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Optimization of operating variables for production of ultra-fine talc in a stirred mill. Specific surface area investigations

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Abstract. Due to its properties such as chemical inertness, softness, whiteness, high thermal conductivity, low electrical conductivity and adsorption properties talc has wide industrial applications in paper, cosmetics, paints, polymer, ceramics, refractory materials and pharmaceutical. The demand for ultra-fine talc is emerging which drives the mineral industry to produce value added products. In this study, it was investigated how certain grinding parameters such as mill speed, ball filling ratio, powder filling ratio and grinding time of dry stirred mill affect grindability of talc ore (d_{97}=127 μm). A series of laboratory experiments using a 2^4 full factorial design was conducted to determine the optimal operational parameters of a stirred mill in order to minimize the specific surface area. The main and interaction effects on the volume specific surface area (SV, $m^2.cm^{-3}$) of the ground product were evaluated using the Yates analysis. Under the optimal conditions at the stirrer speed of 600 rpm, grinding time of 20 min, sample mass of 5% and ball ratio of 70%, the resulting talc powder had larger volume specific surface area (*i.e.*, 3.48 $m^2.cm^{-3}$) than the starting material (*i.e.*, 1.84 $m^2.cm^{-3}$).

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