surface chemical potential

Defined by:

$$\mu_i^\sigma = \left(\frac{\partial A^\sigma}{\partial n_i^\sigma}\right)_{T,\,A_s,\,n_j^\sigma} = \left(\frac{\partial G^\sigma}{\partial n_i^\sigma}\right)_{T,\,p,\,\gamma,\,n_j^\sigma}$$

$$\mu_i^s = \left(\frac{\partial A^s}{\partial n_i^s}\right)_{T,\,V^s,\,A_s,\,n_i^s} = \left(\frac{\partial G^s}{\partial n_j^s}\right)_{T,\,p,\,\gamma,\,n_j^s}$$

where A^σ is the *surface excess Helmholtz energy*, G^σ is the *surface excess Gibbs energy*, A^s is the interfacial Helmholtz energy, G^s is the interfacial Gibbs energy, and A_s is the surface area. The quantities thus defined can be shown to be identical, and the conditions of equilibrium of component i in the system to be

$$\mu_i^\alpha = \mu_i^\sigma = \mu_i^s = \mu_i^\beta$$

where μ_i^α and μ_i^β are the *chemical potentials* of i in the bulk phases α and β. (μ_i^α or μ_i^β have to be omitted from this equlibrium condition if component i is not present in the respective bulk phase.)

The surface chemical potentials are related to the *Gibbs energy* functions by the equations

$$G^\sigma = \sum_i n_i^\sigma \mu_i^\sigma$$

$$G^s = \sum_i n_i^s \mu_i^s$$

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