

## The effect of water to gas ratio on hydrate phase equilibria for gas mixtures containing CO<sub>2</sub>

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Fuel gas (CO<sub>2</sub> + H<sub>2</sub>) and flue gas (CO<sub>2</sub> + N<sub>2</sub>) are industrial gases produced by IGCC power plants, and the separation of CO<sub>2</sub> from these gas mixtures has important industrial and environmental implications. Among various methods separating CO<sub>2</sub>, the separation process using gas hydrates has many advantages in terms of energy, cost, and eco-friendliness over the other methods. Measuring and estimating thermodynamic phase equilibrium conditions of gas hydrates formed with gas mixtures are critical to evaluate the efficiency of gas separation process. Many research studies have been performed to determine hydrate phase equilibrium conditions of fuel gas and flue gas, but there is still a lack of data. Most previous studies did not consider the water and gas mole fractions which play a critical role in determining the phase equilibrium conditions. In this study, the effect of the relative amount water to gas was studied through experimental measurements and calculations by using CSMGem, a prediction tool developed by Colorado School of Mines. The findings obtained from this study can also be applied to other mixed-gas hydrate systems.