

# STOICHIOMETRY/LIMITING REAGENT PRACTICE

# AP CHEMISTRY

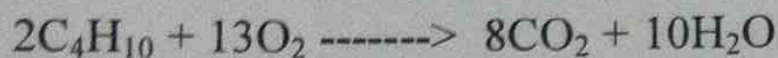
(practice, practice, practice... show all work (including balanced equations)... the answers are on the back... the solutions are on the back wall...)

1. Determine the mass of lithium hydroxide produced when 0.38 g of lithium nitride reacts with water according to the following equation:

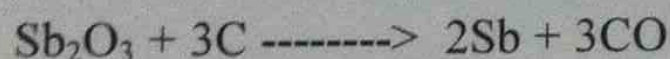


2. What mass of sodium chloride is produced when chlorine reacts with 0.29 g of sodium iodide?

3. Determine the mass of carbon dioxide produced when 0.85 g of butane reacts with oxygen according to the following equation:



4. Determine the mass of antimony produced when 0.46 g of antimony(III)oxide reacts with carbon according to the following equation:



5. What mass of hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) must decompose to produce 0.77 g of water?

6. What mass of carbon monoxide must react with oxygen to produce 0.69 g of carbon dioxide?

7. Identify the limiting reagent when 65.14 g of  $\text{CaCl}_2$  reacts with 74.68 g of  $\text{Na}_2\text{CO}_3$  to produce  $\text{CaCO}_3$  and  $\text{NaCl}$  (show work!)

8. Identify the limiting reactant when 4.687 g of  $\text{SF}_4$  reacts with 6.281 g of  $\text{I}_2\text{O}_5$  to produce  $\text{IF}_5$  and  $\text{SO}_2$ .

9. If 4.1 g of Cr is heated with 9.3 g of  $\text{Cl}_2$ , what mass of  $\text{CrCl}_3$  will be produced?

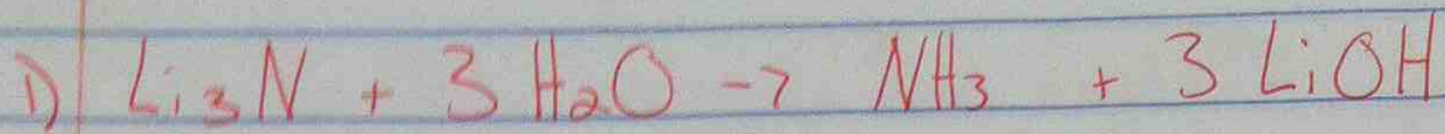
10. What mass of  $\text{SO}_2$  is produced from the reaction between 31.5 g of  $\text{S}_8$  and 8.65 g of  $\text{O}_2$ ?

11. What mass of  $\text{SO}_3$  is produced from the reaction of 12.4 g of  $\text{SO}_2$  and 3.45 g of  $\text{O}_2$ ?

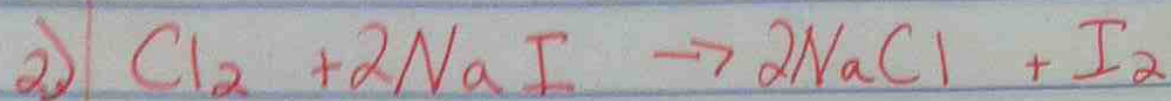
12. What mass of  $\text{H}_2\text{SO}_4$  is produced from the reaction of 6.58 g of  $\text{SO}_3$  and 1.64 g of  $\text{H}_2\text{O}$ ?

13. What mass of  $\text{CdS}$  is produced if 8.47 g of cadmium reacts with 2.51 g of sulfur?

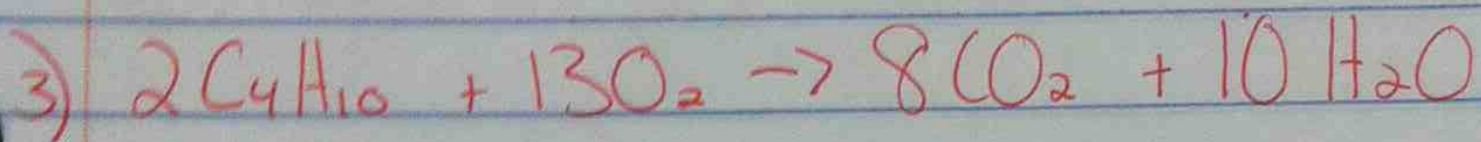
## Stoichiometry / Limiting Reagent Practice



