

### Core questions – Chemistry unit 4 – Chemical changes

No.	Question	Answer
1	What is reduction in terms of electrons?	Gain of electrons
2	What is oxidation in terms of electrons?	Loss of electrons
3	What is reduction in terms of oxygen?	Loss of oxygen from a compound
4	What is oxidation in terms of oxygen?	Gain of oxygen in a compound
5	What is formed when a metal reacts with oxygen?	A metal oxide
6	How is the reactivity of a metal defined?	Its tendency to lose electrons to form positive ions
7	What is the order of reactivity of metals?	Potassium, sodium, lithium, calcium, magnesium, zinc, iron, copper
8	Which non-metals are often included in the reactivity series?	Hydrogen & carbon
9	How can metal reactions with water and acid be used to determine the order of reactivity?	The more reactive the metal, the faster the reaction will go (e.g more bubbles, higher temperature change)
10	What is a displacement reaction?	A more reactive metal can displace a less reactive metal from a compound
11	Why is pure gold found naturally in the Earth?	Because it is not reactive enough to form a compound
12	How are metals that are less reactive than carbon extracted?	Their oxides are reduced using carbon (to form carbon dioxide and the pure metal)
13	What happens during the reaction of oxides, using carbon?	Oxygen is removed from the metal ore and carbon gains oxygen making carbon dioxide
14	What is formed when a metal reacts with an acid?	A salt and hydrogen
15	What is the salt that is formed when magnesium reacts with hydrochloric acid?	Magnesium Chloride
16	What is the salt that is formed when zinc reacts with hydrochloric acid?	Zinc Chloride
17	What is the salt that is formed when iron reacts with hydrochloric acid?	Iron Chloride
18	What is the salt that is formed when magnesium reacts with sulfuric acid?	Magnesium Sulfate
19	What is the salt that is formed when zinc reacts with sulfuric acid?	Zinc Sulfate
20	What is the salt that is formed when iron reacts with sulfuric acid?	Iron Sulfate
21	What is formed when an acid is neutralised by an alkali?	Salt and water
22	What is formed when an acid is neutralised by a metal carbonate?	Salt, water and carbon dioxide
23	What sort of salt is formed when the acid used is hydrochloric acid?	Chloride salts (for example, sodium chloride)
24	What sort of salt is formed when the acid used is sulfuric acid?	Sulfate salts (for example, magnesium sulfate)
25	What sort of salt is formed when the acid used is nitric acid?	Nitrate salts (for example, ammonium nitrate)
26	What does the particular salt produced in a reaction depend on?	The acid used & the positive ions in the base, alkali or carbonate

27	What is the formula of the chloride ion?	Cl <sup>-</sup>
28	What is the formula of the sulfate ion?	SO <sub>4</sub> <sup>2-</sup>
29	What is the formula of the nitrate ions?	NO <sub>3</sub> <sup>-</sup>
30	What ion is present in acids?	Hydrogen ions (H <sup>+</sup> )
31	What ion is present in alkalis?	Hydroxide ions (OH <sup>-</sup> )
32	What is the pH scale?	A measure of the acidity or alkalinity of a solution
33	What does is the range of the pH scale?	From 0 to 14
34	How can the pH of a substance be measured?	Using universal indicator or a pH probe
35	What pH is neutral?	Seven (7)
36	What pH values do acids have?	Less than 7
37	What pH values do bases have?	More than 7
38	What is a base?	A substance with a pH greater than 7
39	Give two examples of bases?	Metal oxides and metal hydroxides
40	What is an alkali?	A base that will dissolve in water
41	How can neutralisation between acids and alkalis be represent in terms of H <sup>+</sup> and OH <sup>-</sup> ions?	H <sup>+</sup> + OH <sup>-</sup> → H <sub>2</sub> O
42	How can a soluble salt be prepared from an insoluble oxide or carbonate reacting with an acid?	<ol style="list-style-type: none"> <li>1. Warm the acid using a Bunsen burner</li> <li>2. Add the insoluble base to the acid until no more reacts (add to <b>excess</b>)</li> <li>3. <b>Filter</b> the excess solid to get the salt solution</li> <li>4. Gently heat the solution to <b>evaporate</b> some water. Leave the rest for the salt to form (<b>crystallisation</b>)</li> </ol>
43T	How is a titration used to find out concentration? ( <b>Triple only</b> )	<ol style="list-style-type: none"> <li>1. Add indicator to the acid or alkali</li> <li>2. Add other reagent (acid or alkali) using a burette swirling each time</li> <li>3. Go slower (drop by drop) near the end point</li> <li>4. Stop when the indicator changes colour</li> </ol>
44T	What is a single indicator? ( <b>Triple only</b> )	An indicator that is only one colour in acid and another colour in alkali, regardless of how strong
45T	Give three examples of single indicators, and what are their colours in acids and alkalis? ( <b>Triple only</b> )	Litmus paper (red in acid, blue in alkali), Phenolphthalein (colourless in acids, pink in alkali), Methyl orange (red in acids, yellow in alkalis)
46T	Why are single indicator used for titrations? ( <b>Triple only</b> )	You want to see a sudden colour change to make it easier to see the end point
47H	What is a strong acid? ( <b>HT only</b> )	An acid that is fully dissociated into its ions
48H	What is a weak acid? ( <b>HT only</b> )	An acid that is partially dissociated into its ions
49H	Give examples of a strong acid. ( <b>HT only</b> )	Hydrochloric acid, sulfuric acid, nitric acid
50H	Give examples of a weak acid. ( <b>HT only</b> )	Ethanoic acid, citric acid, carbonic acid
51H	What is the concentration of an acid? ( <b>HT only</b> )	A measure of the amount of hydrogen ions dissolved in per unit volume of solvent

52	What happens to the hydrogen ion concentration of a solution as the pH decreases by one unit?	The hydrogen ion concentration of the solution increases by a factor of 10
53	What is the difference between concentration and strength of an acid?	Concentration describe the total number of dissolved acid molecules per unit volume Strength is the number of molecules that are ionised to produce hydrogen ions
54	What is an electrolyte?	A liquid or solution that is able to conduct electricity due to the presence of ions
55	What is the cathode?	The negative electrode
56	What is the anode?	The positive electrode
57	What is electrolysis?	Splitting up a compound with electricity
58	What is attracted towards the cathode during electrolysis?	The positive ions (the cations)
59	What is attracted towards the anode during electrolysis?	The negative ions (the anions)
60	What happens to the ions at each electrode?	They turn back into atoms
61	What happens to the positive ions at the cathode?	They gain electrons
62	What happens to the negative ions at the anode?	They lose electrons
63	When is electrolysis used to extract metals?	When the metal is more reactive than carbon OR if the metal reacts with carbon
64	What is aluminium oxide dissolved in during the electrolysis of aluminium oxide?	Cryolite
65	Why is aluminium oxide dissolved in cryolite for its electrolysis?	Its lowers the melting point needed and therefore reduces the amount of energy required
66	What are the electrodes made of for the electrolysis of aluminium oxide?	Carbon
67	Why does the anode need replacing during the electrolysis of aluminium oxide?	It is made of carbon, and reacts with oxygen to produce carbon dioxide
68	Why would hydrogen be produced at the cathode during the electrolysis of an ionic compound in solution?	If the metal is more reactive than hydrogen
69	What is produced at the anode during the electrolysis of an ionic compound in solution when halide ions aren't present?	Oxygen