Honors Chemistry Stoichiometry Practice

Standards …

3.2.10 B Apply process knowledge and organize scientific and technological phenomena in varied ways.

3.2.10 C Apply the elements of scientific inquiry to solve problems.

3.4.10 Explain concepts about the structure and properties of matter.

1) Balance the following equation for the production of acetylene gas. How many grams of acetylene could be produced by combining 3.250 g of calcium carbide (CaC2) with water?

40.08
24.02
64.10

24.02
2.02
26.04

$$_1_\ CaC_2 + _2_\ H_2O \rightarrow _1_\ C_2H_2 + _1_\ Ca(OH)_2$$

$$3.250\ g\ CaC_2 \times \frac{1\ mol}{64.10\ g} \times \frac{1\ mol\ C_2H_2}{1\ mol\ CaC_2} \times \frac{26.04\ g}{mol}$$

1.320 g C_2H_2

2) Combustion of 25.00 grams of propane produces how much water?

$$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

$$25.00\ C_3H_8 \times \frac{1\ mol}{44.11\ g} \times \frac{4\ mol\ H_2O}{1\ mol\ C_3H_8} \times \frac{18.02\ g}{mol} =$$

40.85 g H_2O

3) Sodium hydroxide reacts with carbon dioxide to produce sodium carbonate and water, how many grams of water can be formed when 35.0 g of sodium hydroxide is used?

$$2NaOH + 2CO_2 \rightarrow Na_2CO_3 + H_2O$$

$$35.0\ g\ NaOH \times \frac{1\ mol}{40.00\ g} \times \frac{1\ mol\ H_2O}{2\ mol\ NaOH} \times \frac{18.02\ g}{mol}$$

7.88 g H_2O

4) Decomposing water to get oxygen can be done at extremely high temperatures or with electricity. How many grams of oxygen can be produced from decomposing 1.000 liter of water? (Hint: you can use density)

$$2H_2O \rightarrow 2H_2 + O_2$$

$$\frac{1.000\ L}{1\ L}\ H_2O \left/ \frac{1000\ mL}{1\ L} \right/ \frac{1\ g}{1\ mL} \left/ \frac{1\ mol}{18.02\ g} \right/ \frac{1\ mol\ O_2}{2\ mol\ H_2O} \left/ \frac{32.00\ g}{mol} \right.$$

$$= 887.9\ g\ O_2$$

5) I am having waffle fries from "chick fillet" for lunch and I need exactly 1.000 g of table salt to make my fries stupendously marvelous. Unfortunately I don't have salt. All that I do have is hydrochloric acid and lye (sodium hydroxide). How many grams of lye must I add to the acid to form the required 1.000g salt?

$$HCl + NaOH \rightarrow NaCl + H_2O$$

$$\frac{1.000\ g\ NaCl}{58.44\ g} \left/ \frac{mol}{1\ mol\ NaCl} \right/ \frac{1\ mol\ NaOH}{mol} \left/ \frac{40.00\ g}{mol} \right.$$

$$= 0.6845\ g\ NaOH$$

6) Using 2 concentrated solutions of phosphoric acid and copper (II) sulfate respectively, how many grams of phosphoric acid and copper (II) sulfate are used up in producing 90.00 grams of copper (II) phosphate precipitate? (Hint: You need two answers so you will have to do the problem twice, once for each reactant.)

$$2H_3PO_4 + 3CuSO_4 \rightarrow Cu_3(PO_4)_2 + 3H_2SO_4$$

(98.00 g/mol; 158.52 g/mol; 380.64 g/mol; ?; ?; 90.00 g)

$$\frac{90.00\ g\ Cu_3(PO_4)_2}{380.64\ g} \left/ \frac{mol}{1\ mol\ Cu_3(PO_4)_2} \right/ \frac{2\ mol\ H_3PO_4}{mol} \left/ \frac{98.00\ g}{mol} \right. = 46.34\ g\ H_3PO_4$$

$$\frac{90.00\ g\ Cu_3(PO_4)_2}{380.64\ g} \cdot \frac{3\ mol\ CuSO_4}{1\ mol\ Cu_3(PO_4)_2} \cdot \frac{158.52\ g}{mol} = 112.4\ g\ CuSO_4$$