
PHYS 1220 Group Work Sheet
Ideal gas heat capacity

With your group, discuss how to answer these questions and write your group answer in the space provided. Explain/show how you got your answer: don't just write down a number! (Especially not one without units!)

Some useful quantities:

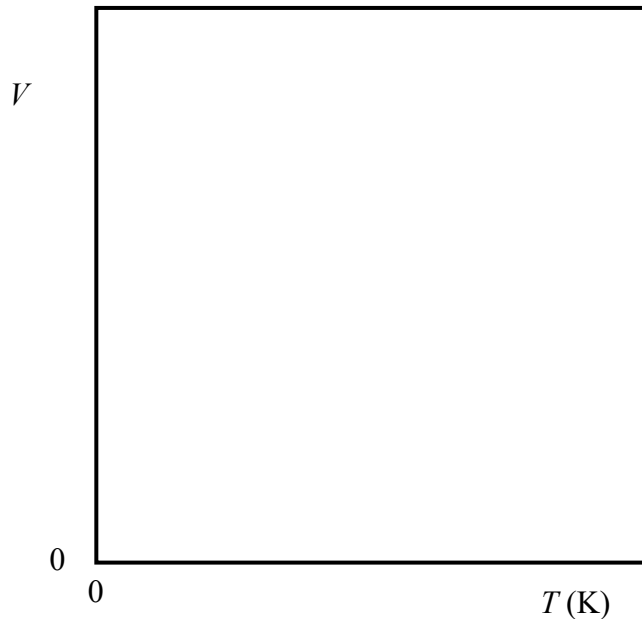
Avogadro's number $N_A = 6.0221 \times 10^{23}$

Boltzmann Constant $k_B = 1.380649 \times 10^{-23} \text{ J/K}$

Universal Gas constant $R = N_A k_B = 8.31446 \text{ J/(mol}\cdot\text{K)}$

1. At 300K, what is the rms speed of nitrogen (N_2) molecules?

2. What would isobars (lines of constant pressure) look like on a V - T plot for an ideal gas?
 - a. Sketch volume vs. temperature curves for several different pressures. Indicate on the plot which isobars correspond to high pressures and which to low pressures.

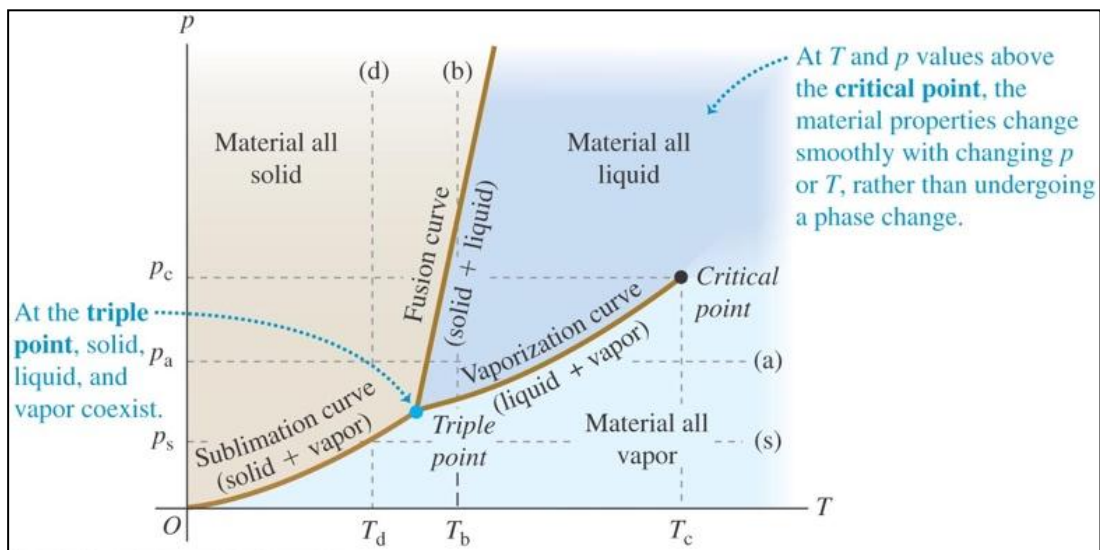


- b. How would the V - T curves change as the amount of gas n increases?

3. 20.0 liters of a monatomic ideal gas at 300 °C is heated to 325 °C.
- How much heat is required if the heating is at constant temperature?

- How much heat is required if the heating is at constant pressure?

2. Consider the generic P-T diagram below.



- Describe what happens to phases and volume raising the temperature from zero at a constant pressure below the triple point pressure.
- Describe what happens to phases and volume raising the temperature from zero at a constant pressure between the triple point pressure and the critical point pressure.
- What is the meaning of the positive slope of the fusion curve?
- What happens along a process crossing the vaporization curve by increasing the temperature from zero at constant pressure?
- What happens crossing the vaporization curve by raising the pressure from zero at a constant temperature?