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HYSTERESIS TEMPERATURE DEPENDENCE DURING PHASE TRANSFORMATIONS UNDER PRESSURE

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Data obtained during investigations on the T-p diagrams of materials belonging to various classes of solids (metals (Tl, Sr [1]), ionic salts (RbCl, $AgNO_3$ [1], TlI [2], RbI [3]), semiconducting compounds of types $A^{II}B^{VI}$ (CdS [4]) and $A^{III}B^{V}$ (InSb [5]), and others) indicate that in all cases there is considerable hysteresis between transformations with the increase and reduction of pressure. The magnitude of the hysteresis increases sharply with a reduction of temperature (Fig. 1).

Since the location of the hysteresis lines (and not the phase equilibrium line) actually determines both the region for synthesis of the high-pressure modifications and the region of their (metastable) existence at normal pressure (i.e., their capability of preserving a high-pressure phase), it is of interest to study the occurrence of the hysteresis and its temperature dependence.

It may be shown that the sharp increase in the hysteresis with the reduction of temperature, and the particular shape of the lines at the start of direct or reversible transformations, agree with the law of thermally activated processes in general, and those of phase transformations in particular.

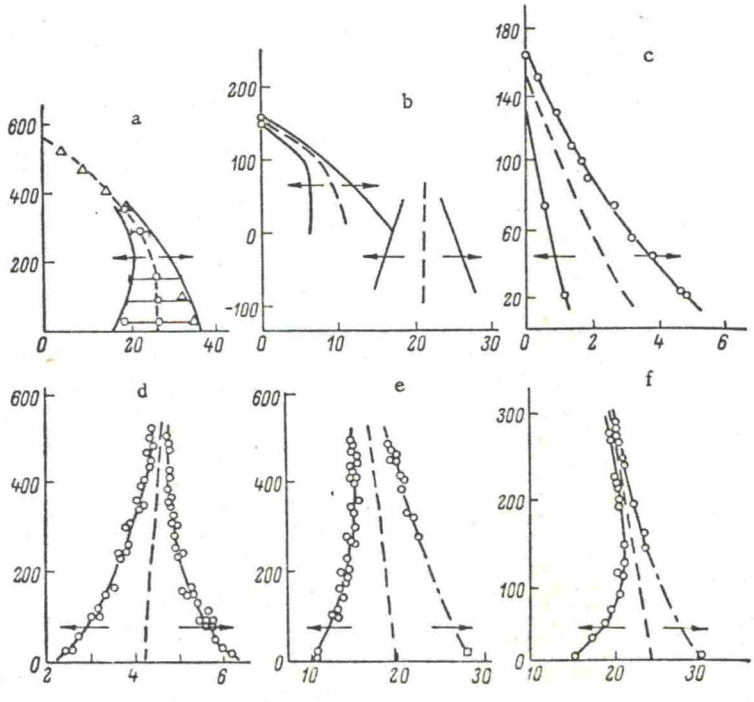

Fig. 1. Hysteresis during phase transformations under pressure: a) Sr [1]; b) $AgNO_3$ [1]; c) TlI [2]; d) RbI [3]; e) CdS [4]; f) InSb [5]. The abscissa axis is pressure (kbars); the ordinate axis is temperature T (°C).