Kubas interaction of hydrogen molecules with a lithium silicate glass network

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The effect of lithium cations on the interaction of molecular hydrogen with the silicate network was studied by measuring the thermal stability of concentrated solid solutions of molecular hydrogen $Li_2O{\bullet}6SiO_2$-$0.39H_2$ and $Li_2O{\bullet}6SiO_2$-$0.25H_2$ synthesized at high pressures. According to the Raman data, the hydrogenated $Li_2O{\bullet}6SiO_2$ glass contained hydrogen in the molecular form. The kinetics of decomposition of the solutions was studied by Raman spectroscopy and by hot hydrogen extraction during isothermal annealing in a pre-evacuated volume at $T = 273 - 370$ K. Raman spectroscopy showed that the decomposition reactions of these solutions had close activation energies of $E_a = 427$ and 486 meV, respectively. The activation energies determined by the hot extraction were $E_a = 185$ and 192 meV, or more than twice as small. At the same time, all these values exceeded the characteristic energy for the Van-der-Waals forces, which suggests a strong Kubas interaction between the H_2 molecules and lithium silicate network.
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