Unit 7 Worksheet 1: Mole relationships

For each of the problems below:
a. Write the balanced chemical equation
b. Identify what is given (with units) and what you want to find (with units)
c. Use coefficients from balanced equation to determine mole ratio.
d. Show set up (organize it!).

1. Hydrogen sulfide gas, which smells like rotten eggs, burns in air to produce sulfur dioxide and water. How many moles of oxygen gas would be needed to completely burn 8 moles of hydrogen sulfide?

   Equation: ___ $H_2S_{(g)}$ + ___ $O_{2\ (g)}$ → ___ $SO_{2(g)}$ + ___ $H_2O_{(g)}$

   Before: ___   ___   ___   ___

   Change   ___   ___   ___   ___

   _____

   After   ___   ___   ___   ___

2. Propane, C_3H_8, burns in air to form carbon dioxide and water. If 12 moles of carbon dioxide are formed, how many moles of propane were burned?

   Equation:

   Before:

   Change

   _____
   After

3. Ammonia, NH_3, for fertilizer is made by causing hydrogen and nitrogen to react at high temperature and pressure. How many moles of ammonia can be made from 0.15 moles of nitrogen gas?

   Equation:

   Before:

   Change

   _____
   After

4. The poison gas phosgene, $COCl_2$, reacts with water in the lungs to form hydrochloric acid and carbon dioxide. How many moles of hydrochloric acid would be formed by 0.835 moles of phosgene?
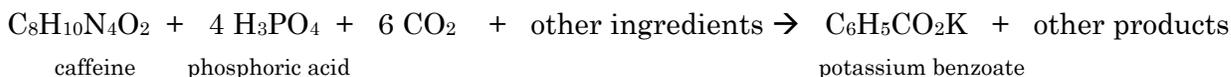
   Equation:

   Before:

   Change
   _____
   After

5. Iron metal and oxygen combine to form the magnetic oxide of iron, Fe_3O_4. How many moles of iron can be converted to magnetite by 8.80 moles of pure oxygen? (make your BCA table)

   How many moles of iron oxide would be produced?

6. The recipe for Coca-Cola Classic is a closely guarded secret. Researchers outside the company believe the flavoring mixture, known as "7X", contains oils of orange, lemon, nutmeg, cinnamon, and coriander. The original mixture also contained caffeine, vanilla, caramel, lime juice, sugar or artificial sweetener, and citric acid.
   Over the years, the recipe has changed. For example, the original recipe contained citric acid but this was combined with phosphoric acid to cut production costs. Corn syrup replaced sugar for the same reason.

   $C_8H_{10}N_4O_2$ + 4 H_3PO_4 + 6 CO_2 + other ingredients → $C_6H_5CO_2K$ + other products
      caffeine   phosphoric acid   potassium benzoate

   To produce 1000 cans of Coca-Cola Classic, 40g (0.21 moles) of caffeine are reacted with phosphoric acid and other ingredients. How many moles of phosphoric acid are required? How many moles of carbon dioxide are required?