

### Energy Gas uptake kinetics of thermally-expanded THF clathrate hydrate

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In this study, we measured the gas uptake kinetics of thermally-expanded THF hydrates in various energy gas and found much faster absorption tendency on thermally-expanded THF hydrate. In THF + Gas hydrate, THF molecules fill the large cage and small gas molecules fill the small cage. When thermal cycle(step heating from 77K to 270K) is applied on this gas hydrate, small gas molecules escaping the small cage leaving expanded lattice parameter by thermal motion. This thermally-expanded THF hydrate can be absorb gas molecules of interest such as H<sub>2</sub>, CH<sub>4</sub>, etc.

Much faster absorption tendency was shown in thermally-expanded THF hydrate for both H<sub>2</sub>, CH<sub>4</sub> was achieved. Repetition of thermal cycle also have effective gas absorption kinetics.