Study on back-shifting and leakage of gas through loop-seals in dual gas fluidized bed reactors

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Gas leakage between reactors in dual fluidized bed systems (*i.e.* indirect steam gasification, chemical looping combustion) must be minimized to prevent being diluted with air for increasing efficiency of the overall system. The proper operation of loop-seals in dual fluidized bed is one of the most important points for preventing or minimizing the leakage between reactors. In this study, the modeling and the experiment were done aiming at evaluating the back-shifting and leakage of gas through loop-seals. The model was implemented to determine the direction and the interstitial velocity of solids and gas through a loop-seal. Experiments were also performed using a plexiglas cold flow model with the down-scaled dimensions of the Chalmers gasifier ($4MW_{th}$), bed materials and gas calculated by applying the Glicksman's scaling law. CO_2 was used as tracer for measuring the leakage through the loop-seal. The dependence of leakage on the fluidization velocities in the loop seal was mainly investigated. The experimental results showed good quantitative agreement with the predicted model in the studied geometry and conditions.