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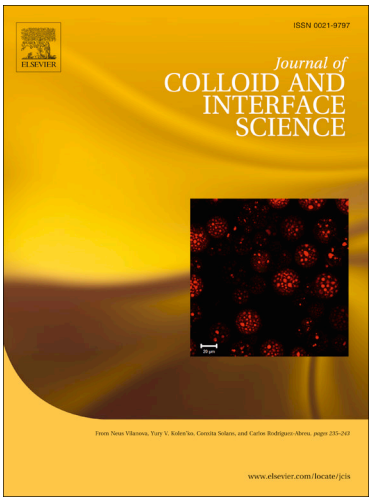

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Another look at the interfacial interaction parameter

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Abstract

Interfacial energy $\gamma_{1,2}$ of a liquid-liquid or solid-liquid system is of paramount importance in colloid and interface science and its applications. To assess the dependence of $\gamma_{1,2}$ on the surface energies γ_1 and γ_2 of two materials in contact, Girifalco and Good proposed their venerable equation involving the interfacial interaction parameter ϕ. Subsequently, values of ϕ have been experimentally determined for various material pairs. Here, we show that, the data of ϕ closely follow a unique relationship $\phi = (1 - \gamma_{1,2}/\gamma_1)^{½}$ for all pairs where the other material is non-polar. Theoretically, this curve describes the smallest possible ϕ. However, we also show that substituting this relationship into the Girifalco-Good equation reduces it to Antonov's rule $\gamma_{1,2} = \gamma_1 - \gamma_2$. Such a simplistic approach is inaccurate, and we conclude that the plotting of ϕ *vs.* $\gamma_{1,2}$ has contributed to overestimating the applicability of the Girifalco-Good Equation.

Keywords: Interfacial tension; Interfacial energy; Interfacial interaction parameter; Girifalco-Good equation; Equation of state

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