Exercise 8-7

woensdag 20 mei 2020 20:45

$$g = RT \ln\left(\frac{P}{P_0}\right) - AP$$

$$A = A(T)$$

$$V = \left(\frac{\partial G}{\partial P}\right)_T \Rightarrow v = \left(\frac{\partial g}{\partial P}\right)_T$$

P_0 disappears, as it is the value of P at the starting time

$$v = \left(\frac{\partial g}{\partial P}\right)_T = RT\frac{1}{P} - A$$

$$v + A = \frac{RT}{P}$$

a) $P(v+A) = RT$ is the equation of state

b) specific entropy $\longrightarrow$ $S = -\left(\frac{\partial G}{\partial T}\right)_P = -R\ln(P) + \frac{dA}{dT}P$

c) specific Helmholtz function

$$\left.\begin{aligned} G &= U - TS + VP \\ F &= U - TS \end{aligned}\right] \rightarrow G = F + VP$$

$$f = g - vP$$

$$= RT\ln\left(\frac{P}{P_0}\right) - AP - vP$$

$$= RT\ln\left(\frac{P}{P_0}\right) - P(A+v)$$

$$= RT\ln\left(\frac{P}{P_0}\right) - RT$$

eq of state

$$= RT\left(\ln\left(\frac{P}{P_0}\right) - 1\right)$$