

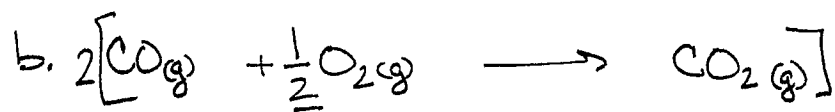
Chapter 5 Homework Key

5.46 Balance each equation:



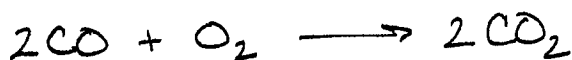
Mg 1
H x 2
Br x 2

Mg 1
H 2
Br 2



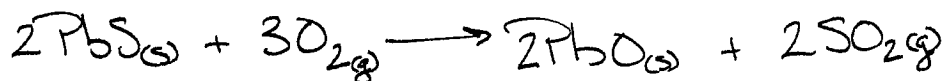
C 1
O x 2

C 1
O 2



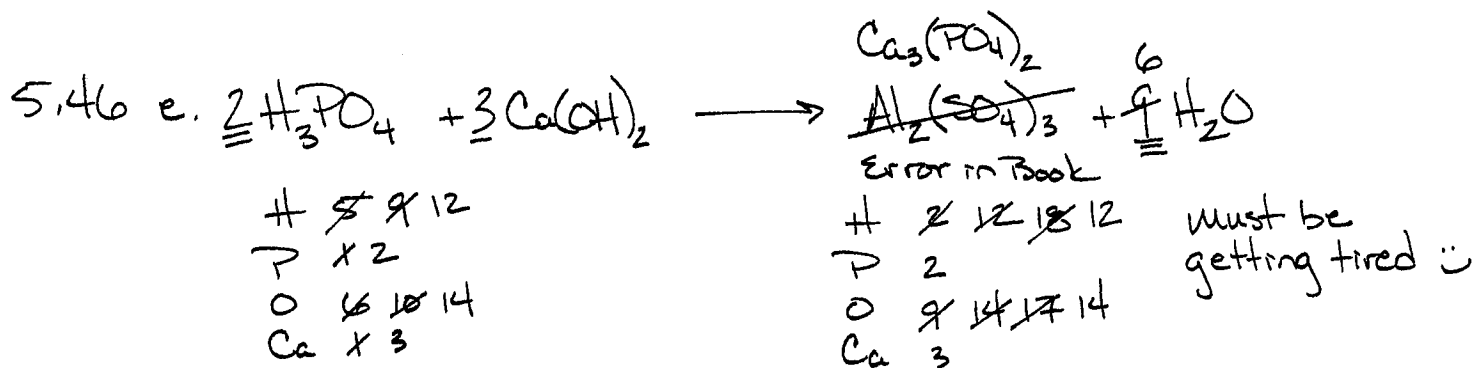
Pb 1
S 1
O x 3

Pb 1
S 1
O 3

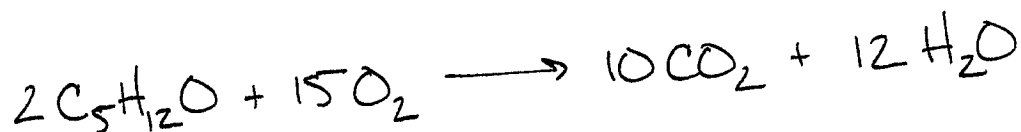


H x 4
S 1
O x 6
Na x 2

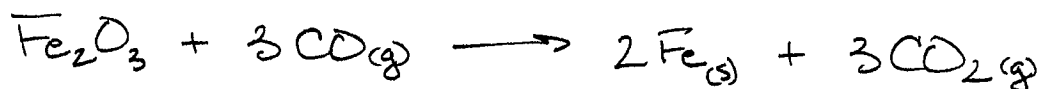
H x 4
S 1
O x 6
Na 2



5.46b MTBE ($\text{C}_5\text{H}_{12}\text{O}$) is a high-octane gasoline additive with a sweet, nauseating odor. Because small amounts of MTBE have contaminated the drinking water in some towns, it is now banned as a fuel additive in some states. MTBE reacts with O_2 to form CO_2 and H_2O . Write a balanced equation for the combustion of MTBE.



