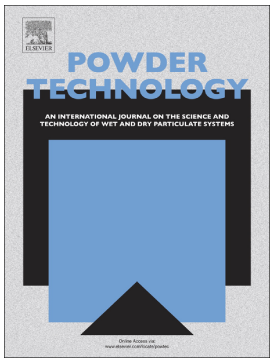

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Influence of the Milling Conditions on the Thermal Decomposition of Bayer Gibbsite

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ABSTRACT

A synthetic gibbsite (Al(OH)3) produced by the Bayer process was mechanically activated by attrition milling for 24 hours with various grinding ball-to-powder ratios (BPR=5, 10 and 20). Changes in its structure were studied by thermal analysis and X-ray diffraction. As a result of increasing ball-to-powder ratio, the grain size of gibbsite decreased while its specific surface area increased. Only for these materials, the formation of nanocrystalline boehmite (AlO·OH) and amorphous aluminium hydroxides was also observed. Upon having been heat treated between 200 – 1200ºC (2 hours), boehmite was detected at the temperature range of 200 and 350ºC for the BPR10 sample, while the boehmite of BPR20 was transformed to γ- Al2O3 at 500ºC. Further, only α-Al2O3 was detected at 1200ºC for all samples. Finally, combining the TG-DSC, XRD and SEM results, it was proposed a mechanism for the thermal decomposition of the non-milled and milled samples.

Key words: Gibbsite; milling; mechanical activation; amorphization; thermal behaviour.

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