



## **Investigation of the applicability of Shrinking Core Model on a pilot-scale Steam Hydrator Reactor**

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**Abstract:** Calcium looping is one of the most promising technology for Carbon Capture and Storage (CCS) purposes. It based on the reversible reaction between sorbent Calcium Oxide (CaO) and Carbon dioxide (CO<sub>2</sub>). One of the major limitations of this process is that the sorbent loses its activity over multiple cycles. In order to improve the activity of sorbent, intermediate steam hydration step was proposed. This process is based on another reversible reaction where deactivated sorbent is treated with steam to form Ca(OH)<sub>2</sub>. This Ca(OH)<sub>2</sub> undergoes the backward reaction to give back the regenerated sorbent. Several studies have shown encouraging results of the efficiency of this process. Recently, Wang et al. (2013)<sup>1</sup> successfully designed a fluidized bed reactor on a pilot-scale. Blamey et al. (2016)<sup>2</sup> developed a shrinking core model based on studies carried out on a small experimental reactor. In this study, we are extending the application of this model on a pilot-scale reactor. Modelling of this unit is essential for scale-up and optimization purposes. The model successfully predicts the trends when the operational parameters like steam partial pressure and operating temperature were changed.

**Keywords :** CO<sub>2</sub> capture, Calcium Looping, Steam Hydration, Shrinking core model.

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