Name: ____________________________  February 5, 2004

General Chemistry II  Quiz 1

\[ R = 0.08206 \frac{L \cdot \text{atm}}{\text{mol} \cdot \text{K}} = 8.314 \frac{J}{\text{mol} \cdot \text{K}} \]

\[ \ln \left( \frac{P_2}{P_1} \right) = \frac{\Delta H_{\text{vap}}}{R} \left( \frac{1}{T_1} - \frac{1}{T_2} \right) \]

1. Which one of the following substances should exhibit hydrogen bonding in the liquid state? (1 pt.)
   A. \( \text{PH}_3 \)  B. \( \text{H}_2 \)  C. \( \text{H}_2\text{S} \)  D. \( \text{CH}_4 \)  E. \( \text{NH}_3 \)

2. Classify the kinds of solids formed as molecular, covalent network, ionic, or metallic? (8 pt.)
   \( \text{SiO}_2 \) covalent network  \( \text{I}_2 \) molecular  
   \( \text{K} \) metallic  \( \text{CaCl}_2 \) ionic

3. Use the graph of vapor pressure to determine the normal boiling point of \( \text{O}_2 \). (2 pt.)

![Graph of vapor pressure against temperature]

Normal boiling point is the boiling point at one atmosphere pressure. This corresponds to a temperature of 90 K.

4. Identify the dominant (strongest) type of intermolecular force present in each of the following compounds. (8 pt.)
   a. \( \text{RbCl(s)} \)  Ionic  
   b. \( \text{H}_2\text{S(g)} \)  dipole-dipole  
   c. \( \text{NH}_3(l) \)  Hydrogen bonding  
   d. \( \text{Cl}_2(l) \)  Dispersion

5. Which of the following liquids would make a good solvent for iodine, \( \text{I}_2 \)? (1 pt.)
   A. \( \text{HCl} \)  B. \( \text{H}_2\text{O} \)  C. \( \text{CH}_3\text{OH} \)  D. \( \text{NH}_3 \)  E. \( \text{C}_6\text{H}_6 \)

6. What is the molarity of a solution that is 26.0% by mass phosphoric acid (\( \text{H}_3\text{PO}_4 \)) and that has a density of 1.155 g/mL? (5 pt.)

\[
\frac{1.155 \text{ g/mL} \times 1000 \text{ mL}}{L} = 1155 \frac{g}{L} \quad 1155 \frac{g}{L} \times 0.26 = 300.3 \frac{g \text{H}_3\text{PO}_4}{L} \\
300.3 \frac{g \text{H}_3\text{PO}_4}{L} \times \frac{1 \text{ mol H}_3\text{PO}_4}{97.99 \text{ g H}_3\text{PO}_4} = 3.064 \frac{\text{mol H}_3\text{PO}_4}{L}
\]