

FORMATION KINETICS AND PHASE EQUILIBRIUM OF CO₂ HYDRATES UNDER MARINE SEDIMENT ENVIRONMENT FOR OFFSHORE CO₂ SEQUESTRATION

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Gas hydrates are nonstoichiometric crystalline guest-host structures in which gas molecules (e.g., CO₂, CH₄, and N₂O) are trapped inside hydrogen-bonded water cages under high pressure and low temperature environment. Massive amount of CO₂ (150~180 m³) could be entrapped in 1 m³ of CO₂ hydrate structure. Moreover, formation of CO₂ hydrates in marine sediments during offshore CO₂ storage could prevent buoyant CO₂ leakage due to the formation of a hydrate cap. Understanding of formation kinetics and phase equilibrium of CO₂ hydrates is significant because they are directly related to CO₂ trapping speed in hydrate structure and stability of stored CO₂, respectively. Therefore, in this study, we investigated the formation kinetics and phase equilibrium of CO₂ hydrate under the marine environmental conditions for potential application of CO₂ hydrates for offshore CO₂ sequestration.

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