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A Preliminary study on the hydrogen reduction of jordanian iron ore

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Abstract: Jordanian iron ore samples, obtained from Warda area, were reduced using hydrogen gas and preliminary kinetic observations and results were obtained. Samples of iron ore were carefully sized, weighed and reduced using flowing hydrogen in a tubular furnace. Constant temperature experiments were conducted to examine the effect of particle size (180 to 710 mm), temperature (400 to 600uC) and gas flow rate (1 to 3 L min21 at STP) on the percentage of reduction with time. It was found that the reduction rate increased with decreasing particle size, increasing gas flow rate, and increasing temperature. In general, the course of ore reduction was observed to follow three distinct stages; an initial stage of increasing percentage of reduction at an increasing rate, followed by a stage of decreasing rate, and a final stage with constant percentage of reduction. The initial stage was successfully modelled using the shrinking core model with the chemical reaction step controls, probably combined by gas diffusion. The observed activation energy of reduction for this period was 291 kJ mol21