

Phase Transitions in the O₂ – H₂O System at High Pressures

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Pressure and temperature induced phase transformations in the O₂ – H₂O system were studied by means of Raman spectroscopy, X-ray powder diffraction and visual observations in diamond anvil cell at high pressure. Ice and liquid oxygen were loaded in high pressure cell simultaneously. Several clathrate hydrate phases in a pressure range 0.5 – 2.8 GPa were detected and assigned to known clathrate hydrate structural types including high-pressure structures recently found for methane and argon clathrate hydrates [1, 2].

Reaction of hydrogen peroxide formation from water and liquid oxygen was found at pressures lower than 1 GPa and room temperature. Break down reaction of H₂O₂ to H₂O and O₂ was also studied, for this purpose 30% solution of H₂O₂ was loaded in the diamond anvil cell. Influence of pressure and temperature on the chemical equilibrium $\frac{1}{2}\text{O}_2 + \text{H}_2\text{O} \leftrightarrow \text{H}_2\text{O}_2$ will be discussed.

[1] Loveday J.S., Nelmes R.J., Guthrie M. *Chem. Phys. Lett.*, 2001, **350**, 459.

[2] Kurnosov A.V., Manakov A.Yu., Komarov V.Yu., Voronin V.I., Teplykh A.E., Dyadin Yu.A., *Doklady Physical Chemistry*, 2001, **381**, 303.

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