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Hydrogen sulfide at high pressure: change in stoichiometry[1]
ALEXANDER GONCHAROV, SERGEY LOBANOV, Carnegie Inst of Washington, IVAN KRUGLOV, Moscow Institute of Physics and Technology, XIAO-MIAO ZHAO, Carnegie Inst of Washington, XIAO-JIA CHEN, Center for High Pressure Science Technology Advanced Research (HPStar), Shanghai, China, ARTEM OGANOV, Skolkovo Institute of Science and Technology, Moscow, Russia, ZUZANA KONOPKOVA, DESY Photon Science, D-22607 Hamburg, Germany, VITALI PRAKAPENKA, Center for Advanced Radiation Sources, University of Chicago, Chicago, IL 60637, USA — Hydrogen sulfide (H_2S) was studied by x-ray synchrotron diffraction (XRD) and Raman spectroscopy up to 144 GPa at 180-295 K. We find that H_2S compound become unstable with respect to formation of new compounds with different composition including pure S, H_3S and HS_2 depending on the thermodynamic P-T path. These results are supported by our quantum-mechanical variable-composition evolutionary simulations that show the stability of the above mentioned compounds at elevated pressures. The stability of H_3S at high pressures, which we find a strong experimental and theoretical confirmation here, suggests that it is this material which is responsible for high-temperature superconducting properties reported previously.

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