Problem Solving Session 7

Problem:

The molar constant pressure heat capacity, $\tilde{C}_p$, has been measured for four different gases at 298 K and 1 bar and the following results obtained (in units of R):

He	Ne	H_2	H_2O
2.50	2.50	3.47	4.04

(a) Use the equipartition principle and ideal gas approximation holds to predict the molar heat capacity of the four gases.

(b) Revise your prediction from (a) by skipping the contribution of vibration as is appropriate if the temperature is low compared with $\hbar\omega/k_B$.

(c) Compare the two predictions from parts (a) and (b) for each of the four gases to the experimental results listed above. Which prediction is closer to the measurement? Explain.