

$$S = S(T, V)$$

$$ds = \left(\frac{\partial s}{\partial T}\right)_V dT + \left(\frac{\partial s}{\partial V}\right)_T dV = \frac{C_V}{T} dT + \left(\frac{\partial p}{\partial T}\right)_V dV$$

$\rightarrow p = \frac{RT}{V} \Rightarrow \left(\frac{\partial p}{\partial T}\right)_V = \frac{R}{V}$

$$\mu = \frac{G}{n} = u - Ts + vP$$

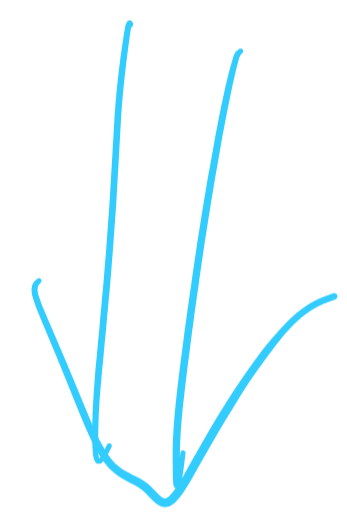
$$= C_V T + u_0 - Ts_0 - C_V T \ln(T) - RT \ln(V) + RT + \text{constant}$$

$$= C_P T - C_V T \ln(T) - RT \ln(V) - s_0 T + \text{constant}$$

$$ds = \left(\frac{\partial s}{\partial T}\right)_P dT + \left(\frac{\partial s}{\partial P}\right)_T dP$$

$$= \frac{C_P}{T} dT - \left(\frac{\partial v}{\partial T}\right)_P dP$$

$$= \frac{C_P}{T} dT - \frac{R}{P} dP$$



$$S - S_0 = C_P \ln T - R \ln P$$

$$\mu = \frac{G}{n} = u - Ts + vP$$

$$u - u_0 = C_V T$$

$$Pv = RT$$

$$\mu = C_V T + u_0 - C_P T \ln T - RT \ln P + s_0 T + RT$$

at constant T,  $C_V T + u_0 - C_P T \ln T + RT + s_0 T = \text{constant}$

$$\mu_0 = \text{constant} + RT \ln P_0$$

then 
$$\mu = \mu_0 + RT \ln \left(\frac{P}{P_0}\right)$$