

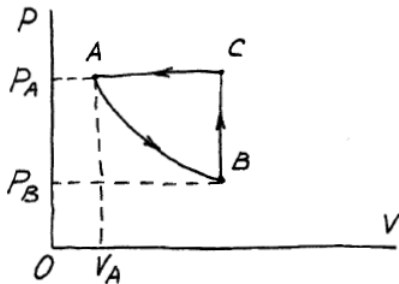
PHYS-430 RECITATIN 4

1-) (a) Starting from $dE = TdS - PdV$, show that the equation of state $PV = NkBT$, in fact implies that E can only depend on T .

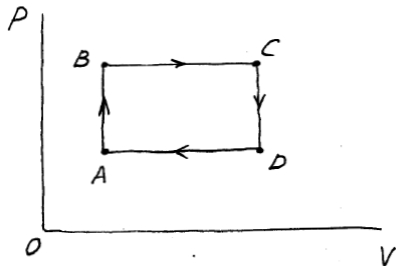
(b) What is the most general equation of state consistent with an internal energy that depends only on temperature?

2.) Calculate the average volume per molecule for an ideal gas at room temperature and atmospheric pressure and average distance between the molecules. Compare this distance with the size of the molecule.

3.) One mole of an ideal gas performs as a process (shown in the picture) which consists of the isothermal part (AB), isochoric part (BC) and isobaric part (CA). Assuming that the volume at the point A is known, V_A , as well as the values of pressure at A and B, P_A and P_B respectively. Find the temperature at the point C.



4.) Ideal gas performs a process shown in the picture below in the P-V coordinates. Draw this process in the P-T coordinates.



5.) The Joule ideal gas cycle for a monatomic ideal gas is shown below. Find the engine efficiency for this cycle in terms of P_1 and P_2 .

