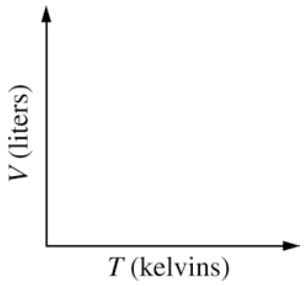
8. Answer the following questions about carbon monoxide, $CO(g)$, and carbon dioxide, $CO_2(g)$. Assume that both gases exhibit ideal behavior.

   (a) Draw the complete Lewis structure (electron-dot diagram) for the CO molecule and for the CO_2 molecule.

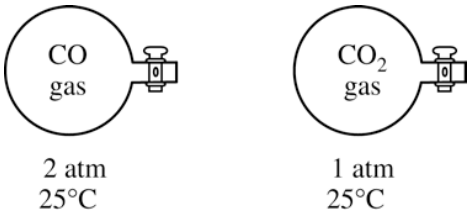
   (b) Identify the shape of the CO_2 molecule.

   (c) One of the two gases dissolves readily in water to form a solution with a pH below 7. Identify the gas and account for this observation by writing a chemical equation.

   (d) A 1.0 mole sample of $CO(g)$ is heated at constant pressure. On the graph below, sketch the expected plot of volume versus temperature as the gas is heated.



   (e) Samples of $CO(g)$ and $CO_2(g)$ are placed in 1 L containers at the conditions indicated in the diagram below.



   (i) Indicate whether the average kinetic energy of the $CO_2(g)$ molecules is greater than, equal to, or less than the average kinetic energy of the $CO(g)$ molecules. Justify your answer.

   (ii) Indicate whether the root-mean-square speed of the $CO_2(g)$ molecules is greater than, equal to, or less than the root-mean-square speed of the $CO(g)$ molecules. Justify your answer.

   (iii) Indicate whether the number of $CO_2(g)$ molecules is greater than, equal to, or less than the number of $CO(g)$ molecules. Justify your answer.

END OF EXAMINATION