Phys. 2C(8), 10/30/19

1. $C_V$ vs. $C_p$ → 2 responses
   - Advertisement for ch. 20

2. Adiabatic Processes → Definition/Conceptual Q's
   - Quantitatively

\[ C_p = C_v + R \]

\[ Q = n C_p \Delta T \quad \text{Q depends on path (given } \Delta T \text{)} \]
\[ Q = n C_v \Delta T \quad \text{(given } \Delta T \text{)} \]

$\Delta E_{\text{th}}$ doesn't depend on path

\[ \Delta E_{\text{th}} = Q_{\text{const. } V} = n C_v \Delta T \]

Values of $C_v$

- Monoatomic: $C_v = \frac{3}{2} R$
- Diatomic: $C_v = \frac{5}{2} R$ at room temp

\[ \Delta E_{\text{th}} = n C_v \Delta T \]

\[ \text{Any Process} \]

**Monday (Ch. 20)**
Two copies of the same amount of the same gas (A and B, w/ same number of moles) undergo processes A and B below. Which gas had more “heat delivered” to it? (remember, sloppy language!)

A) Gas A  
B) Gas B  
C) Same  
D) I dunno

In the previous problem, you saw gas B had more heat delivered. \((Q_B - Q_A) > 0\) is equal to the area underneath line B, \(W_{by}\) (why?). Find two formulae for this work, first in terms of pressure and \(\Delta V\), and second in terms of \(\Delta T\).
Adiabatic \((Q=0)\)

\[\Delta E_{\text{int}} = Q + W_{\text{in}}\]
\[\Delta E_{\text{int}} = Q - W_{\text{by}}\]
\[\Delta E_{\text{int}} = -W_{\text{by}}\]

- "Insulated"
- "Quickly"

Adiabatic

No heat exchange
11. The gas cylinder in FIGURE Q19.11 is well insulated on all sides. The piston can slide without friction. Many small masses on top of the piston are removed one by one until the total mass is reduced by 50%.

a. During this process, are (i) \( \Delta T \), (ii) \( W \), and (iii) \( Q \) greater than, less than, or equal to zero? Explain.

b. Draw a \( pV \) diagram showing the process.

\( Q = 0 \) (adiabatic)
A weather balloon is filled with helium and released. What kind of a process is approximated as the balloon rises in the air? Assume the balloon material is an excellent insulator.

A) Isobaric.
B) Isochoric
C) Isothermal.
D) Adiabatic.

In the pV diagram below, the gas does 7 J of work when taken along isotherm \( ab \) and 5 J when taken along adiabat \( bc \). For which of the three paths is the net heat added to the gas greatest?

A) \( a \) to \( b \)
B) \( b \) to \( c \)
C) \( a \) to \( c \)

ANS on FRIDAY!