

Clathrate hydrate formation in the system Tetrahydrofuran+ Helium+ Water : equilibrium data and crystallographic structures of hydrates

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Clathrate compound are crystalline materials formed by a physical interaction between host molecules and relatively light molecules. There are various cavities capable of entrapping guest molecules in an open network of host molecules composing a crystalline framework. These non-stoichiometric crystalline compounds are divided into three distinct structures I, II, and H, which differ in cage size and shape. Helium, one of smallest light guest molecules (H₂, He, and probably Ne), is important in the field of superconductivity technology. and the thermonuclear industry, However, helium itself normally cannot form gas hydrates because of too small molecular size without helping of hydrate former molecules (sI, sII, and sH formers). In this study, the equilibrium conditions of gas hydrates from mixtures of tetrahydrofuran (sII former)+ helium are experimentally determined to investigate the phase equilibria of this system. In addition, X-ray diffraction was used to confirm the hydrate structure of mixed tetrahydrofuran+ helium+ water system