CST Review Name_____

Topic 4- Conservation of Matter and Stoichiometry Date_____ Per_____

1. Write a balanced chemical equation for each reaction below, and then identify the type of reaction: synthesis, decomposition, single replacement, double replacement, combustion.
   a) sodium carbonate + calcium hydroxide yields sodium hydroxide + calcium carbonate
   b) aluminum + sulfuric acid yields aluminum sulfate + hydrogen
   c) potassium oxide + water yields potassium hydroxide
   d) calcium carbonate yields calcium oxide + carbon dioxide
   e) methane + oxygen gas yields water + carbon dioxide
2. Define "1 mole".
3. Convert 15.45 g $Cu(CN)_2$ to mol.
4. Convert 135.8 g CH_4 to molecules.
5. Convert 85.0 L chlorine gas to grams (at STP).
6. Convert 3.33×10^{22} molecules oxygen gas to liters at STP.
7. Carbon dioxide, CO_2, is produced in the reaction between calcium carbonate, $CaCO_3$, and hydrochloric acid, HCl.

   $$CaCO_3 + 2HCl \rightarrow CO_2 + CaCl_2 + H_2O$$

   a) How many g of calcium carbonate would be needed to react completely with 15.0 g of hydrochloric acid?
   b) How many g of carbon dioxide is produced when 5.50 mol of hydrochloric acid reacts with calcium carbonate?
   c) How many molecules of carbon dioxide are produced when 10.0 g of calcium carbonate reacts with hydrochloric acid?
8. Zinc metal reacts with sulfuric acid to produce hydrogen gas and zinc (II) sulfate, $ZnSO_4$. Obtain a balanced chemical equation and then answer the following questions. (Hint: Sulfuric acid is one of your elementary knowledge acids you should have memorized and hydrogen is a diatomic molecule—HOFBrINCl).
   a) What volume of hydrogen gas can be produced when 25.50 g of zinc metal reacts with sulfuric acid at STP?
   b) How many atoms of zinc are needed to react if 20.0 L of hydrogen gas is produced at STP?
   c) How many g of zinc are needed to react with 100.0 g of sulfuric acid?
9. Calcium oxide is prepared by heating calcium in oxygen: $2Ca + O_2 \rightarrow 2CaO$
   a) How many g of calcium would be needed to make 14.5 g of calcium oxide?
   b) How many molecules of oxygen are needed to produce 4.50 mol of calcium oxide?