Honors Chemistry Stoichiometry Practice With Gasses

For sig figs., round all Periodic table masses to 100ths (.01) For all gasses assume STP!

1) Balance the following equation for the production of acetylene gas. How many liters of acetylene could be produced by combining 3.250 g of calcium carbide (CaC_2) with water?

$$\underset{3.250\,g}{1\ CaC_2} + 2\ H_2O \rightarrow \underset{L\,?}{1\ C_2H_2} + 1\ Ca(OH)_2$$

$$3.250\,g\ CaC_2 \times \frac{1\ mol}{64.10\,g} \times \frac{1\ mol\ C_2H_2}{1\ mol\ CaC_2} \times \frac{22.4\,L}{mol} = \boxed{1.14\,L\ C_2H_2}$$

2) Combustion of 13.00 liters of propane produces how many grams of water? If the water was steam, how many liters would it be at STP?

$$\underset{13.00\,L}{C_3H_8} + 5O_2 \rightarrow 3CO_2 + \underset{g\,?}{4H_2O}$$

$$13.00\,L\ C_3H_8 \times \frac{mol}{22.4\,L} \times \frac{4\ mol\ H_2O}{1\ mol\ C_3H_8} \times \frac{18.02\,g}{mol} = \boxed{41.8\,g\ H_2O}$$

$$13.00\,L\ C_3H_8 \times \frac{mol}{22.4\,L} \times \frac{4\ mol\ H_2O}{1\ mol\ C_3H_8} \times \frac{22.4\,L}{1\ mol} = \boxed{52.0\,L\ H_2O}$$

3) Sodium hydroxide reacts with 20.20 liters of 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?

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

35.0 g 20.20 L ??

$$20.20\,L\,CO_2 \times \frac{1\,mol}{22.4\,L} \times \frac{1\,mol\,H_2O}{1\,mol\,CO_2} \times \frac{18.02\,g}{mol} = 16.3\,g\,H_2O$$

$$35.0\,g\,NaOH \times \frac{1\,mol}{40.00\,g} \times \frac{1\,mol\,H_2O}{2\,mol\,NaOH} \times \frac{18.02\,g}{mol} = \boxed{7.88\,g\,H_2O}$$

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

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

?L ?L

$$1.000\,L\,H_2O \times \frac{1\,g}{1\,mL} \times \frac{1000\,mL}{L} \times \frac{mol}{18.02\,g} \times \frac{2\,mol\,H_2}{2\,mol\,H_2O} \times \frac{22.4\,L}{mol}$$

$$\boxed{1240\,L\,H_2}$$

$$1000.\,g\,H_2O \times \frac{mol}{18.02\,g} \times \frac{1\,mol\,O_2}{2\,mol\,H_2O} \times \frac{22.4\,L}{mol}$$

$$\boxed{622\,L\,O_2}$$