

Exercise 9.2a

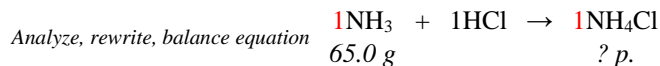
Stoichiometry

Name: _____

Date: _____ Per: _____

DIRECTIONS: Solve the following problems.

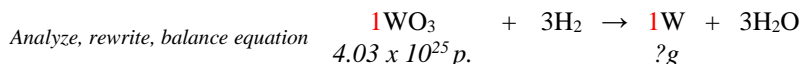
1. Given the equation $\text{NH}_3 + \text{HCl} \rightarrow \text{NH}_4\text{Cl}$, find the number of formula units of NH_4Cl formed if 65.0 g of NH_3 reacts with an excess of HCl .



Solve for only reactant

$$\frac{65.0 \text{ g NH}_3}{17.031 \text{ g NH}_3} \times \frac{1 \text{ mol NH}_3}{1 \text{ mol NH}_3} \times \frac{1 \text{ mol NH}_4\text{Cl}}{1 \text{ mol NH}_3} \times \frac{6.022 \times 10^{23} \text{ p. NH}_4\text{Cl}}{1 \text{ mol NH}_4\text{Cl}} = 2.30 \times 10^{24} \text{ p. NH}_4\text{Cl}$$

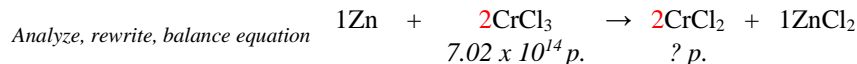
2. Given the equation $\text{WO}_3 + \text{H}_2 \rightarrow \text{W} + \text{H}_2\text{O}$, find the mass of W formed if 4.03×10^{25} formula units of WO_3 reacts with an excess of H_2 .



Solve for only reactant

$$\frac{4.03 \times 10^{25} \text{ p. WO}_3}{6.022 \times 10^{23} \text{ p. WO}_3} \times \frac{1 \text{ mol WO}_3}{1 \text{ mol WO}_3} \times \frac{1 \text{ mol W}}{1 \text{ mol WO}_3} \times \frac{183.84 \text{ g W}}{1 \text{ mol W}} = 12\,300 \text{ g W}$$

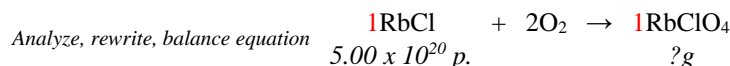
3. Given the equation $\text{Zn} + \text{CrCl}_3 \rightarrow \text{CrCl}_2 + \text{ZnCl}_2$, find the number of formula units of CrCl_2 formed if 7.02×10^{14} formula units of CrCl_3 reacts with an excess of Zn .



Solve for only reactant

$$\frac{7.02 \times 10^{14} \text{ p. CrCl}_3}{6.022 \times 10^{23} \text{ p. CrCl}_3} \times \frac{1 \text{ mol CrCl}_3}{1 \text{ mol CrCl}_3} \times \frac{2 \text{ mol CrCl}_2}{2 \text{ mol CrCl}_3} \times \frac{6.022 \times 10^{23} \text{ p. CrCl}_2}{1 \text{ mol CrCl}_2} = 7.02 \times 10^{14} \text{ p. CrCl}_2$$

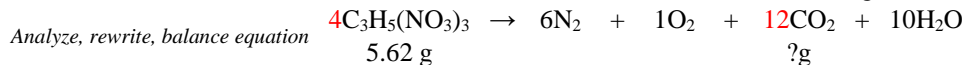
4. Given the equation $\text{RbCl} + \text{O}_2 \rightarrow \text{RbClO}_4$, find the mass of RbClO_4 formed if 5.00×10^{20} formula units of RbCl reacts with an excess of O_2 .



Solve for only reactant

$$\frac{5.00 \times 10^{20} \text{ p. RbCl}}{6.022 \times 10^{23} \text{ p. RbCl}} \times \frac{1 \text{ mol RbCl}}{1 \text{ mol RbCl}} \times \frac{1 \text{ mol RbClO}_4}{1 \text{ mol RbCl}} \times \frac{184.917 \text{ g RbClO}_4}{1 \text{ mol RbClO}_4} = 0.154 \text{ g RbClO}_4$$

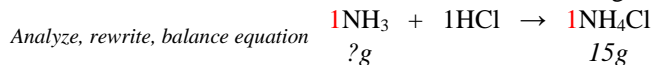
5. Given the equation $\text{C}_3\text{H}_5(\text{NO}_3)_3 \rightarrow \text{N}_2 + \text{O}_2 + \text{CO}_2 + \text{H}_2\text{O}$, find the mass of CO_2 formed if 5.62 g $\text{C}_3\text{H}_5(\text{NO}_3)_3$ decomposes.



