

Investigation of Moving Bed Process Using Solid Sorbents for CO₂ Capture

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Solid sorbents have been intensively studied for CO₂ capture because of its low heat capacity and lower regeneration energy. To maximize the advantages of solid sorbents, an appropriate process should be selected. There are a couple of reactors using solid sorbents for CO₂ capture – moving bed, packed bed and fluidized bed. We investigated several advantages of a moving bed reactor using solid sorbents for CO₂ capture. The moving bed reactor allow a flue gas and solid sorbents to be contacted in counter-current direction. The characteristic of the type has more advantages over other co-current type reactors like fast- and bubbling- fluidized bed. First, the equilibrium condition of gas is the concentration of CO₂ in flue gas (about 13%) for the moving bed reactor, although the condition of other co-current reactors is about 1.3% under the assumption that the carbon capture efficiency is almost 90%. Low equilibrium condition makes the solid circulation rate of processes using co-current type high, which incurs the thermal energy required for sensible heat of solid to be large. On the other hand, the solid circulation rate of moving bed reactor is smaller than the co-current type reactors, which lowers the energy requirement for regeneration.