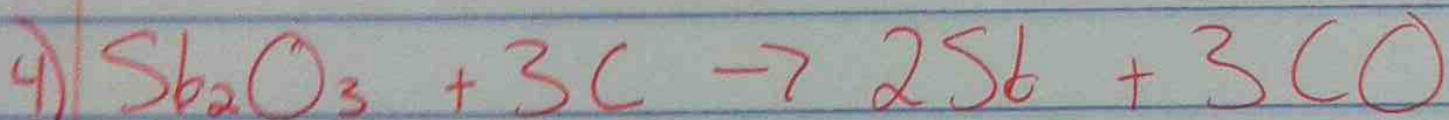
$$\frac{.38\text{g Li}_3\text{N}}{1} \times \frac{1\text{mol Li}_3\text{N}}{35\text{g}} \times \frac{3\text{mol LiOH}}{1\text{mol Li}_3\text{N}} \times \frac{24\text{g}}{1\text{mol LiOH}} = \boxed{.78\text{g LiOH}}$$



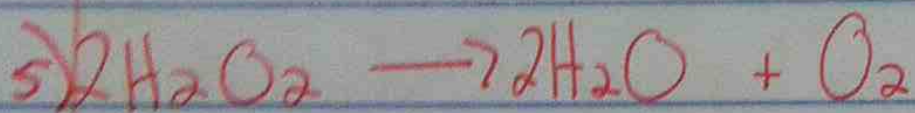
$$\frac{.29\text{g NaI}}{1} \times \frac{1\text{mol NaI}}{150\text{g}} \times \frac{2\text{mol NaCl}}{2\text{mol NaI}} \times \frac{58.5\text{g}}{1\text{mol NaCl}} = \boxed{.11\text{g NaCl}}$$



$$\frac{.85\text{g C}_4\text{H}_{10}}{1} \times \frac{1\text{mol C}_4\text{H}_{10}}{58\text{g}} \times \frac{8\text{mol CO}_2}{2\text{mol C}_4\text{H}_{10}} \times \frac{44\text{g}}{1\text{mol CO}_2} = \boxed{2.6\text{g CO}_2}$$



$$\frac{.46\text{g Sb}_2\text{O}_3}{1} \times \frac{1\text{mol Sb}_2\text{O}_3}{291.5\text{g}} \times \frac{2\text{mol Sb}}{1\text{mol Sb}_2\text{O}_3} \times \frac{121.76\text{g}}{1\text{mol Sb}} = \boxed{.38\text{g Sb}}$$



$$\frac{.77\text{g H}_2\text{O}}{1} \times \frac{1\text{mol H}_2\text{O}}{18.0\text{g}} \times \frac{2\text{mol H}_2\text{O}_2}{2\text{mol H}_2\text{O}} \times \frac{34.0\text{g H}_2\text{O}_2}{1\text{mol H}_2\text{O}_2} = \boxed{1.5\text{g H}_2\text{O}_2}$$



$$.69\text{g CO}_2 \times \frac{1\text{mol CO}_2}{44\text{g}} \times \frac{2\text{mol CO}}{2\text{mol CO}_2} \times \frac{28\text{g}}{1\text{mol CO}} = \boxed{.44\text{g CO}}$$



$$74.68\text{g Na}_2\text{CO}_3 \times \frac{1\text{mol Na}_2\text{CO}_3}{106\text{g}} \times \frac{2\text{mol NaCl}}{1\text{mol Na}_2\text{CO}_3} \times \frac{58.45\text{g}}{1\text{mol}} = 82.56\text{g}$$

$$65.14\text{g CaCl}_2 \times \frac{1\text{mol CaCl}_2}{111\text{g}} \times \frac{2\text{mol NaCl}}{1\text{mol CaCl}_2} \times \frac{58.45\text{g}}{1\text{mol}} = 67.54\text{g}$$

