Shock adiabats of metal alloys at high pressures

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Knowledge of the thermodynamic properties of materials is of both fundamental and practical interest. In this work, we have performed calculations of shock adiabats for alloys of various metals based on the principle of additivity of the shock adiabats of components [1]. In the additive approximation, the volume of the shock-compressed mixture is assumed to be equal to the sum of the volumes of the components obtained at the same pressure as in their actual shock compression in the form of homogeneous monolithic samples. This condition is expressed by the relation $V_{12}(P) = \alpha_1 V_1(P) + \alpha_2 V_2(P)$, where P is the pressure; V_{12} is the specific volume of the mixture; V_1 and V_2 are the specific volumes of components under shock compression of each of them separately; α_1 and α_2 are their weight concentrations ($\alpha_1 + \alpha_2 = 1$); double index 12 means mixture. This equation allows one to find the adiabat of one component from the adiabats of the mixture and of the other component [1]. The results of the present calculations of shock adiabats are compared with the already available data of shock-wave experiments for various metal alloys, for example, rhenium with molybdenum, iron with vanadium, and uranium with niobium and rhodium at high pressures.

[1] Alekseev Y F, Altshuler L V and Krupnikova V P 1971 *J. Appl. Mech. Tech. Phys.* **12** 624–627