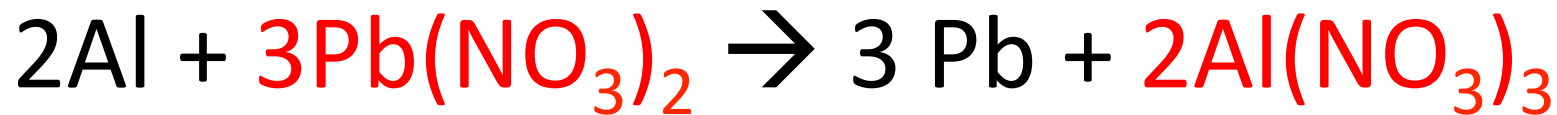


Stoichiometry

- Mole to Mole – Use Mole Ratio
- Mole to Mass – Use Mole Ratio then multiply by Molar Mass
- Mass to Mole – Divide by Molar Mass then use Mole Ratio
- Mass to Mass – Divide by Molar Mass, then Mole Ratio, and finally multiply by the other Molar Mass



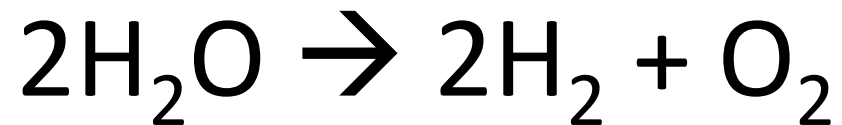
- If 6 moles of lead (II) nitrate react with aluminum, how many moles of aluminum nitrate will be yielded?



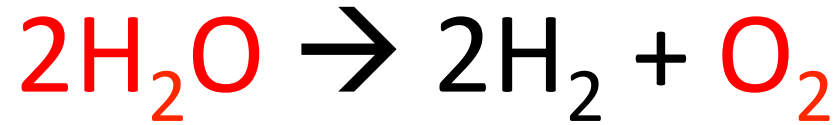
- If 6 moles of lead (II) nitrate react with aluminum, how many moles of aluminum nitrate will be yielded?

$$\begin{array}{r|l} 6 \text{ mol Pb}(\text{NO}_3)_2 & 2 \text{ mol Al}(\text{NO}_3)_3 \\ \hline & 3 \text{ mol Pb}(\text{NO}_3)_2 \end{array}$$

$$= 4 \text{ mol Al}(\text{NO}_3)_3$$



- If 12 moles of water decomposes, how many grams of oxygen will be yielded?

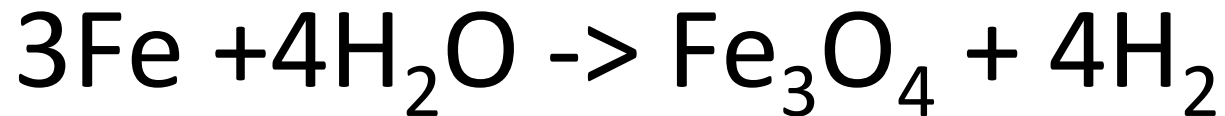


- If 12 moles of water decomposes, how many grams of oxygen will be yielded?

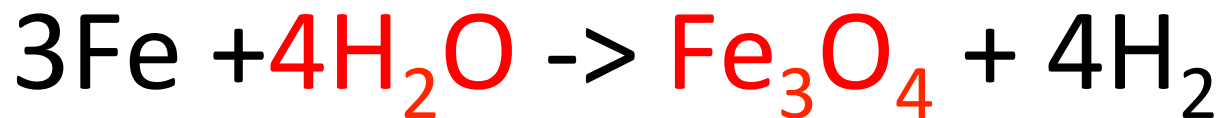
12 mol H ₂ O	1 mol O ₂	32 g O ₂
	2 mol H ₂ O	1 mol O ₂

Molar Mass of O₂ = 2 atoms x 16 g = 32 g/mol

$$= 192 \text{ g O}_2$$



- If 50 grams of iron oxide are yielded, how many moles of water are needed to react with iron?



- If 50 grams of iron oxide are yielded, how many moles of water are needed to react with iron?

