Effect of transition aluminas structure on dehydration of methanol to DME reaction

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Boehmite and bayerite were prepared by sol-gel process. γ-Al2O3 and η-Al2O3 were prepared from boehmite and bayerite, respectively by thermal decomposition with different temperatures. It was convinced by TGA, DTA and XRD that boehmite and bayerite changed to γ-Al2O3 and η-Al2O3 at specific temperature. total acidity and acid site density of γ-Al2O3 was nearly equal with those of η-Al2O3. moreover, η-Al2O3 exhibited lower BET surface area than γ-Al2O3 at calcination temperature over than 500℃. all spectrums of Pyridine-adsorbed FT-IR exited only Lewis of acid sites. SEM image of η-Al2O3 and γ-Al2O3 showed hexagonal and spherical structure, respectively. The activities of γ-Al2O3 and η-Al2O3 were compared by reaction of methanol dehydration at 240℃-280℃ under GHSV 6000 h-1. in a series of each phase, γ-Al2O3 calcined at 500℃ and η-Al2O3 calcined at 600℃ showed the highest activity due to good crystallinity and high acid sites density. But, η-Al2O3 showed much better activity and stability than γ-Al2O3 because of difference of their structure. this result was proved that γ-Al2O3 having spherical structure, prepared from boehmite,was lower activity than γ-Al2O3 having hexagonal structure, prepared from nordstrandite.