**CHM102**

**Assignment 4 (18-2-2017)**

1. If the vibrational frequency of the H2 molecule is 4000 cm-1, what is its frequency in units of Hz.

b) What is the force constant for the H-H bond?

1. What is the vibrational frequency of the i) the D2 molecule and ii) HD molecule.  
   (The force constant for the D2 and HD are the same as the force constant of H2.)

1. What is the zero point energy for the three molecules: H2, D2 and HD?
2. Identify which of the three species has the smallest zero point energy; the heaviest or the lightest?
3. The vibrational frequency of the C-O oscillator is 1030 cm-1. What is the force constant for this oscillator. Does a smaller force vibrational frequency always signify a smaller force constant? Justify.