Związki między funkcjami termodynamicznymi

Pochodna funkcji względem temperatury

$$C_V = \left(\frac{\partial U}{\partial T}\right)_{V,\zeta} \qquad \frac{C_V}{T} = \left(\frac{\partial S}{\partial T}\right)_{V,\zeta}$$

$$C_p = \left(\frac{\partial H}{\partial T}\right)_{p,\zeta} \qquad \frac{C_p}{T} = \left(\frac{\partial S}{\partial T}\right)_{p,\zeta}$$

$$-S = \left(\frac{\partial F}{\partial T}\right)_{V,\zeta} \qquad -S = \left(\frac{\partial G}{\partial T}\right)_{p,\zeta}$$

$$\Delta S_{r(V)} = \left(\frac{\partial A}{\partial T}\right)_{V,\zeta} \qquad \Delta S_{r(p)} = \left(\frac{\partial A}{\partial T}\right)_{p,\zeta}$$

Pochodna funkcji względem objętości i ciśnienia

$$\left(\frac{\partial U}{\partial V}\right)_{T,\zeta} = -p + T\left(\frac{\partial p}{\partial T}\right)_{V,\zeta} \qquad \left(\frac{\partial S}{\partial p}\right)_{T,\zeta} = -\left(\frac{\partial V}{\partial T}\right)_{p,\zeta}$$

$$\left(\frac{\partial H}{\partial p}\right)_{T,\zeta} = V - T\left(\frac{\partial V}{\partial T}\right)_{p,\zeta} \qquad \left(\frac{\partial F}{\partial V}\right)_{T,\zeta} = -p$$

$$\left(\frac{\partial S}{\partial V}\right)_{T,\zeta} = \left(\frac{\partial p}{\partial T}\right)_{V,\zeta} \qquad \left(\frac{\partial G}{\partial p}\right)_{T,\zeta} = V$$

Związki między funkcjami termodynamicznymi

Pochodna funkcji względem liczby postępu reakcji

$$\left(\frac{\partial U}{\partial \zeta}\right)_{V,T} = \Delta U_r \qquad \left(\frac{\partial F}{\partial \zeta}\right)_{V,T} = -A$$

$$\left(\frac{\partial H}{\partial \zeta}\right)_{p,T} = \Delta H_r \qquad \left(\frac{\partial G}{\partial \zeta}\right)_{p,T} = -A$$

$$\left(\frac{\partial S}{\partial \zeta}\right)_{v,T} = \Delta S_r$$

$$H = U + pV$$

$$F = U - TS$$

$$H = G - T\left(\frac{\partial G}{\partial T}\right)_{p,\zeta}$$

$$A = T\left(\frac{\partial S}{\partial \zeta}\right)_{T,p} - \left(\frac{\partial H}{\partial \zeta}\right)_{T,p} = T\Delta S_r - \Delta H_r = -\Delta G_r$$