample of -80+120 mesh size fraction at different temperatures

Fig. 38: Arrhenius plot for synthetic alumina hydrate sample of -80+120 mesh size fraction for initial and final stage dehydration

Fig. 39: Plot of $\ln t_{\alpha,i}$ vs $1/T_i$ for dehydration of synthetic alumina hydrate sample of -80+120 mesh size fraction

Fig. 40: FWO analysis of the step 1 for thermal decomposition of the bauxite sample

Fig. 41: FWO analysis of the step 2 for thermal decomposition of the bauxite sample

Fig. 42: Modified Coats and Redfern analysis of the step 1 for thermal decomposition of the bauxite sample

Fig. 43: Modified Coats and Redfern analysis of the step 2 for thermal decomposition of the bauxite sample

Fig. 44: Kissinger analysis of the step 1 and step 2 for thermal decomposition of the bauxite sample

Fig. 45: FWO analysis of the step 1 for thermal decomposition of the synthetic alumina hydrate sample

Fig. 46: FWO analysis of the step 2 for thermal decomposition of the synthetic alumina hydrate sample

Fig. 47: Modified Coats and Redfern analysis of the step 1 for thermal decomposition of the synthetic alumina hydrate sample

Fig. 48: Modified Coats and Redfern analysis of the step 2 for thermal decomposition of the synthetic alumina hydrate sample

Fig. 49: Kissinger analysis of the step 1 and step 2 for thermal decomposition of the synthetic alumina hydrate sample

Fig. 50: y(α) - α curves for the reaction mechanism model A2, A3, A4, R2 and R3 of thermal decomposition of bauxite sample

Fig. 51: y(α) - α curves for the reaction mechanism model P2, P3 and P4 of thermal decomposition of bauxite sample

Fig. 52: y(α) - α curves for the reaction mechanism model D1, D2 and D3 of thermal decomposition of bauxite sample

Fig. 53: y(α) - α curves for the reaction mechanism model A2, A3, A4, R2 and R3 of thermal decomposition of synthetic alumina hydrate sample

Fig. 54: y(α) - α curves for the reaction mechanism model P2, P3 and P4 of thermal decomposition of synthetic alumina hydrate sample

Fig. 55: y(α) - α curves for the reaction mechanism model D1, D2 and D3 of thermal decomposition of synthetic alumina hydrate sample