Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Styrene is an organic molecule that is used as a building block for many polymers (like polystyrene). The molecular formula for styrene is C8H8.
   1. What is the molecular weight of styrene?
   2. What is the mass of 1.000 mole of styrene?
   3. What is the mass of 1.54 mole of styrene?
   4. How many moles in 9.67 kg of styrene?
   5. How many moles in 84.6 mg of styrene?
2. Solid sulphur and oxygen gas react together to produce sulphur trioxide gas.
3. Write the equation for the reaction and balance the equation.
4. What type of reaction is it?
5. What mass of sulphur trioxide is produced if 2.10g of sulphur reacts?
6. The white limestone cliffs of Dover, England, contain a large percentage of calcium carbonate (CaCO3). A sample of limestone with a mass of 84.4 g reacts with an excess of hydrochloric acid to form calcium chloride, water and carbon dioxide.
   1. Write the balanced chemical equation for this reaction.
   2. How much calcium chloride should be formed from the sample.
   3. If 81.8 g of calcium chloride were actually formed, what was the percentage yield?
7. How many moles of oxygen atoms are in 1.1 moles of KMnO4?
8. According to the balanced chemical equation, nitrogen and hydrogen react to produce ammonia gas (NH3). How many grams of hydrogen are required to react completely with 17.00g of nitrogen?
9. What mass of sodium oxide is produced by the reaction of 1.44g of sodium with an excess of oxygen?
10. What volume (at STP) of carbon monoxide is required to produce 100.0 g of iron according to the equation: Fe2O3 + 3CO 🡪 2Fe + 3CO2
11. When solid carbon combusts with oxygen gas it produces carbon dioxide gas. (a) How many grams of carbon can be completely burned in 15.0 L of oxygen@ STP?   
    (b) How many litres of carbon dioxide gas (at STP) are produced in this reaction?

**Answers:**

1. a) 104.14432 g/mol

b) 104.14432 g/mol

c) 160. g styrene

d) 92.9 mol styrene

e) 8.12 x 10-4 mol styrene

1. A) 2S(s) + 3O2(g) 🡪 2SO3(g)

b) synthesis/combination

c) 5.24 g SO3 gas

1. A) CaCO3 (s) + 2HCl (aq) 🡪 CaCl2 (s) + H2O (l) + CO2 (g)

b) 93.6 g calcium chloride

c) 87.4 % yield

1. 4.4 mol of oxygen atoms
2. 3.67 g hydrogen
3. 1.94 grams sodium oxide
4. 60.16 L carbon dioxide
5. a) 8.04 g carbon

b) 15.0 L carbon dioxide