We discuss the possibility of explanation of unusual behavior of high-pressure conducting phase IV of solid hydrogen observed recently in diamond-anvil experiments of Eremets and Troyan [1] at room temperature within ionic model. It is based on the assumption of dissociative ionization of hydrogen molecules into negative atomic and positive molecular ions induced by high compression.

First-order transition of molecular hydrogen solid into partly ionic conducting phase is studied. The transition pressure, change of volume, vibronic spectra and degree of ionization in this phase in the pressure interval from 230 up to 270 GPa are estimated.

Density, energy and conductivity of the partly ionic solid hydrogen are calculated directly using molecular dynamics technique and results are compared with experimental data. The model proposed explains both pressure and temperature dependence of resistivity, measured at room temperature, and is in agreement with high-temperature shock compression experiments [2].

We discuss possible improvements of the model proposed and non-solved problems and challenges for experimentalists, related to the nature of the second transition [3] observed by Eremets and Troyan at 270 GPa.