Solve for only reactant

$$\frac{5.62 \text{ g C}_3\text{H}_5(\text{NO}_3)_3}{227.085 \text{ g C}_3\text{H}_5(\text{NO}_3)_3} \times \frac{1 \text{ mol C}_3\text{H}_5(\text{NO}_3)_3}{1 \text{ mol C}_3\text{H}_5(\text{NO}_3)_3} \times \frac{12 \text{ mol CO}_2}{4 \text{ mol C}_3\text{H}_5(\text{NO}_3)_3} \times \frac{44.009 \text{ g CO}_2}{1 \text{ mol CO}_2} = 3.27 \text{ g CO}_2$$

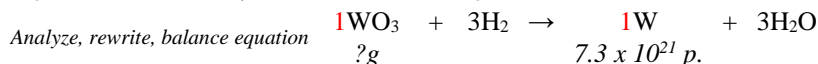
6. Given the equation $\text{NH}_3 + \text{HCl} \rightarrow \text{NH}_4\text{Cl}$, find the mass of NH_3 needed to form 15.0 g of NH_4Cl .



Solve for only reactant

$$\frac{15.0 \text{ g NH}_4\text{Cl}}{53.492 \text{ g NH}_4\text{Cl}} \times \frac{1 \text{ mol NH}_4\text{Cl}}{1 \text{ mol NH}_4\text{Cl}} \times \frac{1 \text{ mol NH}_3}{1 \text{ mol NH}_4\text{Cl}} \times \frac{17.031 \text{ g NH}_3}{1 \text{ mol NH}_3} = 4.78 \text{ g NH}_3$$

7. Given the equation $\text{WO}_3 + \text{H}_2 \rightarrow \text{W} + \text{H}_2\text{O}$, find the mass of WO_3 needed to form 7.30×10^{21} formula units of W .



Solve for only reactant

$$\frac{7.30 \times 10^{21} \text{ p. W}}{6.022 \times 10^{23} \text{ p. W}} \times \frac{1 \text{ mol W}}{1 \text{ mol W}} \times \frac{1 \text{ mol WO}_3}{1 \text{ mol W}} \times \frac{231.837 \text{ g WO}_3}{1 \text{ mol WO}_3} = 2.81 \text{ g WO}_3$$

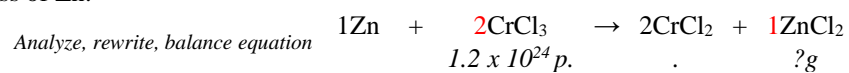
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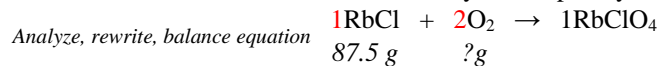
8. Given the equation $\text{Zn} + \text{CrCl}_3 \rightarrow \text{CrCl}_2 + \text{ZnCl}_2$, find the mass of ZnCl_2 formed if 1.20×10^{24} formula units of CrCl_3 reacts with an excess of Zn.



Solve for only reactant

$$\frac{1.20 \times 10^{24} \text{ p. CrCl}_3}{6.022 \times 10^{23} \text{ p. CrCl}_3} \times \frac{1 \text{ mol CrCl}_3}{1 \text{ mol CrCl}_3} \times \frac{1 \text{ mol ZnCl}_2}{2 \text{ mol CrCl}_3} \times \frac{136.286 \text{ g ZnCl}_2}{1 \text{ mol ZnCl}_2} = 136 \text{ g ZnCl}_2$$

9. Given the equation $\text{RbCl} + \text{O}_2 \rightarrow \text{RbClO}_4$, find the mass of O_2 necessary to completely react 87.5 g RbCl .



Solve for only reactant

$$\frac{87.5 \text{ g RbCl}}{120.921 \text{ g RbCl}} \times \frac{1 \text{ mol RbCl}}{1 \text{ mol RbCl}} \times \frac{2 \text{ mol O}_2}{1 \text{ mol RbCl}} \times \frac{31.998 \text{ g O}_2}{1 \text{ mol O}_2} = 46.3 \text{ g O}_2$$