Kinetics of different particle size of magnetite for chemical looping application

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For solving the recent environmental issues and CO2 capture with its utilization, chemical looping (CL) process for CO2 activation has been recognized to be an environmentally begin alternative process compared with the conventional CO2 reforming reaction. The redox reaction of iron oxides by the reduction of magnetite and its subsequent oxidation by CO2 is to produce a high-purity CO through CL process. Magnetites having different particle sizes were synthesized by organic-phase method through high temperature with the different size of iron oxide nanoparticles in the range of 4 − 20 nm. The kinetic parameters of different particle size of magnetites were investigated using isothermal method with the assumption of the simple first-order oxidation kinetics. This kinetics showed a most acceptable fit to the experimental data and suitable kinetic model for redox reaction of iron oxide nanoparticles. The powder XRD, XRF, and TPR analysis were applied to characterize the physicochemical properties of iron oxide nanoparticles.