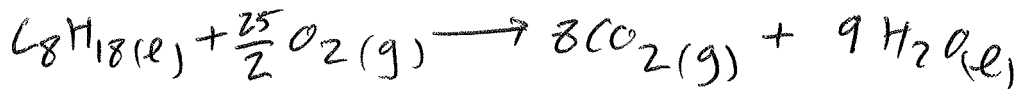


Balance the following chemical reaction: $\text{C}_8\text{H}_{18}(\text{l}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$



or



If you have 1.75 kg of C_8H_{18} , how many kg of oxygen gas do you need to react with all of the C_8H_{18} ? And how much CO_2 will form if that reaction occurs?

$$1.75 \text{ kg C}_8\text{H}_{18} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ mol C}_8\text{H}_{18}}{114.3 \text{ g}} = 15.3 \text{ mol C}_8\text{H}_{18}$$

$$15.3 \text{ moles C}_8\text{H}_{18} \times \frac{25 \text{ mol O}_2}{2 \text{ mol C}_8\text{H}_{18}} \times \frac{32.0 \text{ g O}_2}{1 \text{ mol O}_2} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 6.12 \text{ kg O}_2$$

$$15.3 \text{ mol C}_8\text{H}_{18} \times \frac{16 \text{ mol CO}_2}{2 \text{ mol C}_8\text{H}_{18}} \times \frac{44.01 \text{ g CO}_2}{1 \text{ mol CO}_2} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 5.39 \text{ kg CO}_2$$

If you react 1.25 kg of C_8H_{18} with 575 grams of O_2 , how much water will be formed?

$$1250 \text{ g C}_8\text{H}_{18} \times \frac{1 \text{ mol}}{114.3 \text{ g}} = 10.94 \text{ moles C}_8\text{H}_{18}$$

$$575 \text{ g O}_2 \times \frac{1 \text{ mol}}{32.0 \text{ g}} = 17.97 \text{ mol O}_2$$

need 25 mol O_2
for every 2 mol C_8H_{18}
 O_2 is limiting reactant

$$17.97 \text{ mol O}_2 \times \frac{18 \text{ mol H}_2\text{O}}{25 \text{ mol O}_2} \times \frac{18.02 \text{ g H}_2\text{O}}{1 \text{ mol}} = 233 \text{ g H}_2\text{O}$$

How much sodium nitrate do you need to make 750 mL of a 0.28 M sodium nitrate solution?

$$0.75 \text{ L} \times \frac{0.28 \text{ mol}}{\text{L}} \times \frac{84.99 \text{ g}}{1 \text{ mol NaNO}_3} = 17.8 \text{ g NaNO}_3$$

If you combine 352 grams of $\text{C}_6\text{H}_{12}\text{O}_6$ with enough water to make 1.50 L of solution, what is the molarity of this solution?

$$352 \text{ g C}_6\text{H}_{12}\text{O}_6 \times \frac{1 \text{ mol}}{180.12 \text{ g}} = 1.95 \text{ mol C}_6\text{H}_{12}\text{O}_6$$

$$\frac{1.95 \text{ mol}}{1.5 \text{ L}} = 1.30 \text{ M C}_6\text{H}_{12}\text{O}_6$$

If you combine 79.5 grams of sodium oxalate with enough water to make 2.5 L of solution, what will be the concentration of the **sodium ion** in this solution?

$$79.5 \text{ g Na}_2\text{C}_2\text{O}_4 \times \frac{1 \text{ mol Na}_2\text{C}_2\text{O}_4}{134 \text{ g}} \times \frac{2 \text{ mol Na}}{1 \text{ mol Na}_2\text{C}_2\text{O}_4} = 1.19 \text{ mol Na}^+$$

$$\frac{1.19 \text{ mol Na}^+}{2.5 \text{ L}} = 0.47 \text{ M Na}^+$$

If you have 500 mL of a 0.45 M solution of magnesium nitrate, how do you make 250 mL of a 0.18 M magnesium nitrate solution?

