

Combined Science - Chemistry - Key Stage 4

Chemical Change Higher Tier Review

Mr Campbell



Periodic Table of Elements

Key:
relative atomic mass →
Name →

1
H
hydrogen
1

1
H
hydrogen
1

Atomic symbol
Atomic (proton number)

1 H hydrogen 1																	4 He helium 2
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[97] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[267] Rf rutherfordium 104	[270] Db dubnium 105	[269] Sg seaborgium 106	[270] Bh bohrium 107	[270] Hs hassium 108	[278] Mt meitnerium 109	[281] Ds darmstadtium 110	[281] Rg roentgenium 87	[285] Cn copernicium 112	[286] Nh nihonium 113	[289] Fl flerovium 114	[289] Mc moscovium 115	[293] Lv livermorium 116	[293] Ts tennessine 117	[294] Og oganesson 118

Source: Oak



1. In terms of electrons, what is meant by oxidation and reduction?
2. Why can an acid be described as both weak and concentrated?
3. What pH are acids?
4. What happens to hydrogen ion concentration as pH decreases?
5. For every change in 1 pH value how much does hydrogen ion concentration change by?
6. Balance the half equation $\text{Al}^{3+} + \text{e}^- \rightarrow \text{Al}$
7. Balance the half equation $\text{O}^{2-} \rightarrow \text{O}_2 + \text{e}^-$
8. In the electrolysis of copper sulfate solution, what will form at the anode?
9. During electrolysis does oxidation or reduction take place at the cathode?
10. Balance this equation $\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$

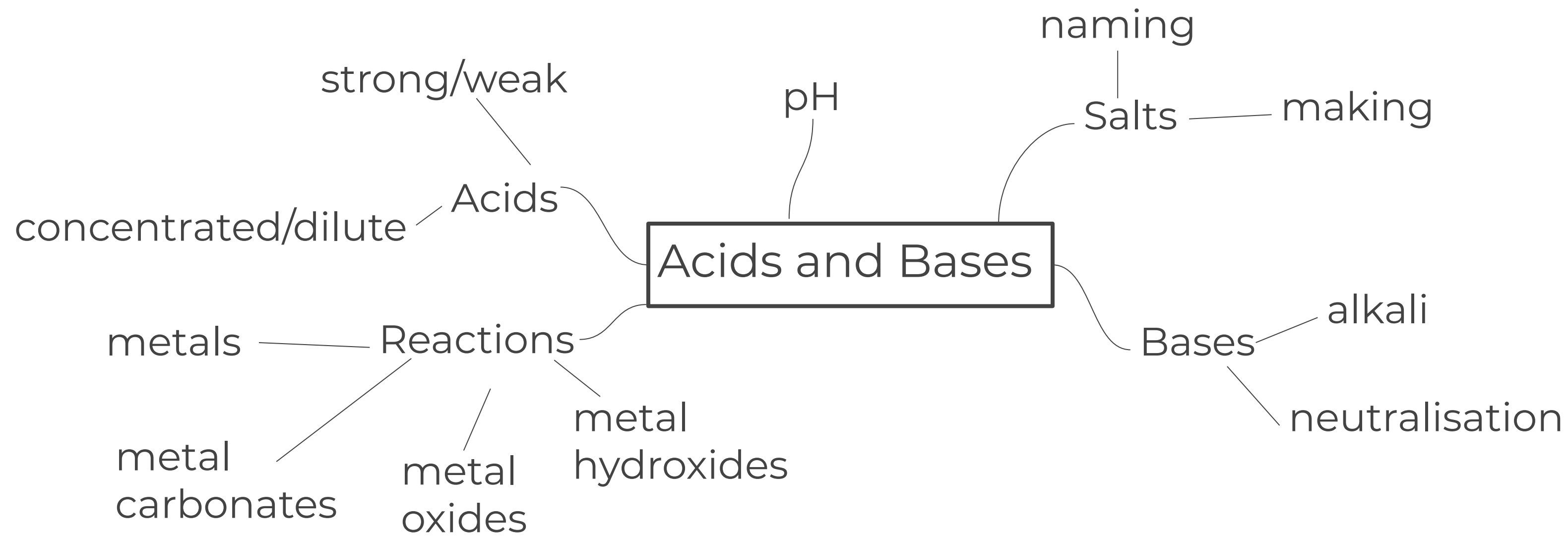


1. In terms of electrons, what is meant by oxidation and reduction?
Oxidation is loss of electrons, reduction is gain of electrons
2. Why can an acid be described as both weak and concentrated? A weak acid only partially ionises, it can be concentrated if there are a large amount of acid particles per volume
3. What pH are acids? Below 7
4. What happens to hydrogen ion concentration as pH decreases?
Hydrogen ion concentration increases
5. For every change in 1 pH value how much does hydrogen ion concentration change by? Hydrogen ion concentration changes by a factor of 10 or one order of magnitude



6. Balance the half equation $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$
7. Balance the half equation $2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$
8. In the electrolysis of copper sulfate solution, what will form at the anode?
Oxygen
9. During electrolysis does oxidation or reduction take place at the cathode? Reduction (positive metal ions gain electrons)
10. Balance this equation $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$





Magnesium bromide can be electrolysed both when molten and as a solution.

Identify the products at the anode and cathode for the electrolysis of molten magnesium bromide and magnesium bromide solution. Include half equations for the reactions at each electrode.

Explain the difference between the products at the cathode during the electrolysis of molten magnesium bromide and magnesium bromide solution.

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Molten magnesium bromide

- Product at anode = bromine Half equation = $2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}^-$
- Product at cathode = magnesium Half equation = $\text{Mg}^{2+} + 2\text{e}^- \rightarrow \text{Mg}$

Magnesium bromide solution

- Product at anode = bromine Half equation = $2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}^-$
- Product at cathode = hydrogen Half equation = $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$

Explanation - Hydrogen is formed at the cathode during the electrolysis of magnesium bromide solution because magnesium is more reactive than hydrogen.