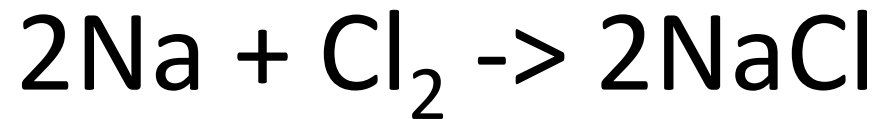
$50 \text{ g Fe}_3\text{O}_4$	$1 \text{ mol Fe}_3\text{O}_4$	$4 \text{ mol H}_2\text{O}$
$232 \text{ g Fe}_3\text{O}_4$	$1 \text{ mol Fe}_3\text{O}_4$	

Molar Mass of Fe_3O_4 - O = 4 atoms x 16 g = 64 g/mol

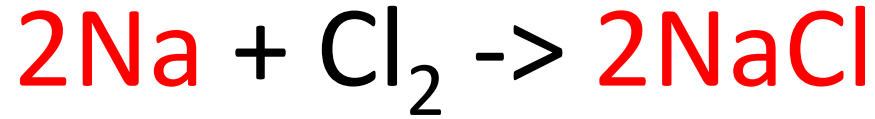
Fe = 3 atoms x 56 g = 168 g/mol

= 232 g/mol

= 0.86 mol H_2O



- If 100 grams of sodium react with chlorine gas, how many grams of sodium chloride are yielded?



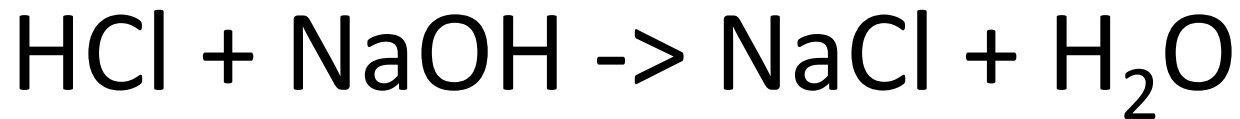
- If 100 grams of sodium react with chlorine gas, how many grams of sodium chloride are yielded?

100 g Na	1 mol Na	2 mol NaCl	58.5 g NaCl
	23 g Na	2 mol Na	1 mol NaCl

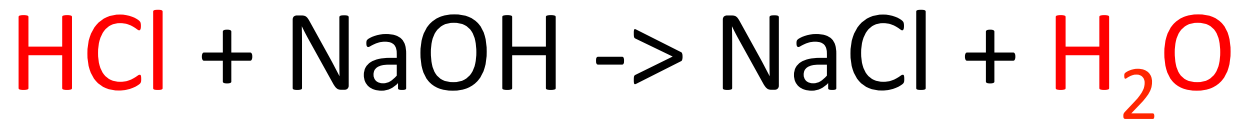
Molar Mass of NaCl

Na = 1 atom x 23 g = 23 g/mol
 Cl = 1 atom x 35.5 g = 35.5g/mol
 = 58.5 g/mol

= 254 g NaCl



- If 25 grams of hydrochloric acid react with sodium hydroxide, how many grams of water are yielded?



- If 25 grams of hydrochloric acid react with sodium hydroxide, how many grams of water are yielded?