5.80 Iron, like most metals, does not occur naturally as the pure metal. Rather, it must be produced from iron ore, which contains iron(III) oxide, according to the given balanced equation.



a. How many grams of Fe are formed from 10.0 g of Fe_2O_3 ?

Road Map: g $\text{Fe}_2\text{O}_3 \rightarrow$ moles $\text{Fe}_2\text{O}_3 \rightarrow$ moles Fe \rightarrow g Fe

Required Molar Mass Fe_2O_3
 Molar Mass Fe

Molar Mass Fe_2O_3

$$\begin{array}{r} \text{Fe} \quad 2 \times 55.845 = 111.69 \\ \text{O} \quad 3 \times 15.9994 = + 47.9982 \\ \hline 159.6882 \end{array} \quad \text{use long} \Rightarrow \text{just remember good to 5 sig fig}$$

$$10.0 \text{ g Fe}_2\text{O}_3 \times \frac{1 \text{ mole Fe}_2\text{O}_3}{159.6882 \text{ g Fe}_2\text{O}_3} \times \frac{2 \text{ mole Fe}}{1 \text{ mole Fe}_2\text{O}_3} \times \frac{55.845 \text{ g Fe}}{1 \text{ mole Fe}} = 6.99 \text{ g Fe}$$

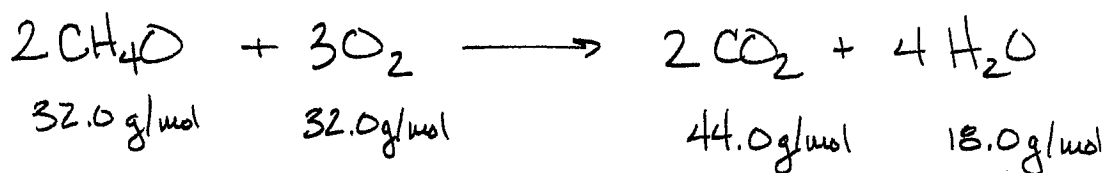
$$= \boxed{6.99 \text{ g Fe}}$$

b. How many grams of Fe are formed from 25.0 g Fe_2O_3 ?

$$25.0 \text{ g Fe}_2\text{O}_3 \times \frac{1 \text{ mole Fe}_2\text{O}_3}{159.6882 \text{ g Fe}_2\text{O}_3} \times \frac{2 \text{ mole Fe}}{1 \text{ mole Fe}_2\text{O}_3} \times \frac{55.845 \text{ g Fe}}{1 \text{ mole Fe}} = 17.5 \text{ g Fe}$$

$$= \boxed{17.5 \text{ g Fe}}$$

5.86 Methanol (CH_3OH), which is used as a fuel source in high performance racing cars, burns in the presence of O_2 to form CO_2 and H_2O . The molar masses for all substances are given under the balanced equation.



a. What is the theoretical yield of CO_2 from 48.0 g of Methanol?

Road Map: $\text{g CH}_3\text{OH} \rightarrow \text{mole CH}_3\text{OH} \rightarrow \text{mole CO}_2 \rightarrow \text{g CO}_2$

$$48.0\text{ g CH}_3\text{OH} \times \frac{1\text{ mole CH}_3\text{OH}}{32.0\text{ g CH}_3\text{OH}} \times \frac{2\text{ mole CO}_2}{2\text{ mole CH}_3\text{OH}} \times \frac{44.0\text{ g CO}_2}{1\text{ mole CO}_2} = \boxed{66.0\text{ g CO}_2}$$

