Ph202H/212H
W09 Homework – due Monday, February 2, 2009

1. A sample of gas expands from 1.0 to 5.0 m^3 while its pressure decreases from 15 to 5 Pa. Sketch the following processes on a PV diagram and calculate the work done on the gas by each process. (a) a constant pressure process followed by a constant volume process; (b) a constant volume process followed by a constant pressure process; (c) a direct, straight-line process from the initial *P,V* to the final *P,V*.

2. Calculate the work done by an external agent in compressing 1.12 mole of oxygen from a volume of 22.4 L and 1.32 atm pressure to 15.3 L at constant temperature.

Ans: 1.14kJ

3. Let 20.9 J of heat be added to a particular ideal gas. As a result, its volume changes from 63.0 to 113 cm^3 while the pressure remains constant at 1.00 atm. (a) By how much does the internal energy of the gas change? (b) If the quantity of gas present is 2.00×10^{-3} mole, find the molar heat capacity at constant pressure. (c) Find the molar heat capacity at constant volume.

Ans: (b) 34.4 J/mol•K

4. An engine carries 1.00 mole of an ideal monatomic gas around the following cycle: from *A* (where $T = 300$ K) at constant volume to *B* ($T = 600$ K), then adiabatically to *C* ($T = 455$ K), then at constant pressure back to *A*. For each process and for the cycle as a whole, find the heat transfer, work done on the gas, and change in internal energy.

Ans: $W_{BC} = -1810$ J