CHEM2011 office hours notes

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Test 1 notes

Terminology and cases

- **Isothermal** $\implies T \equiv const \implies w = -nRT\ln(\frac{V_2}{V_1}) = -nRT\ln(\frac{P_1}{P_2})$
- **Isobaric** $\implies P \equiv const \implies w = -P\Delta V$
- **Isochoric** $\implies V \equiv const \implies w = 0, \Delta U = q$
- **Adiabatic** $\implies q = 0 \implies \Delta U = w \implies T_1 P_1^{\frac{1-\gamma}{\gamma}} = T_2 P_2^{\frac{1-\gamma}{\gamma}}$

Definition of a state function and constants

- A function $f(x, y)$ is a state function if and only if the following property is satisfied::

$$\left(\frac{\left(\frac{\partial f}{\partial x}\right)_y}{\partial y}\right)_x = \left(\frac{\left(\frac{\partial f}{\partial x}\right)_y}{\partial y}\right)_x$$

- For monoatomic gases, $\bar{C_V} = \frac{3}{2}R$, $\bar{C_P} = \frac{5}{2}R$, $\gamma = \frac{\bar{C_P}}{\bar{C_V}} = \frac{5}{3}$
- For diatomic gases (assume no vib.),$\bar{C_V} = \frac{5}{2}R$, $\bar{C_P} = \frac{7}{2}R$, $\gamma = \frac{\bar{C_P}}{\bar{C_V}} = \frac{7}{5}$