EQUATION OF ISOTHERM OF SURFACE TENSION OF BINARY METAL SYSTEMS

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In [1] from the analysis of experimental data on the dependence of the surface tension (ST, $\sigma(x)$) on the composition of the melt of binary metal systems, the equation of the isotherm ST is proposed

$$\sigma(x) = \beta\frac{(F-1)(1-x)x}{1+(F-1)x} + \sigma_A(1-x) - \sigma_B x, \tag{1}$$

where β and F are parameters of the equation (1) that do not depend on the composition, σ_A and σ_B - ST of the pure components of the A - B system , and x is the thermodynamic concentration of the second component of the system.

To prove the validity of (1) for binary systems with monotonic change of ST depending on the composition, we rewrite it as a linear function

$$y(x) = \frac{(1-x)x}{\Delta\sigma(x)} = \frac{1}{\beta(F-1)} + \frac{1}{\beta}x, \tag{2}$$

where

$$\Delta\sigma(x) = \sigma(x) - \sigma_A(1-x) - \sigma_B x, \tag{3}$$

where $\sigma(x)$ is the PN of the melt of x, measured in the experiment.

The straight line (2) is constructed using experimental data $\sigma(x)$ for binary systems: 1 - alkali metals; 2 - p-metals; 3 - p-metal+alkali metal; 4 - refractory metal+p-metal . For all these systems, the expression (2) is satisfactory and it is shown that it describes all kinds of experimental isotherms of PN binary systems with a monotonous change of PN with high accuracy - the permissible relative deviations from the experiment are about 1%.

The high accuracy of the description of experimental isotherms by the equation (1) allows to construct methods of forecasting of surface properties of binary and triple systems with a minimum number of reference measurements.

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1. Kalazhokov Zamir Kh., Zikhova K.V., Kalazhokov Z.Kh., Kalazhokov Kh.Kh., TaovaT.M. Calculation of isotherms for surface tension of melts for multicomponent metal systems. // High Temperature. - 2012. - V.50 N3. - P.469-472.