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## **M2Po2A-03 [27]: The issue of induction the superconducting state in selected compressed sulfur and hydrogen systems**

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Thermodynamic properties of superconducting state in the  $H_5S_2$  system were analyzed precisely. The calculations were carried out in two cases: included the lowest-order vertex correction-scheme VCEE (Vertex Corrected Eliashberg Equations), on the other hand we get the model without the vertex corrections, the so-called CEE scheme (Classical Eliashberg Equations). It has been proven that under pressure 112 GPa, the superconducting state induced in the  $H_5S_2$  compound is characterized by anomalously high value of Coulomb pseudopotential (also after taking into account the vertex corrections to the electron-phonon interaction). The analysis contains also the parameters study of superconducting state, that is induced in the  $H_4S_3$  and  $H_2S$  compounds. The superconducting state of  $H_4S_3$  compound is the BCS type, however it cannot be equated with the experimentally measured low-temperature superconducting state in the compressed hydrogen sulfide, since it has a very low critical temperature. On the other hand, has been shown that the superconducting state in  $H_2S$  compound has thermodynamic parameters with values close to the values determined for  $H_5S_2$  in the CEE (Classical Eliashberg Equations) scheme and is not the state of BCS type. In our opinion, experimentally was observed the superconducting state in the  $H_2S$  compound, which is kinetically protected in the samples prepared at the low temperature. It should be emphasized that in the case of  $H_2S$  reproducing the experimental dependence of critical temperature on the pressure does not require anomalously high value of Coulomb pseudopotential.

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