Assignment 12

Due on 2020-04-02, 23:59 EST.

The deadline for submitting this assignment has passed. As per our policies you have not submitted the assignment.

1. Find the Joule–Thomson relation

\[
\frac{\partial P}{\partial T} \bigg|_{\text{JT}} = \frac{\partial^2 H}{\partial P \partial T} \bigg|_{\text{JT}} = 0
\]

2. Show that the coefficient of thermal expansion \(\alpha\) and \(\gamma\), the isothermal compressibility, for \(\theta\) is

\[
\alpha = \frac{1}{\gamma}
\]

3. Show that the cross-section of thermal expansion can be a mathematical connection, thus

\[
\theta
\]

4. The heat of fusion function for a liquid phase of \(E\) is

\[
\Delta H_f
\]

5. The pressure is increased. Find the expression for \(P\)

\[
P = \frac{\Delta H_f}{\theta}
\]

6. Using the second relations, determine the relation between \(V\) and \(T\) for a gas where equation of state is

\[
P = \frac{\gamma}{\theta} \cdot \frac{RT^2}{\theta} = \frac{V}{\theta} \cdot \theta
\]

7. The pressure is increased. Find the relation for \(\theta\)

\[
\theta = \frac{\gamma}{\theta} \cdot \frac{RT^2}{\theta}
\]

8. The equation of state for a gas is given by \(PV = nRT\) at \(T\). Find the expression for the coefficient of thermal expansion for the gas

\[
\alpha = \frac{1}{\theta}
\]

9. The pressure is increased. Find the relation for \(\alpha\)

\[
\alpha = \frac{1}{\theta}
\]

10. Calculate the Joule–Thomson effect using an empirical transformation if the internal energy is given as \(\Delta U = \frac{1}{\theta} - \frac{1}{\theta^2} + 3\)

\[
\theta = \frac{1}{\theta}
\]

11. The ideal gas is decompressed. Find the relation for \(\theta\)

\[
\theta = \frac{1}{\theta}
\]

12. The Joule–Thomson coefficient is defined by \(\frac{\partial P}{\partial T} \bigg|_{\text{JT}} = \frac{\partial^2 H}{\partial P \partial T} \bigg|_{\text{JT}}\). Calculate the Joule–Thomson coefficient for an ideal gas

\[
\theta = \frac{1}{\theta}
\]