

### Hydrate Phase Equilibria and Spectroscopic Identification of binary (diazine +methane) clathrate hydrates

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Clathrate hydrates are host-guest compounds commonly stabilized by physically stable interaction (van der Waals interaction) between guest and hydrogen-bonded water molecules. Recently, clathrate hydrates have received much attention due to potential applications such as natural gas resource, recovery and sequestration of carbon dioxide. The guest molecule has been known for a key factor in determining the crystalline structures of clathrate hydrate. In the present study, clathrate hydrate was investigated with novel guest molecules that are three isomers of diazine ( $C_4H_4N_2$ ). Crystal structure and guest clathration will be identified by spectroscopic observation with powder X-ray diffraction and Raman spectroscopy. Thermodynamic stability will be examined by measuring hydrate dissociation conditions.