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# Carbon dioxide hydrogenation to methanol: Process simulation and optimization studies

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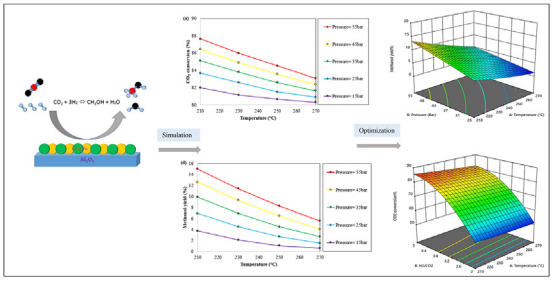
## HIGHLIGHTS

- Catalytic $CO_2$ hydrogenation to methanol has been investigated in this work.
- Aspen plus V-8 was used for process simulation and optimization studies were performed using Design expert V-11.
- The effect of temperature, pressure and the feed flow rate on $CO_2$ conversion and methanol yield was evaluated.
- Response surface methodology (RSM) was used to analyze the chemical equilibrium of the $CH_3OH$ production process.
- The simulation gave a $CO_2$ conversion of 87.65% and a $CH_3OH$ yield of 11.39%.

## GRAPHICAL ABSTRACT

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## ABSTRACT

This work investigates process simulation and optimization as an efficient approach to mitigate global warming using carbon dioxide hydrogenation to methanol. Modeling and simulation of hydrogenation to methanol were studied using Aspen Plus V8. $Cu/ZnO/Al_2O_3$ catalyst is used to optimize parameters to enhance the reduction of $CO_2$ to methanol. The effect of temperature, pressure, and the feed flow rate on $CO_2$ conversion and $CH_3OH$ yield

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