

Transformation and powder Characteristics of TiO₂ during high-energy milling.

Abstract

Ball milling is a way of inducing phase transformations, chemical reactions and changes in the reactivity of solids. Anatase to rutile phase transformation was studied by milled samples. Ball milling was carried out by planetary milling with different milling medium, Ball-to-Powder Ratio (BPR), and different milling time. The results revealed that the anatase to rutile transformation completed after 20 hours by dry milling whereas there is no phase transformation by wet milling even after 60 h milling time. The amount of energy by using (BPR 5 : 1) during all dry milling periods was not enough to transfer the phase from anatase to rutile while anatase phase completely transferred to rutile by using BPR (10 : 1 and 20 : 1). The Crystallite size decreasing with increasing milling time. Crystallite size estimated from X-ray Diffraction (XRD) data. Scanning Electron Microscopy (SEM) micrographs clearly show more agglomeration by using BPR (20 : 1). Less agglomeration and smaller size of the powder particles were obtained by wet milling compared to dry milling.

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