differential molar energy of adsorption

Also contains definitions of: differential molar interfacial energy, differential molar surface excess energy

When the addition of a differential amount dn_i^{σ} or dn_i^{s} is effected at constant gas volume, the differential molar energy of adsorption of component i, $\Delta_a U_i^{\sigma}$ or $\Delta_a U_i^{s}$, is defined as:

$$\Delta_a U_i^{\sigma} = U_i^{\sigma} - U_i^{g}$$

or

$$\Delta_a U_i^{s} = U_i^{s} - U_i^{g}$$

where the differential molar surface excess energy, U_i^{σ}, is given by

$$U_i^{\sigma} = \left(\frac{\partial U^{\sigma}}{\partial n_i^{s}} \right)_{T,m,n_j^{\sigma}} = \left(\frac{\partial U}{\partial n_i^{\sigma}} \right)_{T,m,V^g,p_i,n_j^{\sigma}}$$

and the differential molar interfacial energy, U_i^{s}, by

$$U_i^{s} = \left(\frac{\partial U}{\partial n_i^{s}} \right)_{T,m,V^g,p_i,n_j^{\sigma}} = \left(\frac{\partial U}{\partial n_i^{s}} \right)_{T,m,V^g,V^s,p_i,n_j^{s}}$$

U_i^{g} is the differential molar energy of component i in the gas phase, i.e.

$$\left(\frac{\partial U}{\partial n_i^{g}} \right)_{T,V,n_i^{g}}$$

Source:
PAC, 1972, *31*, 577 *(Manual of Symbols and Terminology for Physicochemical Quantities and Units, Appendix II: Definitions, Terminology and Symbols in Colloid and Surface Chemistry)* on page 603