

## Production of Natural Gas Hydrate by Using Air and Carbon Dioxide

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**Abstract :** In this study, we demonstrate the production of natural gas hydrates from permeable marine sediments with simultaneous mechanisms for methane recovery and methane-air or methane-air/carbon dioxide replacement. The simultaneous melting happens until the chemical potentials become equal in both phases as natural gas hydrate depletion continues and self-regulated methane-air replacement occurs over an arbitrary point. We observed certain point between dissociation and replacement mechanisms in the natural gas hydrate reservoir, and we call this boundary as critical methane concentration. By the way, when carbon dioxide was added, the process of chemical exchange of methane by air/carbon dioxide was observed in the natural gas hydrate. The suggested process will operate well for most global natural gas hydrate reservoirs, regardless of the operating conditions or geometrical constraints.

**Keywords :** air injection, carbon dioxide sequestration, hydrate production, natural gas hydrate

**Conference Title :** ICCE 2015 : International Conference on Chemical Engineering

**Conference Location :** Stockholm, Sweden

**Conference Dates :** July 13-14, 2015