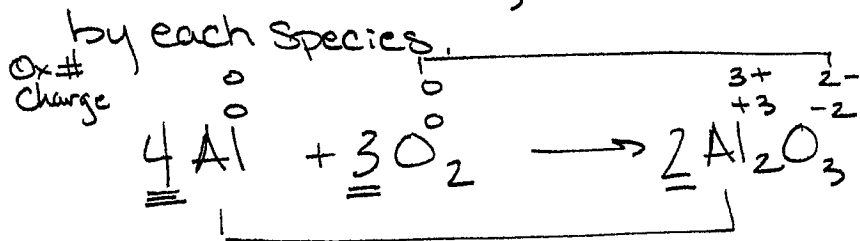
b. What is the percent yield of CO_2 if 48.0 g of CO_2 are formed.

$$\% \text{ yield} = \frac{\text{Actual yield}}{\text{Theoretical yield}} \times 100$$

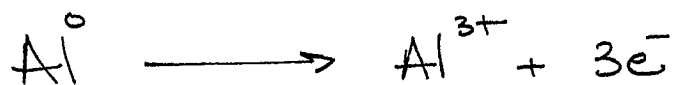
$$= \frac{48.0\text{ g CO}_2}{66.0\text{ g CO}_2} \times 100 = 72.7272\%$$

$$= \boxed{72.7\%}$$

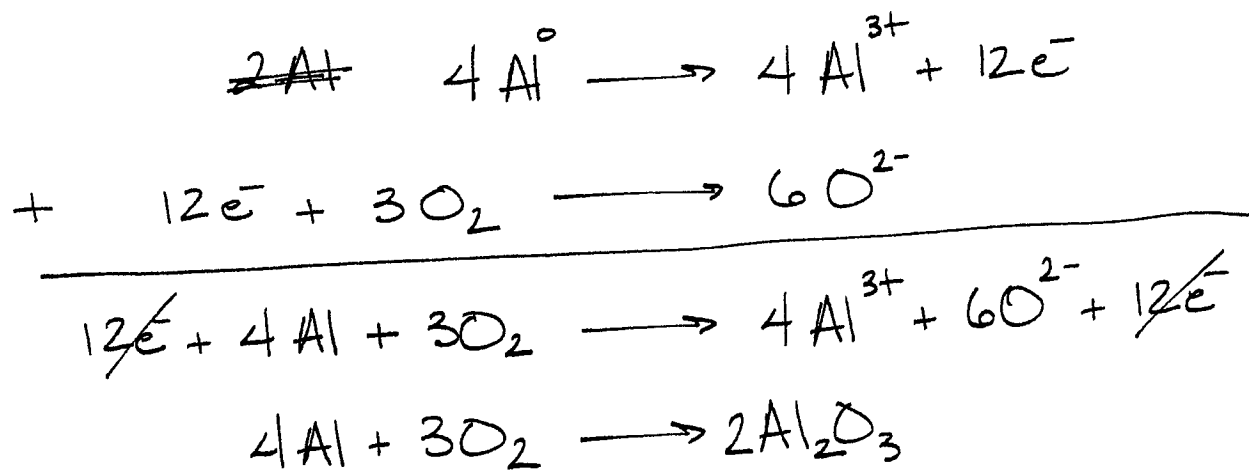
5.96 The reaction of aluminium metal (Al) with oxygen (O₂) forms Al₂O₃. Write a balanced equation for this redox reaction. Write two half reactions to show how many electrons are gained or lost by each species.



Half Reaction is represented by the pairs



Extra Info: Redox equations are balanced by the number of e⁻ gained and lost.



just thought you might like to see where the e⁻ go.

5.102 How many moles of sucrose (table sugar $C_{12}H_{22}O_{11}$, molar mass 342.3 g/mole) are contained in a 5-lb bag of sugar.

→ Road Map: 5 lb → g → moles

$$5 \text{ lb} \times \frac{453.6 \text{ g}}{1 \text{ lbs}} \times \frac{1 \text{ mole } C_{12}H_{22}O_{11}}{342.3 \text{ g } C_{12}H_{22}O_{11}} = \underline{6.626} \text{ mole } C_{12}H_{22}O_{11}$$
$$= 7 \text{ mole } C_{12}H_{22}O_{11}$$

* The two worksheets handed out in lab titled

VIII The Mole & XIII stoichiometry

are much better preparation than the problems here.