



# SEMINAR

Thursday, 26.10.2023, 13:00, Kolar's Lecture Hall

## Influence of (alkali) cations on the phase transformations from $\gamma$ to $\alpha$ Alumina

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Corundum and transition alumina powders are commonly produced through the Bayer process. Digestion of bauxite in a sodium hydroxide solution is followed by gibbsite precipitation, which contains significant amounts of  $\text{Na}^+$  ions. During the de-hydroxylation of gibbsite,  $\text{Na}^+$  is associated with retardation of the structural phase transformations between transition alumina and corundum ( $\alpha\text{-Al}_2\text{O}_3$ ) phases. The exact role of Na is unclear. The influence of  $\text{Na}^+$  ions on the phase transformation of  $\gamma\text{-Al}_2\text{O}_3$  to  $\alpha$ -alumina was investigated by varying the concentration of NaOH in aqueous  $\gamma\text{-Al}_2\text{O}_3$  suspensions. The phase transformation behavior of  $\gamma\text{-Al}_2\text{O}_3$  was monitored through thermal analysis, XRD, SEM, XPS, and TEM. As the Na concentration in  $\gamma$ -alumina suspensions increased, the amount of  $\alpha\text{-Al}_2\text{O}_3$  decreased in samples that were heat treated at 1200 °C for 2 h. XPS analysis indicated that washing transition alumina powders with  $\text{NH}_4\text{OH}$  solutions had decreased the surface concentration of  $\text{Na}^+$  and facilitated the phase transformation to  $\alpha\text{-Al}_2\text{O}_3$ . Experiments with other (alkali) cations as well as other anions indicated that % blocking of specific sites on the surface may be effective in retardation. Although significant advances in understanding is made, the quest is ongoing.

**Kindly invited.**