

Swapping $N_2 + CO_2$ mixture for natural gas in sII type natural gas hydrate

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Clathrate compounds are crystalline materials formed by van der waals interaction between host and guest molecules. These clathrate compounds are divided into three different structures, sI, sII, and sH. Large amounts of natural gas hydrates are stored on continental margins and permafrost regions. If we could swap the sII type natural gas hydrates for CO_2 hydrate, they would serve double duty as methane gas recovery and greenhouse gases storage in the deep ocean sediments. For this study, we investigate the swapping phenomenon occurring sII type natural gas hydrate and spectroscopic analyses. Also, the direct quantitative analysis provides the replacement rate of sII type natural gas hydrate by $N_2 + CO_2$ mixture.