

## How to Read Chemical Equations

<b>Reaction</b>	<b>Reading by Elementary Entities (Formula Units)</b>	<b>Reading by Mole (<math>N_A</math> of elementary entities or formula units)</b>
$2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$	<b>2 molecules</b> of hydrogen react with <b>1 molecule</b> of oxygen to form <b>2 molecules</b> of water	<b>2 moles</b> of hydrogen react with <b>1 mole</b> of oxygen to form <b>2 moles</b> of water
$\text{CH}_4 + 2 \text{O}_2 \rightarrow \text{CO}_2 + 2 \text{H}_2\text{O}$	<b>1 molecule</b> of methane reacts with <b>2 molecules</b> of oxygen to form <b>1 molecule</b> of carbon dioxide and <b>2 molecules</b> of water	<b>1 mole</b> of methane reacts with <b>2 moles</b> of oxygen to form <b>1 mole</b> of carbon dioxide and <b>2 moles</b> of water
$2 \text{Na} + 2 \text{H}_2\text{O} \rightarrow 2 \text{NaOH} + \text{H}_2$	<b>2 atoms</b> of sodium react with <b>2 molecules</b> of water to form <b>2 formula units</b> of sodium hydroxide and <b>1 molecule</b> of hydrogen	<b>2 moles</b> of sodium reacts with <b>2 moles</b> of water to form <b>2 moles</b> of sodium hydroxide and <b>1 mole</b> of hydrogen
$\text{Ca} + 2 \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$	<b>1 atom</b> of calcium reacts with <b>2 molecules</b> of water to form <b>1 formula unit</b> of calcium hydroxide and <b>1 molecule</b> of hydrogen	<b>1 mole</b> of calcium reacts with <b>2 moles</b> of water to form <b>1 mole</b> of calcium hydroxide and <b>1 mole</b> of hydrogen
$2 \text{NaBr} + \text{Cl}_2 \rightarrow 2 \text{NaCl} + \text{Br}_2$	<b>2 formula units</b> of sodium bromide react with <b>1 molecule</b> of chlorine to form <b>2 formula units</b> of sodium chloride and <b>1 molecule</b> of bromine	<b>2 moles</b> of sodium bromide react with <b>1 mole</b> of chlorine to form <b>2 moles</b> of sodium chloride and <b>1 mole</b> of bromine
$\text{AgNO}_3 + \text{KCl} \rightarrow \text{AgCl}\downarrow + \text{KNO}_3$	<b>1 formula unit</b> of silver nitrate reacts with <b>1 formula unit</b> of potassium chloride to form <b>1 formula unit</b> of silver chloride (precipitate) and <b>1 formula unit</b> of potassium nitrate	<b>1 mole</b> of silver nitrate reacts with <b>1 mole</b> of potassium chloride to form <b>1 mole</b> of silver chloride (precipitate) and <b>1 mole</b> of potassium nitrate
$2\text{AgNO}_3 + \text{CaBr}_2 \rightarrow 2 \text{AgBr}\downarrow + \text{Ca}(\text{NO}_3)_2$	<b>2 formula units</b> of silver nitrate react with <b>1 formula unit</b> of calcium bromide to form <b>2 formula units</b> of silver bromide (precipitate) and <b>1 formula unit</b> of calcium nitrate	<b>2 moles</b> of silver nitrate react with <b>1 mole</b> of calcium bromide to form <b>2 moles</b> of silver bromide (precipitate) and <b>1 mole</b> of calcium nitrate
$\text{Na}_2\text{CO}_3 + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{CO}_2\uparrow + \text{H}_2\text{O}$	<b>1 formula unit</b> of sodium carbonate reacts with <b>2 formula units</b> of hydrochloric acid to form <b>2 formula units</b> of sodium chloride, <b>1 molecule</b> of carbon dioxide (gas), and <b>1 molecule</b> of water	<b>1 mole</b> of sodium carbonate reacts with <b>2 moles</b> of hydrochloric acid to form <b>2 moles</b> of sodium chloride, <b>1 mole</b> of carbon dioxide (gas), and <b>1 mole</b> of water

