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High-energy thermal study of the high-entropy silver–copper alloy system using the PBIN database and Thermo-Calc software package

ABSTRACT. High-energy thermal analysis using the CALPHAD method has been undertaken to determine the phase diagram, Gibbs energy, enthalpy, thermodynamic molar activities and excess energies at temperatures of 1800 K, 1850 K and 1900 K at a constant atmospheric pressure of 10^6 Pa. The Ag–Cu system shows the highest positive deviations from Henry's and Vegard's laws at 1850 K, due to a high level of repulsive contacts; at this temperature the total Gibbs energy of the system also has its highest value, –6.609 MJ/mol. The alloy shows a good negative deviation from Raoult's law, indicating system stability at the highest enthalpy level (again at 1850 K). The alloy is therefore shown to be usefully stable for industrial use.

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