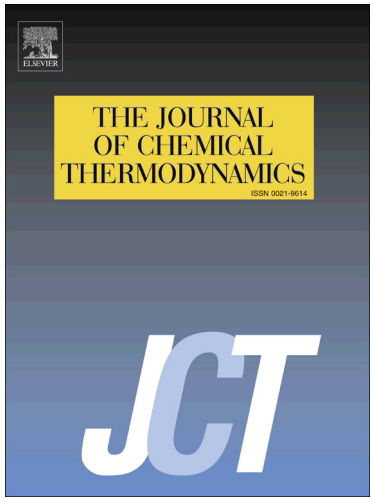

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ABSTRACT

Enhanced depressurisation for methane recovery from gas hydrate-bearing sediments was experimentally studied by injection of compressed air and nitrogen. Experiments were conducted in simulated sediments (silica sand) from 273.4 K to 283.0 K and initial system pressures ranging from 3.8 MPa to 7.2 MPa before air or nitrogen injection. The results show that injection of air and nitrogen made it possible to implement conventional depressurisation in multiple stages. In each pressure stage, methane hydrate was quickly dissociated by the injected air or nitrogen due to direct shift of the methane hydrate equilibrium phase boundary. Methane hydrate dissociation at high pressures enables methane recovery inside the methane hydrate stability zone. Depressurisation well above the methane hydrate dissociation pressure generated a methane-rich gas phase of up to 90 mol% methane depending on the injected gas. Injection of compressed air or nitrogen provides a potential approach to improve the technical feasibility and economic viability of conventional depressurisation method for methane recovery from most gas hydrate reservoirs with severe conditions such as low permeability or dispersed hydrates.

Keywords: *Gas hydrate; methane recovery; compressed air; nitrogen; kinetics; depressurisation*.

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