# When Propane Burns in Air

burning + $O_2(g)$ ! fire △

1. Write the balanced chemical equation for the combustion of propane gas, $C_3H_8$, in a BBQ.

$$C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$$

mol A mol B

2. If you want to burn 0.60 moles of propane, how many moles of oxygen will you require?

1 step $0.60\ mol\ C_3H_8 \times \frac{5\ mol\ O_2}{1\ mol\ C_3H_8} =$ **3 mol $O_2$**

3. If your BBQ pumps out 10.5 moles of carbon dioxide gas, what mass of propane did you burn?

$3 \times 12 = 36$, $8 \times 1 = 8$ → 44 g/mol

2 step $10.5\ mol\ CO_2 \times \frac{1\ mol\ C_3H_8}{3\ mol\ CO_2} \times \frac{44\ g\ C_3H_8}{1\ mol\ C_3H_8} =$ **154 g $C_3H_8$**

4. If you produce 46 g of water vapour, how many moles of oxygen did you use?

$2 \times 1 = 2$, $16$ → 18 g/mol

2 step $46\ g\ H_2O \times \frac{1\ mol\ H_2O}{18\ g\ H_2O} \times \frac{5\ mol\ O_2}{4\ mol\ H_2O} =$ **3.2 mol $O_2$**

5. If you burn 50. g of propane, how many grams of water vapour will you produce?

3 step $50\ g\ C_3H_8 \times \frac{1\ mol\ C_3H_8}{44\ g\ C_3H_8} \times \frac{4\ mol\ H_2O}{1\ mol\ C_3H_8} \times \frac{18\ g\ H_2O}{1\ mol\ H_2O} =$ **81.82 g $H_2O$**

6. If 66.0 g of oxygen react, what mass of carbon dioxide will form?

3 step $66.0\ g\ O_2 \times \frac{1\ mol\ O_2}{32\ g\ O_2} \times \frac{3\ mol\ CO_2}{5\ mol\ O_2} \times \frac{44\ g\ CO_2}{1\ mol\ CO_2} =$ **54.5 g $CO_2$**

7. If 54 g of water vapour is produced, how many molecules of oxygen reacted?

3 step $54\ g\ H_2O \times \frac{1\ mol\ H_2O}{18\ g\ H_2O} \times \frac{5\ mol\ O_2}{4\ mol\ H_2O} \times \frac{6.02 \times 10^{23}\ molecules\ O_2}{1\ mol\ O_2} =$ **$2.26 \times 10^{24}$ molecs $O_2$**