

Experimental Observations of Hydrate Formation in a Convection Tank

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Clathrate hydrates are crystalline compounds formed by cage-like structure of hydrogen-bonded water molecules enclosing a guest molecule of a hydrate-forming substance. Many substances such as gases and fluorocarbon refrigerants are hydrate formers. We carried out experiments to examine the hydrate formation process at the interface between water and the immiscible refrigerant R141b (CH₃CCl₂F). In this case, hydrate formation is possible if T is less than 281.5K and P is greater 0.04 MPa. Experiments were carried out both in quiescent and convection states. In the quiescent state at 2°C, a thin hydrate film first forms on the interface. Thereafter a mushy hydrate layer grows above the film in the water layer. In a test tank with copper sidewalls, hydrates also grow from these walls at a greater rate than those at the interface. Under the convection state, growth of the hydrate mushy layer is very much affected by the flow of water.

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