thermodynamische Potentiale und Maxwell Relationen

Potential	vollständiges Differential	partielle Ableitungen	Maxwell-Relationen
$U(S,V,N)$	$dU = TdS - pdV + \mu dN$	$T = \left(\frac{\partial U}{\partial S}\right)_{V,N} \quad -p = \left(\frac{\partial U}{\partial V}\right)_{S,N}$ $\mu = \left(\frac{\partial U}{\partial N}\right)_{S,V}$	$\left(\frac{\partial T}{\partial V}\right)_{S,N} = -\left(\frac{\partial p}{\partial S}\right)_{V,N}$ $\left(\frac{\partial T}{\partial N}\right)_{S,V} = \left(\frac{\partial \mu}{\partial S}\right)_{V,S}$ $\left(\frac{\partial p}{\partial N}\right)_{S,V} = -\left(\frac{\partial \mu}{\partial V}\right)_{N,S}$
$H(S,p,N)$ $= U + pV$	$dH = TdS + Vdp + \mu dN$	$T = \left(\frac{\partial H}{\partial S}\right)_{p,N} \quad V = \left(\frac{\partial H}{\partial p}\right)_{S,N}$ $\mu = \left(\frac{\partial H}{\partial N}\right)_{S,p}$	$\left(\frac{\partial T}{\partial p}\right)_{S,N} = \left(\frac{\partial V}{\partial S}\right)_{p,N}$ $\left(\frac{\partial T}{\partial N}\right)_{S,p} = \left(\frac{\partial \mu}{\partial S}\right)_{p,N}$ $\left(\frac{\partial V}{\partial N}\right)_{S,p} = \left(\frac{\partial \mu}{\partial p}\right)_{S,N}$
$F(T,V,N)$ $= U - TS$	$dF = -SdT - pdV + \mu dN$	$-S = \left(\frac{\partial F}{\partial T}\right)_{V,N} \quad -p = \left(\frac{\partial F}{\partial V}\right)_{T,N}$ $\mu = \left(\frac{\partial F}{\partial N}\right)_{T,V}$	$\left(\frac{\partial S}{\partial V}\right)_{T,N} = \left(\frac{\partial p}{\partial T}\right)_{V,N}$ $\left(\frac{\partial S}{\partial N}\right)_{T,V} = -\left(\frac{\partial \mu}{\partial T}\right)_{N,V}$ $\left(\frac{\partial p}{\partial N}\right)_{V,T} = -\left(\frac{\partial \mu}{\partial V}\right)_{T,N}$
$G(T,p,N)$ $= U - TS + pV$	$dG = -SdT + Vpd + \mu dN$	$-S = \left(\frac{\partial G}{\partial T}\right)_{p,N} \quad V = \left(\frac{\partial G}{\partial p}\right)_{T,N}$ $\mu = \left(\frac{\partial G}{\partial N}\right)_{p,T}$	$\left(\frac{\partial S}{\partial p}\right)_{T,N} = -\left(\frac{\partial V}{\partial T}\right)_{p,N}$ $\left(\frac{\partial S}{\partial N}\right)_{p,T} = -\left(\frac{\partial \mu}{\partial T}\right)_{p,N}$ $\left(\frac{\partial V}{\partial N}\right)_{p,T} = \left(\frac{\partial \mu}{\partial p}\right)_{T,N}$
$\Phi(T,V,\mu)$ $= F - \mu N$	$d\Phi = -SdT - pdV - Nd\mu$	$-S = \left(\frac{\partial \Phi}{\partial T}\right)_{V,\mu} \quad -p = \left(\frac{\partial \Phi}{\partial V}\right)_{\mu,T}$ $-N = \left(\frac{\partial \Phi}{\partial \mu}\right)_{V,T}$	$\left(\frac{\partial S}{\partial V}\right)_{\mu,T} = \left(\frac{\partial p}{\partial T}\right)_{\mu,V}$ $\left(\frac{\partial S}{\partial \mu}\right)_{V,T} = \left(\frac{\partial N}{\partial T}\right)_{\mu,N}$ $\left(\frac{\partial p}{\partial \mu}\right)_{V,T} = \left(\frac{\partial N}{\partial V}\right)_{\mu,T}$