

Abstract Submitted
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Is Ball Milling An Innovative Technique For the Production of Zn From ZnO?¹ JEFF MCLEOD, ALI BAKHSHAI, Goucher College — The process of mechanical alloying using ball milling transfers mechanical energy to reactants in powder form, causing the particle size of the reactant powders to be reduced until defects in the lattice structure of the reactants are created. For reactions of sufficient exothermicity, this facilitates a complete mechanochemical reaction through self-heat propagating synthesis (SHS). The oxide reduction reaction of ZnO with Al, which yields pure Zn as a product, cannot be induced using ball milling alone because of its low exothermicity. This study used a systematic combination of ball milling and annealing in order to induce the reaction. Parameters tested were milling time, annealing time, and annealing temperature with the purpose of establishing the importance of each of these variables in inducing a complete reaction in the sample. The completeness of the reaction was determined using XRD analysis and inspection with an optical microscope. Results confirmed that neither ball milling nor heat treatment could induce the reaction individually; only ball milling followed by annealing could cause the reaction to take place. This study suggests that using ball milling in conjunction with heat treatment can produce Zn from ZnO in a less costly, more efficient, and less wasteful manner than traditional methods.

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