7th Grade CHEMISTRY Quiz #7 Study Guide / Practice Sheet
Quiz date: Tuesday May 7th, 2019 (all elements)

Molarity

1. Molarity is defined by the \( \text{moles of solute} \) per \( \text{liters of solution} \).

2. If you're making a 2.3 M solution of KCl in a 200 mL volumetric flask, what is the mass of KCl needed?

\[
2.3 \text{ M} = \frac{x \text{ mol}}{0.200 \text{ L}}
\]

\[
x = 0.46 \text{ mol KCl}
\]

\[
0.46 \text{ mol KCl} \times \frac{74.559 \text{ g KCl}}{1 \text{ mol KCl}} = 34.293 \text{ g KCl}
\]

3. The typical concentration of vinegar to be 0.839 M. What volume of vinegar contains 75.6 g of acetic acid?

\[
0.839 \text{ M} = \frac{1.26 \text{ mol}}{x \text{ L}}
\]

\[
x = 1.50 \text{ L vinegar}
\]

\[
75.6 \text{ g H}_2\text{C}_2\text{H}_3\text{O}_2 \times \frac{1 \text{ mol H}_2\text{C}_2\text{H}_3\text{O}_2}{60.052 \text{ g H}_2\text{C}_2\text{H}_3\text{O}_2} = 1.26 \text{ mol H}_2\text{C}_2\text{H}_3\text{O}_2
\]

4. How many grams of NaCl are contained in 0.250 L of a 5.30 M solution?

\[
5.30 \text{ M} = \frac{x \text{ mol}}{0.250 \text{ L}}
\]

\[
x = 1.33 \text{ mol NaCl}
\]

\[
1.33 \text{ mol NaCl} \times \frac{58.44 \text{ g NaCl}}{1 \text{ mol NaCl}} = 77.725 \text{ g NaCl}
\]

Dilution problems \( (M_1V_1 = M_2V_2 \text{ where } M \text{ is molarity and } V \text{ is volume in L}) \)

1. If 0.850 L of a 5.00 M solution of copper nitrate, \( \text{Cu(NO}_3\text{)}_2 \), is diluted to a volume of 1.80 L by the addition of water, what is the molarity of the diluted solution?

\[
5.00 \text{ M} \times 0.850 \text{ L} = M_2 \times 1.80 \text{ L}
\]

\[
M_2 = \frac{2.36 \text{ M}}{}
\]

2. From a bottle of 3.0 M HCl, you pipet out 67.4 mL and add to an empty flask. Water is then added for final volume of 250 mL. What is the concentration of this new solution?

\[
3.0 \text{ M} \times 0.0674 \text{ L} = M_2 \times 0.250 \text{ L}
\]

\[
M_2 = \frac{0.81 \text{ M}}{}
\]

3. What volume of 0.12 M HBr can be prepared from 11 mL (0.011 L) of 0.45 M HBr?

\[
0.45 \text{ M} \times 0.011 \text{ L} = 0.12 \text{ M} \times V_2
\]

\[
V_2 = 0.04125 \text{ L}
\]

4. What volume of 1.59 M KOH is required to prepare 5.00 L of 0.100 M KOH?

\[
1.59 \text{ M} \times V_1 = 0.100 \text{ M} \times 5.00 \text{ L}
\]

\[
V_1 = 0.314465 \text{ L}
\]
Synthesis reactions
1. Synthesis reactions have \textbf{multiple (simple)} reactant(s) and \textbf{one (complex)} product(s).
2. Predict the reactants or products of binary compound synthesis reactions. You don’t have to add coefficients but you must write proper chemical formulas.
   a. \( \text{Mg} + \text{O}_2 \rightarrow \text{MgO} \)
   b. \( \text{N}_2 + \text{H}_2 \rightarrow \text{NH}_3 \)
   c. \( \text{K} + \text{Cl}_2 \rightarrow \text{KCl} \)
   d. \( \text{Rb} + \text{F}_2 \rightarrow \text{RbF} \)

Decomposition reactions
1. Decomposition reactions have \textbf{one} reactant(s) and \textbf{multiple} product(s).
2. Predict the products of each decomposition reaction. You don’t have to add coefficients but you must write proper chemical formulas.
   a. \( \text{BaCO}_3 \rightarrow \text{CO}_2 + \text{BaO} \)
   b. \( \text{Mg(ClO}_3)_2 \rightarrow \text{O}_2 + \text{MgCl}_2 \)
   c. \( \text{NaOH} \rightarrow \text{H}_2\text{O} + \text{Na}_2\text{O} \)
   d. \( \text{CsCl} \rightarrow \text{Cs} + \text{Cl}_2 \)
   e. \( \text{Mg(OH)}_2 \rightarrow \text{H}_2\text{O} + \text{MgO} \)
   f. \( \text{CaCO}_3 \rightarrow \text{CO}_2 + \text{CaO} \)
   g. \( \text{LiClO}_3 \rightarrow \text{O}_2 + \text{LiCl} \)
   h. \( \text{H}_2\text{O} \rightarrow \text{H}_2 + \text{O}_2 \)

Precipitation reactions
1. Precipitation reactions involve the mixing of two solutions to produce an insoluble product.
2. The insoluble product is called a precipitate and its phase is \textbf{solid} in water.
3. Soluble salts include ammonium, nitrate, alkali metal salts and their phase is \textbf{aqueous} in water.
4. Predict whether each salt is soluble or insoluble. Then write the phase it would be if mixed with water.
   a. \( \text{Cd(NO}_3)_2 (aq) \quad \text{soluble} \)
   b. \( \text{PbCl}_2 (s) \quad \text{insoluble} \)
   c. \( \text{BaSO}_4 (s) \quad \text{insoluble} \)
   d. \( \text{Na}_2\text{CO}_3 (aq) \quad \text{soluble} \)
   e. \( \text{NH}_4\text{Cl} (aq) \quad \text{soluble} \)
   f. \( \text{MgCO}_3 (s) \quad \text{insoluble} \)
5. Determine the phases for each product and then balance each molecular equation. Then write total ionic equations.
   a. \( \text{BaCl}_2 (aq) + 2\text{AgNO}_3 (aq) \rightarrow 2\text{AgCl} (s) + \text{Ba(NO}_3)_2 (aq) \)

   \( \text{FYI (not on quiz): spectator ions are highlighted.} \)

   b. \( 2\text{Kl} (aq) + \text{Pb(NO}_3)_2 (aq) \rightarrow 2\text{KNO}_3 (aq) + \text{PbI}_2 (s) \)

   \( 2\text{K}^+(aq) + 2\text{I}^-(aq) + \text{Pb}^{2+}(aq) + 2\text{NO}_3^-(aq) \rightarrow 2\text{K}^+(aq) + 2\text{NO}_3^-(aq) + \text{PbI}_2(s) \)