Indian Institute of Technology Kanpur
ESO 201 A: Thermodynamics
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Tutorial- 12

Q.12-13

Verify the validity of the last Maxwell relation (Eq. 12-19) for refrigerant-134a at 50 °C and 0.7 MPa.

Q.12-16

Using the Maxwell relations, determine a relation for $\left(\partial s/\partial P\right)_T$, for a gas whose equation of state is P (v-b) = RT.

Q.12-19

Prove that $\left(\frac{\partial P}{\partial T}\right)_s = \frac{k}{k-1}\left(\frac{\partial P}{\partial T}\right)_v$.

Q.12-23

Using the Clapeyron equation, estimate the enthalpy of vaporization of steam at 300 kPa, and compare it to the tabulated value.

Homework-12

Q.12-49

Derive an expression for the isothermal compressibility of a substance whose equation of state is

$$P = \frac{RT}{v-b} - \frac{a}{v(v+b)T^{1/2}}$$

Where *a* and *b* are empirical constants.

Q.12-66

Demonstrate that the Joule-Thomson coefficient is given by $\mu = \frac{T^2}{c_p}\left[\frac{\partial\left(v/T\right)}{\partial T}\right]_P$