

Kinetic studies of pure SF₆ and SF₆-N₂ hydrate using in-situ Raman spectroscopy

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SF₆ gas has been widely used as insulating gas in electrical transformers, cleaning gas in semiconductors manufacturing processing and covering gas at the foundry process due to the outstanding insulating feature as well as the inert property. It should be noted that the use of SF₆ gas increases especially in many developing countries. However, the chemically stable gas is one of the most potent greenhouse gases (GHGs) that cause significantly global warming, and has been, thus, blanketed into the Kyoto Protocol. The global warming potential of SF₆ is 23,900 times larger than CO₂ and it remains in the air for 3,200 years. In general, gas hydrates can be formed under high pressure and low temperature. However, SF₆ gas is known to form hydrate under relatively milder conditions compare to those of other global warming gases. Therefore, technological and economical effects could be expected for the separation of SF₆ gas from gas mixtures.

In this study, fiber optic based Raman spectroscopy (Sentinel, BRUKER) with semi-batch vessel (at constant P & T) were used to analyze the kinetic characteristics of pure SF₆ hydrate and SF₆-N₂ hydrate.