1. How many valence electrons do the following atoms or ions have?
   a) Carbon atom \( \frac{4}{4} \)
   b) Phosphorus atom \( \frac{5}{5} \)
   d) Calcium ion (Ca\(^{2+}\)) \( \frac{8}{0} \)
   e) Fluoride ion (F\(^{-}\)) \( \frac{8}{8} \)

2. Draw the Lewis structure of water.
   \[
   \begin{array}{c}
   \text{H} \\
   \text{O} \\
   \text{H}
   \end{array}
   \]

3. Draw the Lewis structure of 1,1-dichloroethane.
   \[
   \begin{array}{c}
   \text{Cl} \\
   \text{C} \\
   \text{Cl} \\
   \text{C} \\
   \text{H} \\
   \text{H}
   \end{array}
   \]

4. The pKa of HCN is 10 and the pKa of acetic acid is 5. Which is a stronger base cyanide anion or acetate anion?
   \[
   \text{C} \equiv \text{N}^-
   \]

5. Give an example of a carbon compound containing a \( \pi \) bond. Circle the \( \pi \) bond. What kind of atomic orbitals are used in \( \pi \) bonding?
   \[
   \begin{array}{c}
   \text{H} \\
   \text{C} \\
   \text{H}
   \end{array}
   \]

6. What is the oxidation number of Mn in KMnO\(_4\)?
   \[
   \begin{array}{c}
   \text{Mn} \\
   +7
   \end{array}
   \]

7. Complete the following acid-base equations.
   a) \( 2 \text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow 2 \text{H}_2\text{O} + 2\text{Na}^+ + \text{SO}_4^{2-} \) or \( (\text{Na}_2\text{SO}_4) \)
   b) \( \text{NaH}_2\text{PO}_4 + \text{HBr} \rightarrow \text{H}_3\text{PO}_4 + \text{Na}^+ + \text{Br}^- \) or \( (\text{NaBr}) \)

8. What is the pH of 0.1 M HCl solution in water?
   \[
   \rho \text{H} = -\log [\text{H}^+] = -\log 10^{-1} = -(-1) = 1
   \]

9. The equilibrium constant for the following reaction is 99. What is the percentage of A present at equilibrium?
   \[
   \frac{\text{B}}{\text{A}} = \frac{99}{1}
   \]
   \[
   \% \text{A} = \frac{1}{99+1} \times 100 = 1\%
   \]