Phys102 (~~Sec # 42~~) Quiz # 4 (Ch.19)

Name: (Key) ID #

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1- Consider 100 g of helium (He) gas at 77 K. How much heat energy must be supplied to the gas to increase its temperature to 24 degrees-C, if the process is isovolumetric? (M(He) = 4 g/mole and He is a monatomic gas.)

$Q = n C_v \Delta T$

$= (25)(\frac{3}{2}R)(220)$

$= 6.9 \times 10^4$ J

$n = \frac{m}{M} = \frac{100}{4} = 25$ mol

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2- One mole of a monatomic ideal gas is initially at a temperature of 300 K and with a volume of 0.080 m^3. The gas is compressed adiabatically to a volume of 0.040 m^3. What is the final temperature?

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

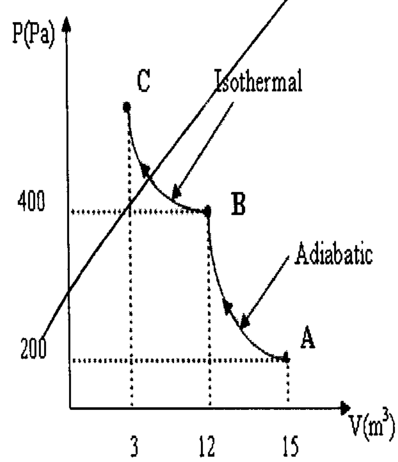
$(300)(0.08)^{0.67} = T_f (0.04)^{0.67}$

$T_f = 300 (2)^{0.67} = 477$ K

$\gamma = \frac{C_p}{C_v} = \frac{\frac{5}{2}R}{\frac{3}{2}R} = \frac{5}{3}$

$\gamma - 1 = 0.67$

3- Two moles of an ideal monatomic gas are compressed adiabatically from A to B and then further compressed isothermally from B to C as shown in the figure. Calculate the net work done in the process from A to C.



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