Name_____

1. Calculate the transition frequencies in cm^{-1} for the Lyman series with n'=4 and for the Balmer series with n'=5. What is the energy of the photons of these transitions.

2.) Which of the following molecules have a dipole moment and why?

HF, H_2CO, H_2S, CO_2, N_2O, O_2, F_2, C_6H_6

3) Given the following frequencies for $H^{35}Cl$ transitions calculate the B rotational constant and the equilibrium internuclear separation.

J"→ J'	E / cm^{-1}
0→1	20.87827
1→2	41.74388
2→3	62.58417
3→4	83.38649
4→5	104.13829
5→6	124.82697

4. Calculate the number of revolutions per second that a HCl molecule undergoes when in the (a) J=0 state and (b) the J=3 state.(Remember that ω is in radians per second.)