活性氧化铝孔结构的控制

Pore Structure Control of Activated Alumina

中文关键词：活性氧化铝　孔分布　比表面　pH交替变动　水热处理　表面活性剂

英文关键词：activated alumina　pore size distribution　specific surface area　pH value swing　hydrothermal treatment　surfactant

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作者	单位
李国印	中国日用化学工业研究院，太原 030001
支建平	中国日用化学工业研究院，太原 030001
张玉林	中国日用化学工业研究院，太原 030001

中文摘要：

研究了pH值交替变动、水热处理以及表面活性剂对活性氧化铝孔结构的影响。实验结果表明：pH值交替变动可以制备出结晶度高，晶粒大且均匀的拟薄水铝石；水热处理有利于氧化铝结构内铝原子迁移，促进晶粒进一步增长；而表面活性剂能够插入拟薄水铝石层间，减少焙烧过程中层间坍塌和毛细孔收缩，从而有效调控氧化铝孔结构。其中pH值交替变动和水热处理使氧化铝微孔分布向大孔方向迁移，比表面降低；加入表面活性剂使氧化铝微孔分布向小孔方向迁移，比表面增加，制备出了低比表面(≤150 $m^2\cdot g^{-1}$)和高比表面(≥250 $m^2\cdot g^{-1}$)的大孔容氧化铝载体。同时对铝原子的配位情况进行考察，发现铝原子主要以四配位和六配位状态存在，加入表面活性剂和水热处理能显著改变四配位铝和六配位铝的比值。

英文摘要：

Influences of pH value swing, hydrothermal treatment and the surfactants addition on the pore structure of activated alumina were studied. The results indicated that pH value changes in alternative way could be beneficial to the preparation of pseudoboehmites with large, uniform crystalline sizes and high crystallinities, hydrothermal treatment favored the migration of aluminum atoms and promoted crystal growth, while surfactants could insert into layers of pseudoboehmite, decreasing the tendency in collapsing of layers and shrinking of capillarys upon calcinations, so pore structure of alumina could be controlled effectively. Hydrothermal treatment and pH value swing could shift the micropore distribution of alumina to macroporous direction, and decreased surface areas; the surfactants addition could shift the micropore distribution of alumina to microporous direction, and increase surface areas. The high-porosity alumina carriers were obtained with surface areas (≤150 $m^2\cdot g^{-1}$) and surface areas (≥250 $m^2\cdot g^{-1}$). The coordinated states of aluminum species were investigated too, and it was found that aluminum atoms were in 4-coordinated and 6-coordinated states mainly, the addition of surfactants and hydrothermal treatment could remarkably influence the ratio of 4-coordinated Al to 6-coordinated Al.