

## C4 : Chemical Changes

### Section 1: Key Terms

1 Metal oxide	Metals react with oxides to produce metal oxides. This is an oxidation reaction.
2 Displacement reaction	A <b>more reactive metal</b> can <b>displace</b> a <b>less reactive metal</b> from a <b>compound</b> .
3 Oxidation	Two definitions: Chemicals are oxidised if they <b>gain oxygen</b> in a reaction. Chemicals are oxidised if they <b>lose electrons</b> in a reaction. (HT)
4 Reduction	Two definitions: Chemicals are oxidised if they <b>lose oxygen</b> in a reaction. Chemicals are oxidised if they <b>gain electrons</b> in a reaction. (HT)
5 Acid	A chemical that <b>dissolves in water</b> to produce <b>H<sup>+</sup> ions</b> .
6 Base	A chemical that <b>reacts with acids</b> and <b>neutralise</b> them. E.g. <b>metal oxides, metal hydroxides, metal carbonate</b>
7 Alkali	A <b>base</b> that <b>dissolves in water</b> . It produces <b>OH<sup>-</sup> ions</b> in solution.
8 Neutralisation	When a <b>neutral solution</b> is formed from reacting an <b>acid</b> and <b>alkali</b> . General equation: <b>H<sup>+</sup> + OH<sup>-</sup> → H<sub>2</sub>O</b>
9 pH	A scale to <b>measure acidity/ alkalinity</b> . A <b>decrease of one pH</b> unit causes a <b>10x increase in H<sup>+</sup> ions</b> . (HT)
10 Strong acid (HT)	A strong acid is <b>completely ionised</b> in solution. E.g. <b>hydrochloric, nitric</b> and <b>sulfuric</b> acids.
11 Weak acid (HT)	A weak acid is <b>only partially ionised</b> in solution. E.g. <b>ethanoic, citric</b> and <b>carbonic</b> acids.

### Section 2: Reactivity

Element	Reaction	Reactivity
12 Potassium	When potassium is added to <b>water</b> , the metal <b>melts</b> and floats. It moves around very quickly. The metal is also <b>set on fire</b> , with sparks and a <b>lilac flame</b> .	↑
13 Sodium	When sodium is added to <b>water</b> , it <b>melts</b> to form a ball that moves around on the surface. It <b>fizzes rapidly</b> .	
14 Lithium	When lithium is added to <b>water</b> , it floats. It <b>fizzes steadily</b> and becomes smaller.	
15 Calcium	<b>Fizzes quickly</b> with dilute <b>acid</b> .	
16 Magnesium	<b>Fizzes quickly</b> with dilute <b>acid</b> .	
17 (Carbon)		
18 Zinc	<b>Bubbles slowly</b> with dilute <b>acid</b> .	
19 Iron	<b>Very slow reaction</b> with dilute <b>acid</b> .	
20 (Hydrogen)		
21 Copper	<b>No reaction</b> with dilute <b>acid</b> .	

### Section 4: Extracting Metals

22 Very unreactive metals	Found <b>naturally</b> in the ground. <b>Don't need extracting</b> .
23 Metals less reactive than carbon	Extracted by <b>reduction with carbon</b> .
24 Metals more reactive than carbon	Extracted by <b>electrolysis</b> .

### Section 5: Reactions of Acids

25 With metal	Acid + Metal → Salt + Hydrogen
26 With alkali	Acid + Metal Hydroxide → Salt + Water (Neutralisation reaction)
27 With metal oxide	Acid + Metal Oxide → Salt + Water (Neutralisation reaction)
28 With carbonate	Acid + Metal Carbonate → Salt + Water + Carbon Dioxide (Neutralisation reaction)

### Section 6: Making a Soluble Salt

29	<b>Add solid</b> metal, metal carbonate, metal oxide or metal hydroxide <b>to an acid</b> .
30	Add solid <b>until no more reacts</b> .
31	<b>Filter</b> off excess solid.
32	<b>Evaporate</b> to remove some of the water.
33	Leave to <b>crystallise</b> .
34	Remove all water in a <b>desiccator/ oven</b> .

### pH scale

