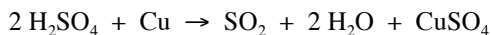


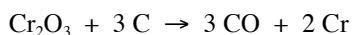
Be sure to show all work, use the correct number of significant figures, circle final answers and use correct units in all problems.
ANSWERS appear in BOLD.

1. The reaction of sulfuric acid with elemental copper produces sulfur dioxide, water, and copper(II) sulfate. How many grams of water will be produced if 6.000×10^9 molecules of sulfur dioxide are created? (5 points)



$$6.000 \times 10^9 \text{ molecules} * (\text{mol SO}_2 / 6.022 \times 10^{23} \text{ molecules}) * (2 \text{ mol H}_2\text{O} / 1 \text{ mol SO}_2) * (18.02 \text{ g} / \text{mol H}_2\text{O}) = 3.591 \times 10^{-13} \text{ g H}_2\text{O}$$

2. A mixture of excess chromium(III) oxide and 5.00 g of carbon is used to create elemental chromium and carbon monoxide. What is the theoretical yield of chromium in grams? (5 points)

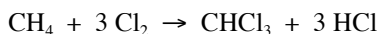


$$5.00 \text{ g C} * (\text{mol C} / 12.01 \text{ g C}) * (2 \text{ mol Cr} / 3 \text{ mol C}) * (52.00 \text{ g} / \text{mol Cr}) = 14.4 \text{ g Cr}$$

3. Using the information in problem #2, above, calculate the percent yield for the reaction if 2.17 g of chromium are actually produced. (4 points)

$$\% \text{ yield} = (2.17 \text{ g} / 14.4 \text{ g}) * 100\% = 15.1\%$$

4. Chlorine reacts with methane (CH_4) to yield chloroform (CHCl_3) and hydrochloric acid. How many grams of chloroform are formed from a reaction mixture containing 50.0 g of chlorine and 50.0 g of methane? (6 points)



$$50.0 \text{ g Cl}_2 * (\text{mol Cl}_2 / 71.0 \text{ g}) * (1 \text{ mol CH}_4 / 3 \text{ mol Cl}_2) * (16.0 \text{ g CH}_4 / \text{mol}) = 3.76 \text{ g CH}_4$$

More CH_4 present (50.0 g) than is required by Cl_2 (3.76 g), so CH_4 in excess, Cl_2 limiting

$$50.0 \text{ g Cl}_2 * (\text{mol Cl}_2 / 71.0 \text{ g}) * (1 \text{ mol CHCl}_3 / 3 \text{ mol Cl}_2) * (119.5 \text{ g CHCl}_3 / \text{mol}) = 28.1 \text{ g CHCl}_3$$

(If CH_4 used, 373 g CHCl_3 "created")