25 g HCl	1 mol HCl	1 mol H ₂ O	18 g H ₂ O
	36.5 g HCl	1 mol HCl	1 mol H ₂ O

Molar Mass of HCl H = 1 atom x 1 g = 1g/mol

Cl = 1 atom x 35.5 g = 35.5g/mol

= 36.5 g/mol

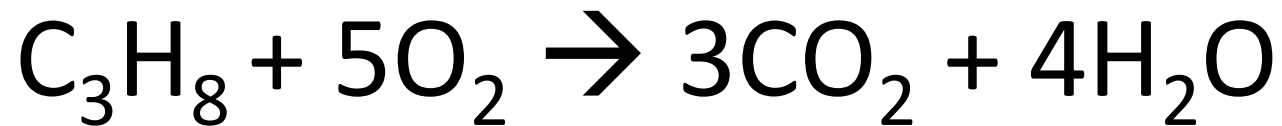
= 12.3 g H₂O

Molar Mass of H₂O

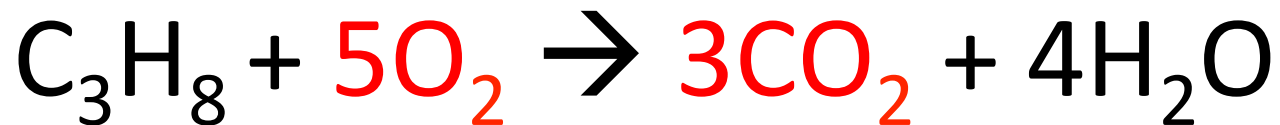
H = 2 atom x 1 g = 2 g/mol

O = 1 atom x 16 g = 16 g/mol

= 18 g/mol



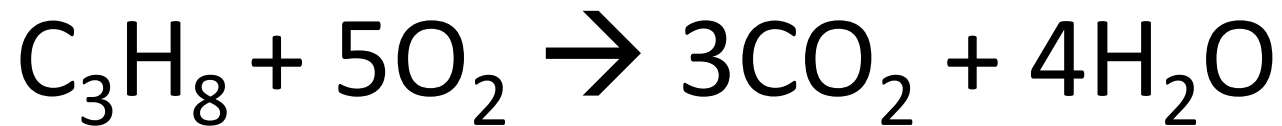
- How many moles of oxygen are needed to produce 12 moles of carbon dioxide?



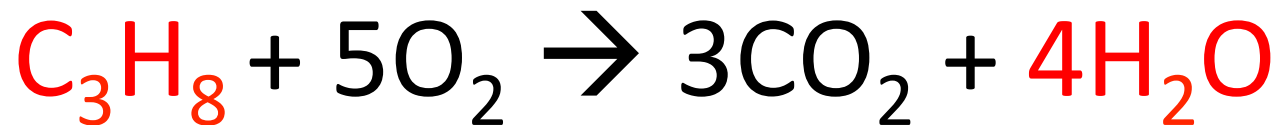
- How many moles of oxygen are needed to produce 12 moles of carbon dioxide?

$$\frac{12 \text{ mol CO}_2}{3 \text{ mol CO}_2} \times 5 \text{ mol O}_2$$

$$= 20 \text{ mol O}_2$$



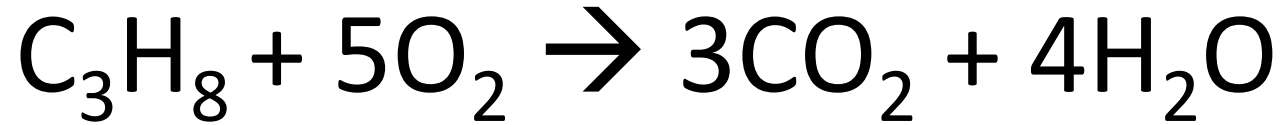
- How many moles of propane are needed to produce 12 moles of water?



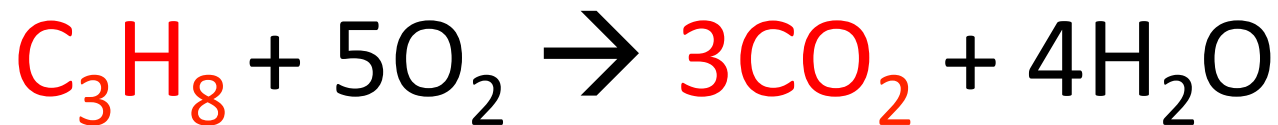
- How many moles of propane are needed to produce 12 moles of water?

$$\frac{12 \text{ mol H}_2\text{O}}{4 \text{ mol H}_2\text{O}} \left| \frac{1 \text{ mol C}_3\text{H}_8}{1 \text{ mol C}_3\text{H}_8} \right.$$

$$= 3 \text{ mol C}_3\text{H}_8$$



- How many grams of propane are needed to produce 13.5 moles of carbon dioxide?



- How many grams of propane are needed to produce 13.5 moles of carbon dioxide?

13.5 mol CO ₂	1 mol C ₃ H ₈	44 g C ₃ H ₈
	3 mol CO ₂	1 mol C ₃ H ₈

Molar Mass of C₃H₈

C = 3 atoms x 12 g = 36 g/mol

H = 8 atoms x 1 g = 8 g/mol

= 44 g/mol

= 198 g C₃H₈