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RESEARCH PAPERS

纳米碳酸钙在非等温条件下热分解动力学及机理研究

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摘要 Experiments on thermal decomposition of nano-sized calcium carbonate were carried out in a thermo-gravimetric analyzer under non-isothermal condition of different heating rates (5 to 20 K@min-1). The Coats andRedfern's equation was used to determine the apparent activation energy and the pre-exponential factors. Themechanism of thermal decomposition was evaluated using the master plots, Coats and Redfern's equation and thekinetic compensation law. It was found that the thermal decomposition property of nano-sized calcium carbonatewas different from that of bulk calcite. Nano-sized calcium carbonate began to decompose at 640 ℃, which was 180℃lower than the reported value for calcite. The experimental results of kinetics were compatible with the mechanismof one-dimensional phase boundary movement. The apparent activation energy of nano-sized calcium carbonate wasestimated to be 151kJ@mol-1 while the literature value for normal calcite was approximately 200kJ@mol-1. Theorder of magnitude of pre-exponential factors was estimated to be 109 s-1.

关键词 nano-sized calcium carbonate non-isothermal decomposition kinetic mechanism

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Kinetics and Mechanism of Decomposition of Nano-sized Calcium Carbonate under Non-isothermal Condition

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Key words nano-sized calcium carbonate; non-isothermal decomposition; kinetic mechanism

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