<b>Reaction</b>	<b>Reading by Mole (<math>N_A</math> of elementary entities or formula units)</b>	<b>Reading by Mass (Molar mass of each substance is needed)</b>
$2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$	<b>2 moles</b> of hydrogen react with <b>1 mole</b> of oxygen to form <b>2 moles</b> of water	<b>4 g</b> of hydrogen react with <b>32 g</b> of oxygen to form <b>36 g</b> of water
$\text{CH}_4 + 2 \text{O}_2 \rightarrow \text{CO}_2 + 2 \text{H}_2\text{O}$	<b>1 mole</b> of methane reacts with <b>2 moles</b> of oxygen to form <b>1 mole</b> of carbon dioxide and <b>2 moles</b> of water	<b>16 g</b> of methane react with <b>32 g</b> of oxygen to form <b>44 g</b> of carbon dioxide and <b>36 g</b> of water
$2 \text{Na} + 2 \text{H}_2\text{O} \rightarrow 2 \text{NaOH} + \text{H}_2$	<b>2 moles</b> of sodium reacts with <b>2 moles</b> of water to form <b>2 moles</b> of sodium hydroxide and <b>1 mole</b> of hydrogen	<b>46 g</b> of sodium react with <b>36 g</b> of water to form <b>80 g</b> of sodium hydroxide and <b>2 g</b> of hydrogen
$\text{Ca} + 2 \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{H}_2$	<b>1 mole</b> of calcium reacts with <b>2 moles</b> of water to form <b>1 mole</b> of calcium hydroxide and <b>1 mole</b> of hydrogen	<b>40 g</b> of calcium react with <b>36 g</b> of water to form <b>74 g</b> of calcium hydroxide and <b>2 g</b> of hydrogen
$2 \text{NaBr} + \text{Cl}_2 \rightarrow 2 \text{NaCl} + \text{Br}_2$	<b>2 moles</b> of sodium bromide react with <b>1 mole</b> of chlorine to form <b>2 moles</b> of sodium chloride and <b>1 mole</b> of bromine	<b>206 g</b> of sodium bromide react with <b>71 g</b> of chlorine to form <b>117 g</b> of sodium chloride and <b>160 g</b> of bromine
$\text{AgNO}_3 + \text{KCl} \rightarrow \text{AgCl}\downarrow + \text{KNO}_3$	<b>1 mole</b> of silver nitrate reacts with <b>1 mole</b> of potassium chloride to form <b>1 mole</b> of silver chloride (precipitate) and <b>1 mole</b> of potassium nitrate	<b>170 g</b> of silver nitrate react with <b>74 g</b> of potassium chloride to form <b>143 g</b> of silver chloride (precipitate) and <b>101 g</b> of potassium nitrate
$2\text{AgNO}_3 + \text{CaBr}_2 \rightarrow 2 \text{AgBr}\downarrow + \text{Ca(NO}_3)_2$	<b>2 moles</b> of silver nitrate react with <b>1 mole</b> of calcium bromide to form <b>2 moles</b> of silver bromide (precipitate) and <b>1 mole</b> of calcium nitrate	<b>240 g</b> of silver nitrate react with <b>200 g</b> of calcium bromide to form <b>356 g</b> of silver bromide (precipitate) and <b>184 g</b> of calcium nitrate
$\text{Na}_2\text{CO}_3 + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{CO}_2\uparrow + \text{H}_2\text{O}$	<b>1 mole</b> of sodium carbonate reacts with <b>2 moles</b> of hydrochloric acid to form <b>2 moles</b> of sodium chloride, <b>1 mole</b> of carbon dioxide (gas), and <b>1 mole</b> of water	<b>106 g</b> of sodium carbonate reacts with <b>73 g</b> of hydrochloric acid to form <b>117 g</b> of sodium chloride, <b>44 g</b> of carbon dioxide (gas), and <b>18 g</b> of water