Chemistry
Assessment #12: Stoichiometry and Limiting Reagents PRACTICE

For each of the following questions or statements, select the most appropriate response and write its letter on the answer line:

_____ 1. In a small-scale experiment, 29.3 g of silver nitrate in solution is reacted with excess copper wire:

    \[ 2 \text{AgNO}_3 + \text{Cu} \rightarrow \text{Cu(NO}_3)_2 + 2 \text{Ag} \]

How much copper (II) nitrate can theoretically be formed in this reaction?
A. 5.5 g
B. 16.2 g
C. 32.3 g
D. 64.7 g

_____ 2. Mercury (I) carbonate will break down when exposed to heat:

    \[ \text{Hg}_2\text{CO}_3 \rightarrow \text{Hg}_2\text{O} + \text{CO}_2 \]

How much product will be formed when 2.50 g of reactant is decomposed?
A. 0.0977 g \text{Hg}_2\text{O}
B. 1.17 g \text{Hg}_2\text{O}
C. 2.26 g \text{Hg}_2\text{O}
D. 4.00 g \text{Hg}_2\text{O}

_____ 3. Tetraphosphorus decoxide combines with water to form phosphoric acid in the following unbalanced chemical equation:

    \[ \text{P}_4\text{O}_{10} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_4 \]

In order to form 100.0 g phosphoric acid, how much tetraphosphorus decoxide will you need?
A. 72.42 g
B. 138.1 g
C. 262.6 g
D. 289.7 g

_____ 4. When placed in lead (II) sulfate solution, magnesium reacts to form magnesium sulfate and lead. How much lead (II) sulfate would be required to react with 327.0 g magnesium?
A. 1619 g
B. 2788 g
C. 4080 g
D. 6868 g
5. A propane grill on a backyard patio is left burning for too long and eventually goes out. Which of the following chemicals is the limiting reagent?
   A. carbon dioxide
   B. oxygen gas
   C. propane
   D. water vapor

6. Like most alkali metals, potassium reacts with water to form basic potassium hydroxide and hydrogen gas:

   \[ 2 \text{K} + 2 \text{H}_2\text{O} \rightarrow 2 \text{KOH} + \text{H}_2 \]

   How much hydrogen gas will be formed by reacting 125 g potassium with 65 g water?
   A. 1.61 g
   B. 3.22 g
   C. 3.64 g
   D. 6.44 g

7. Consider the following combustion reaction:

   \[ \text{C}_3\text{H}_8 \text{(g)} + 5 \text{O}_2 \text{(g)} \rightarrow 3 \text{CO}_2 \text{(g)} + 4 \text{H}_2\text{O} \text{(g)} \]

   At STP, reacting 64.4 L of propane with 87.0 L of oxygen gas will produce:
   A. 39.2 L H\text{2}O
   B. 69.6 L H\text{2}O
   C. 105 L H\text{2}O
   D. 258 L H\text{2}O

8. Nitric acid can be neutralized by any base to form a salt and water, as in the following equation:

   \[ \text{Mg(OH)}_2 + 2 \text{HNO}_3 \rightarrow \text{Mg(NO}_3)_2 + 2 \text{H}_2\text{O} \]

   How much magnesium nitrate salt will be formed by the reaction of 250. g magnesium hydroxide with 250. g nitric acid?
   A. 147 g
   B. 294 g
   C. 318 g
   D. 636 g

9. How many grams of titanium (IV) oxide can be produced when 80 g of TiCl\text{4} reacts with 20 g O\text{2} as shown in the following unbalanced equation?

   \[ \text{TiCl}_4 \text{(s)} + \text{O}_2 \text{(g)} \rightarrow \text{TiO}_2 \text{(s)} + \text{Cl}_2 \text{(g)} \]

   A. 34 g
   B. 50 g
   C. 88 g
   D. 130 g
10. The following chemical equation represents a reaction that we will do in the lab next quarter:

\[ \text{Mg (s) + 2 HCl (aq) \rightarrow MgCl}_2 \text{ (aq) + H}_2 \text{ (aq)} \]

How many grams of excess reagent will be left over when 6.00 g of HCl reacts with 5.00 g of Mg? (hint: determine the limiting reagent first by converting to either product, then calculate how much of the excess reagent was actually used, then find the difference)

A. 1.00 g  
B. 2.00 g  
C. 3.00 g  
D. 4.00 g
Answers:
1. B
2. C
3. A
4. C
5. C
6. B
7. B
8. B
9. A
10. C