Phys102 ~~(Sec~~ # 40) Quiz # 4 (Ch.19)

Name: Key ID #

1- *Three* moles of an ideal gas expands isothermally at 100 °C to *four* times its initial volume. Calculate the heat transferred during the process.

3

$$Q = W = nRT \ln \frac{V_f}{V_i}$$

$$= (3)(8.31)(373) \ln 4$$

$$= 12.9 \times 10^3 \text{ J}$$

2- A cylinder contains 4 moles of a diatomic ideal gas at a temperature of 27 °C and a pressure of 1.5 atm. The gas is heated under constant pressure until its temperature reaches 127 °C. How much work is done by the gas in this process?

3

$$W = P\Delta V = nR\Delta T$$

$$= (4)(8.31)(100)$$

$$= 3.3 \times 10^3 \text{ J}$$

3- One mole of a diatomic ideal gas is initially at a temperature of 127 °C and has a volume of 0.090 m^3. The gas is compressed adiabatically to a volume of 0.045 m^3. What is the final temperature?

4

$$T_i V_i^{\gamma-1} = T_f V_f^{\gamma-1}$$

$$\gamma = \frac{c_p}{c_v} = \frac{\frac{7}{2}R}{\frac{5}{2}R} = \frac{7}{5}$$

$$(127+273)(0.09)^{7/5-1} = T_f (0.045)^{7/5-1}$$

$$T_f = 400(2)^{0.4} = 527.8 \text{ K}$$

$$= 254.8 \text{ °C}$$