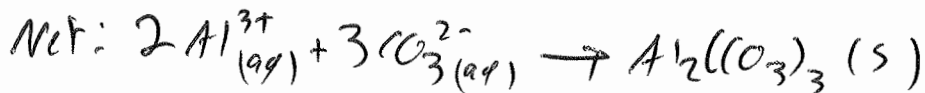
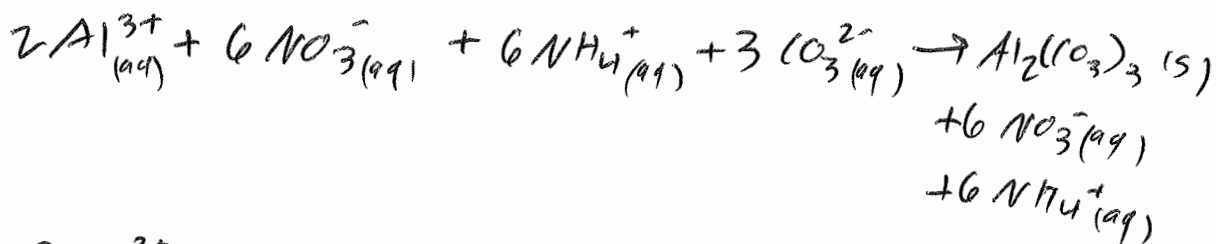
$$0.25 \text{ L} \times \frac{0.18 \text{ mol}}{\text{L}} = 0.045 \text{ mol Mg(NO}_3)_2 \text{ needed}$$

$$0.045 \text{ mol} \times \frac{1 \text{ L}}{0.45 \text{ mol}} = 0.1 \text{ L} = 100 \text{ mL}$$

Take 100 mL of more conc. solution and dilute to final volume of 250 mL

Take 100 mL of more conc. solution and dilute to volume = 250 mL

You combine 350 mL of 0.25 M aluminum nitrate with 425 mL of 0.15 M ammonium carbonate.
 a) Write the balanced total and net ionic equations for what happens



b) How many grams of precipitate form?

$$\text{Al}^{3+}: 0.35\text{L} \times \frac{0.25\text{ mol}}{1\text{L}} \text{Al}^{3+} = 0.0875\text{ mol Al}^{3+}$$

$$\text{CO}_3^{2-}: 0.425\text{L} \times \frac{0.15\text{ mol}}{1\text{L}} \text{CO}_3^{2-} = 0.06375\text{ mol CO}_3^{2-}$$

$$0.0875\text{ mol Al}^{3+} \times \frac{3\text{ mol CO}_3^{2-}}{2\text{ mol Al}^{3+}} = 0.13125\text{ mol CO}_3^{2-} \text{ required to react w/ all Al}^{3+} \rightarrow \text{CO}_3^{2-} \text{ runs out 1st} \rightarrow \text{limiting}$$

$$0.06375\text{ mol CO}_3^{2-} \times \frac{1\text{ mol Al}_2(\text{CO}_3)_3}{3\text{ mol CO}_3^{2-}} \times \frac{233.96\text{ g}}{1\text{ mol Al}_2(\text{CO}_3)_3} = 4.97\text{ g}$$

c) What is the concentration of each ionic species in solution after the mixing occurs?

$$[\text{CO}_3^{2-}] = 0$$

$$\frac{0.25\text{ mol Al(NO}_3)_3}{1\text{L}} \times 0.35\text{L} \times \frac{3\text{ mol NO}_3^{-}}{1\text{ mol Al(NO}_3)_3} = 0.2625\text{ mol NO}_3^{-} \xrightarrow{0.775\text{L}} 0.339\text{ M NO}_3^{-}$$

$$0.425\text{L (NH}_4)_2\text{CO}_3 \times 0.15\text{ mol} \times \frac{2\text{ mol NH}_4^{+}}{1\text{ mol (NH}_4)_2\text{CO}_3} = 0.1275\text{ mol} \xrightarrow{0.775\text{L}} 0.165\text{ M NH}_4^{+}$$

$$0.06375\text{ mol CO}_3^{2-} \times \frac{2\text{ mol Al}^{3+}}{3\text{ mol CO}_3^{2-}} = 0.0425\text{ mol Al}^{3+} \text{ precip} \rightarrow 0.045\text{ mol Al}^{3+} \text{ remaining}$$

$$0.045\text{ mol} / 0.775\text{L} = 0.058\text{ M Al}^{3+} \quad \frac{0.045\text{ mol}}{0.775\text{L}} = 0.058\text{ M Al}^{3+}$$