Practice Quiz for Stoichiometry

This is a balanced equation. The first reactant is octane, or gasoline.

$$2C_8H_{18(L)} + 25O_{2(G)} \rightarrow 16CO_{2(G)} + 18H_2O_{(G)}$$

1. What is the mole ratio for this equation?
2. What type of reaction is this?
3. When 11.5 moles of water form, how many moles of octane had to react?
4. When 322. grams of oxygen completely react, how many liters of carbon dioxide form?
5. When 1.55×10^{25} molecules of octane react, how many grams of water being produced?

Answers follow on next page (no peeking)

Answer Key

1 The mole ratio for this reaction is 2:25:16:18
2 This is a combustion reaction; hydrocarbon and oxygen react and form carbon dioxide and water.

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3 When 11.5 moles of water form, how many moles of octane had to react?
Moles to Moles stoich is a one-step problem using the mole ratio of the equation.

$$\text{MR}\ \frac{\text{water}}{\text{octane}}\ \frac{18}{2} = \frac{11.5}{x}$$ Cross multiply and solve for x $18x = 23.0$ $x = 1.28$ moles octane

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4 When 322. grams of oxygen completely react, how many liters of carbon dioxide form?
First change grams oxygen to moles, then mole ratio, then convert moles CO_2 into liters, 3 steps.

$$\frac{322\text{ g oxygen}}{1} \times \frac{1\text{ mole oxygen}}{32\text{ grams}} = 10.1\text{ moles oxygen}$$

$$\text{MR}\ \frac{\text{oxygen}}{CO_2}\ \frac{25}{16} = \frac{10.1}{x}$$ Cross multiply and solve for x $25x = 161.6$ $x = 6.46$ moles CO_2

$$\frac{5.46\text{ moles } CO_2}{1} \times \frac{22.4\text{ Liters } CO_2}{1\text{ mole } CO_2} = 145\text{ liters } CO_2$$

When 1.55×10^{25} molecules of octane react, how many grams of water being produced?

$$\frac{1.55 \times 10^{25}\text{ molecules octane}}{1} \times \frac{1\text{ mole}}{6.02 \times 10^{23}\text{ molecules}} = \frac{1.55}{6.02} \times \frac{10^{27}}{10^{25}} = 0.257 \times 10^2 = 25.7\text{ moles octane}$$

$$\text{MR}\ \frac{\text{octane}}{\text{water}}\ \frac{2}{18} = \frac{25.7}{x}$$ Cross multiply and solve for x $2x = 462.6$ $x = 231$ moles water

$$\frac{231\text{ moles water}}{1} \times \frac{18\text{ grams water}}{1\text{ mole water}} = 4158 \rightarrow 4160\text{ grams water}$$ (3 SF)