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Complex Behavior of Noble Gases under Compression B.A. NADYKTO, Russian Federal Nuclear Center - VNIIEF — When cooled or compressed, elementary monoatomic noble gases become a condensed liquid or solid. Further compression of condensed inert gases in static experiments (for example, in diamond anvils) and shock experiments revealed a number of interesting features in their behavior under compression. The paper provides a computational analysis of experiments based on the assumption that condensed noble gases change their electron structure under compression. Even at low pressures (up to 5 GPa), compressibility of argon was observed to change drastically, which is associated with its turning solid at a pressure of P = 1.3 GPa at room temperature. At high pressures, the change in the slope of the P(ρ) diagram can be interpreted as a change in the outer electron shell of atoms, which is fundamental to material properties. Parameters of the high-pressure phase of xenon fitted to describe experimental data at P < 100 GPa are in very close agreement with recently published data for pressures up to 840 GPa. Data of temperature measurements at megabar shock-wave pressures for argon, krypton and xenon are analyzed. Effects of electron state excitation in atoms on heat capacity and measured temperature are discussed.

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