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 $dn_i^g$ 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 $\Delta_a U_i^g$, is defined as:

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

or

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

where the differential molar surface excess energy, $U_i^\sigma$, is given by

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

and the differential molar interfacial energy, $U_i^g$, by

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

$U_i^g$ 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