Solutions to Pathria's Statistical Mechanics Chapter 4

SM-at-THU

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Problem 4.1

Problem 4.5

We could know from 4.3.20:

$$S = kT(\frac{\partial q}{\partial T})_{z,V} - Nkln(z) + kq$$

We can know partial differential:

$$(\frac{\partial q}{\partial T})_{z,V} - (\frac{\partial q}{\partial T})_{\mu,V} = (\frac{\partial q}{\partial z})_{T,V}(\frac{\partial z}{\partial T})_{\mu,V}$$

$$(\frac{\partial q}{\partial z})_{T,V} = \frac{N}{z}$$

So we can infer that:

$$S = k[\frac{\partial (Tq)}{\partial T}]_{V,\mu}$$

Problem 4.15

According to Clausius-Clapeyron equation.And ignore the volume of solid phase.

$$\frac{dP_\sigma}{dT} = \frac{L}{TV}$$

Use the gas equation.

$$ln(p) = -\frac{L}{kT} + A$$

Use the triple point parameter.

$$ln(p) = -\frac{L}{kT} + 6.6 \times 10^{26}$$