



Physical modeling of the formation of clathrate hydrates of methane

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Abstract

Nowadays natural gas hydrates attract special attention as a possible source of fossil fuel. According to various estimates, the reserves of hydrocarbons in hydrates exceed considerably explored reserves of natural gas. Due to the clathrate structure the unit volume of the gas hydrate can contain up to 160–180 volumes of pure gas. In recent years interest to a problem of gas hydrates has considerably increased. Such changes are connected with the progress in searches of the alternative sources of hydrocarbonic raw materials in countries that do not possess the resources of energy carriers. Thus gas hydrates are nonconventional sources of the hydrocarbonic raw materials which can be developed in the near future. At the same time, mechanisms of methane clathrate hydrates formations have not reached an advanced level, their thermophysical and mechanical properties have not been investigated profoundly. Thereby our experimental modeling of the processes of formation of methane clathrate hydrates in water cryomatrix prepared by co-condensation from the gas phase onto a cooled substrate was carried out over the range of condensation temperatures 12–60 K and pressures 10^{-4} – 10^{-6} Torr. In our experiments the concentration of methane in water varied in the range of 5%–90%. The thickness deposited films was 30–60 μm . The vibrational spectra of two-component thin films of $\text{CH}_4 + \text{H}_2\text{O}$ condensates were measured and analyzed.

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Article outline:

1. Introduction 2. Experimental 3. Results and discussion 4. Conclusions

Key Topics

Methane

Desorption

Clathrates

Absorption spectra

Condensation

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B01D5/00

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