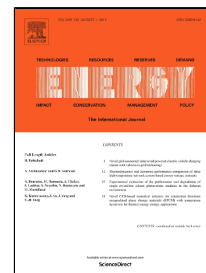


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An Experimental Study on Carbon Dioxide Hydrate Formation Using a Gas-Inducing Agitated Reactor

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ABSTRACT

The capture, storage and transportation technology of carbon dioxide based on hydrate formation is an innovative conception. This work presents an experimental investigation on CO₂ hydrate formation as a function of rotation speed (0, 200, 400, 600, 800 rpm), temperatures (274.15~279.15 K) and initial pressures (2.09, 3.17, 4.03, 5.04, 6.02 MPa) by using a gas-inducing agitated reactor. It was found that stable CO₂ hydrate formation was efficiently enhanced at the stage of CO₂ dissolution and nucleation in the liquid phase by the gas-inducing agitated reactor through mechanical agitation and gas recycle. The induction time was shortened from 261 to 24 minutes with an increase of agitation speed. Reactor design is one of the important effects on CO₂ hydrate formation. In addition, temperature and initial pressure also have strong effects on CO₂ hydrate formation and storage capacity. The induction time of nucleation was greatly reduced with a decrease in cooling temperature and an increase in initial pressure. The amount of CO₂ consumed and storage capacity were also increased.

KEYWORDS

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