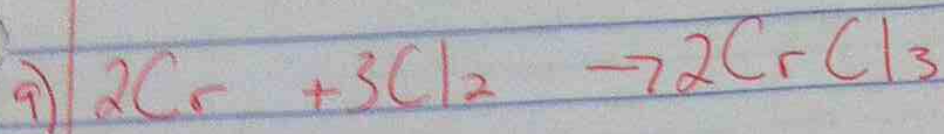
CaCl<sub>2</sub> is limiting reactant



$$4.687\text{g SF}_4 \times \frac{1\text{mol SF}_4}{108\text{g}} \times \frac{5\text{SO}_2}{5\text{SF}_4} \times \frac{64\text{g}}{1\text{mol SO}_2} = 2.77\text{g SO}_2$$

$$6.281\text{g I}_2\text{O}_5 \times \frac{1\text{mol I}_2\text{O}_5}{333.8\text{g}} \times \frac{5\text{mol SO}_2}{2\text{mol I}_2\text{O}_5} \times \frac{64\text{g}}{1\text{mol SO}_2} = 3.011\text{g SO}_2$$

SF<sub>4</sub> is limiting.



$$\frac{4.1\text{g Cr}}{1} \times \frac{1\text{mol Cr}}{52\text{g}} \times \frac{2\text{mol CrCl}_3}{2\text{mol Cr}} \times \frac{158.5\text{g}}{1\text{mol CrCl}_3} = \boxed{13\text{g CrCl}_3} \star$$

$$\frac{9.3\text{g Cl}_2}{1} \times \frac{1\text{mol Cl}_2}{71\text{g}} \times \frac{2\text{mol CrCl}_3}{3\text{mol Cl}_2} \times \frac{158.5\text{g}}{1\text{mol CrCl}_3} = \boxed{14\text{g CrCl}_3}$$

Cr is the limiting reactant



$$\frac{31.5\text{g S}_8}{1} \times \frac{1\text{mol S}_8}{256\text{g S}_8} \times \frac{8\text{mol SO}_2}{1\text{mol S}_8} \times \frac{64\text{g}}{1\text{mol SO}_2} = 63.0\text{g SO}_2$$

$$\frac{8.65\text{g O}_2}{1} \times \frac{1\text{mol O}_2}{32\text{g O}_2} \times \frac{8\text{mol SO}_2}{8\text{mol O}_2} \times \frac{64\text{g}}{1\text{mol SO}_2} = \boxed{17.3\text{g SO}_2}$$



$$\frac{12.4\text{g SO}_2}{1} \times \frac{1\text{mol SO}_2}{64\text{g}} \times \frac{2\text{mol SO}_3}{2\text{mol SO}_2} \times \frac{80\text{g SO}_3}{1\text{mol SO}_3} = \boxed{15.5\text{g SO}_3}$$

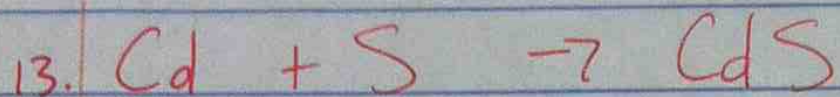
$$\frac{3.45\text{g O}_2}{1} \times \frac{1\text{mol O}_2}{32\text{g}} \times \frac{2\text{mol SO}_3}{1\text{mol O}_2} \times \frac{80\text{g SO}_3}{1\text{mol SO}_3} = 17.3\text{g SO}_3$$



$$\frac{6.58 \text{ g SO}_3}{1} \times \frac{1 \text{ mol SO}_3}{80 \text{ g}} \times \frac{1 \text{ mol H}_2\text{SO}_4}{1 \text{ mol SO}_3} \times \frac{98 \text{ g}}{1 \text{ mol H}_2\text{SO}_4} = \boxed{8.06 \text{ g H}_2\text{SO}_4}$$

$$\frac{1.64 \text{ g H}_2\text{O}}{1} \times \frac{1 \text{ mol H}_2\text{O}}{18 \text{ g}} \times \frac{1 \text{ mol H}_2\text{SO}_4}{1 \text{ mol H}_2\text{O}} \times \frac{98 \text{ g}}{1 \text{ mol}} = 8.93 \text{ g H}_2\text{SO}_4$$

$\text{SO}_3$  is the limiting reactant.



$$\frac{8.47 \text{ g Cd}}{1} \times \frac{1 \text{ mol Cd}}{112.4 \text{ g}} \times \frac{1 \text{ mol CdS}}{1 \text{ mol Cd}} \times \frac{144.4 \text{ g}}{1 \text{ mol CdS}} = \boxed{10.9 \text{ g CdS}}$$

$$\frac{2.51 \text{ g S}}{1} \times \frac{1 \text{ mol S}}{32 \text{ g}} \times \frac{1 \text{ mol CdS}}{1 \text{ mol S}} \times \frac{144.4 \text{ g}}{1 \text{ mol CdS}} = 11.3 \text{ g CdS}$$