

Quiz #6
Name _____

Week: Oct. 3 -Oct. 5
Chemistry 331

Equations and constants:

$$R = 8.31 \text{ J/mol-K} = 0.08206 \text{ L-atm/mol-K}, \sigma = 5.67 \times 10^{-8} \text{ W/m}^2/\text{K}^4$$
$$\delta w = -PdV, dU = C_V dT, dH = C_V dT, dH = dU + PdV$$

$$W = \sigma T^4, \rho = \frac{8\pi h\nu^3}{c^3} \frac{1}{(e^{h\nu/kT} - 1)}, dU = \delta w, C_V = \frac{3}{2}nR$$

$$C_P = \frac{5}{2}nR, \frac{T_2}{T_1} = \left(\frac{V_1}{V_2}\right)^{2/3}, \frac{P_2}{P_1} = \left(\frac{V_1}{V_2}\right)^{5/3}, \frac{T_2}{T_1} = \left(\frac{P_2}{P_1}\right)^{2/5}$$

1. Compare the work done for four paths for an expansion an ideal monatomic gas from an initial pressure of 800 atm and volume of 0.2 L to a final pressure of 10 atm
 - a. what is the reversible work done at 450 K (4 points)?

number of moles of gas = _____.

work of reversible expansion = _____ (Joules)

- b. what is the work done for a constant pressure expansion against 10 atm at 450 K? (4 points)

work of constant P expansion = _____ (L-atm).

work of constant P expansion = _____ (Joules).

- c. what is the work adiabatic work starting at 450 K (4 points)?

The temperature difference is = _____.

The work of adiabatic expansions is = _____.

2. Water is placed a parabolic bowl that can radiate to the night sky.
- How much heat is lost due to radiation in 1 hour at night assuming that the surface area of the water is 0.1 m^2 and temperature is 293 K (4 points)?

Heat lost due to radiation = _____.

- What is the temperature drop if the volume of the solution is 2 liters?
($C_p = 4.184 \text{ kJ/kg-K}$ for water) (4 points)

Temperature drop = _____.

P.S. If you do not get part a. then just assume that the amount of energy lost is 100 kJ. NOTE: this is not the right answer for part a.