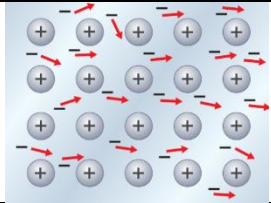
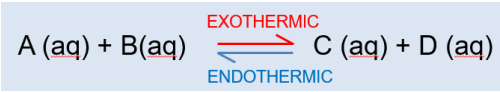


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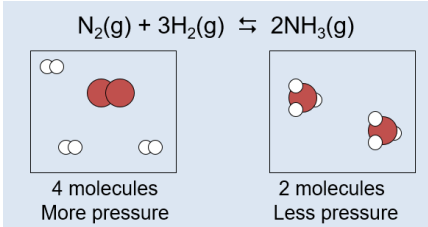
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Extracting metals		
1.	Name the more reactive metals.	Metals that end in "ium". Potassium, sodium, magnesium, calcium, aluminium
2.	Name the least reactive metals	Silver, gold, platinum
3.	What does native mean?	Not combined with other elements, found on its own
4.	What happens in a displacement reaction?	A more reactive metal takes the place of a less reactive metal in its compound.
5.	What is an ore?	A rock that contains a metal compound
6.	Why are some metals extracted by heating with carbon?	Metals that are less reactive than carbon can be displaced by carbon. e.g: carbon + copper oxide → copper + carbon dioxide
7.	Why are more reactive metals extracted by electrolysis?	Carbon is not reactive enough to displace the metal from its compound so a more powerful reduction reaction is needed.
8.	What is oxidation?	Gain of oxygen
9.	What is reduction?	Loss of oxygen
10.	What is the disadvantage of using electrolysis for extracting metals?	Uses a lot of energy so it is expensive
Biological methods of extraction (HT)		
1	What biological substance is needed in bioleaching?	Bacteria
2	Describe how bioleaching extracts metals from low-grade ores.	Bacteria breaks away the bonds between Cu-S and forms a liquid called a leachate. The leachate must then go through electrolysis to obtain pure metal.
3	What biological substance is needed in phytomining?	Plants
4	Describe how phytomining extracts metals from low-grade ores.	Plants are grown on low grade ores and absorbs copper ions from the ores. The plant is then burned, and the copper compound is reacted with acid to form copper metal.
Metallic bonding and properties of metals		
1	What kind of bonds are present between metallic elements?	Metallic bonds
2	Describe how metals form metallic bonds.	Metals lose the electrons in its outer shell to form a positive metal ion (cation) The electrons are delocalised throughout the structure and holds the positive ions together.

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3	Explain why metals are malleable	The layers of ions can slide over each other. The sea of delocalised (free) electrons holds the ions together so the metal can change shape instead of breaking
4	Why are metals good conductors of electricity?	Electrons are free to move around and carry the current
<b>Equilibria</b>		
1	Explain what is meant by a reversible reaction	A reaction that can go in both directions so the products of a reaction can react together to form the reactants.
2	Describe what is meant by 'dynamic equilibrium'	Dynamic equilibrium is when a forward and backward reaction occurs at the same speed and time.
3	What is the process of producing ammonia called?	Haber process
4	Which two gases are required to form ammonia and where are they obtained?	Nitrogen (from the air) and hydrogen (from natural gas)
5	What is the optimum temperature for producing ammonia?	450 °C
6	What is the optimum pressure for producing ammonia?	200 atmospheres
7	What catalyst is added in the Haber process?	Iron catalyst
<b>Le Chatelier's principle (HT)</b>		
1	Describe le chateliers principle.	The position of equilibrium will shift to oppose the change introduced.
2	If you increase the temperature of a reaction what will happen to the position of equilibrium.	Equilibrium moves to cool it
3	If you decrease the pressure of a reaction what will happen to the position of equilibrium	Equilibrium moves to raise it
4	Predict which way the position of equilibrium will move if you increase the concentration of C:  	To the left (backward reaction)
5	Predict which way the position of equilibrium	To the left (backward reaction)

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	will move if you decrease the concentration of A:	
	$\text{A (aq)} + \text{B (aq)} \xrightleftharpoons[\text{ENDOTHERMIC}]{\text{EXOTHERMIC}} \text{C (aq)} + \text{D (aq)}$	
6	Predict which way the position of equilibrium will move if you decrease the temperature:	To the right (forward reaction)
	$\text{A (aq)} + \text{B (aq)} \xrightleftharpoons[\text{ENDOTHERMIC}]{\text{EXOTHERMIC}} \text{C (aq)} + \text{D (aq)}$	
7	Predict which way the position of equilibrium will move if you decrease the pressure :	To the left (backward reaction)
	$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ 	
<b>Fertilisers</b>		
1	What are NPK fertilisers?	Fertilisers that contain Nitrogen, Phosphorous and Potassium
2	Why are NPK fertilisers needed?	To promote plant growth so that it increases crop yields.
3	How and why is ammonium nitrate produced?	By reacting ammonia with nitric acid to make ammonium nitrate salts. These salts are soluble in water so can be taken up by plants more effectively.
4	Compare the laboratory and industrial production of ammonium sulfate salts.	<p>Laboratory production:</p> <ul style="list-style-type: none"> <li>- Small amounts made</li> <li>- Batch process</li> <li>- Difficult to automate</li> <li>- Apparatus cleaned and then another small amount made.</li> </ul> <p>Industrial production:</p> <ul style="list-style-type: none"> <li>- Continuous process</li> <li>- Reactants are constantly fed into machinery and products constantly removed</li> <li>- Rarely stop process to clean apparatus</li> <li>- Fully automated</li> </ul>
<b>Rate of attainment of equilibria (HT)</b>		

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1	What happens to the rate of getting to equilibria when pressure increases? Explain why.	It increases. Particles are in a smaller space so more likely to have successful collisions and form products.
2	What happens to the rate of getting to equilibria when temperature increases? Explain why.	It increases. More particles will have the required activation energy to have successful collisions and form products.
3	What happens to the rate of getting to equilibria when concentration increases? Explain why.	It increases. More particles present in the same space so more likely to have successful collisions and form products.
4	What happens to the rate of getting to equilibria when a catalyst is added? Explain why.	It increases. Catalysts increase the rate of reaction by lowering the activation energy needed for a successful collision.
5	Predict which way the position of equilibrium will move if you add a catalyst :  <div style="text-align: center;"> <math display="block">\text{A (aq)} + \text{B (aq)} \xrightleftharpoons[\text{ENDOTHERMIC}]{\text{EXOTHERMIC}} \text{C (aq)} + \text{D (aq)}</math> </div>	Adding a catalyst has no effect on the position of equilibrium. They increase the rate of reaction for the forward and reverse reaction.
6	Why do we sometimes have to compromise of the position of equilibrium?	A condition might be favoured but the equipment needed is too expensive.  Sometimes a lower temperature is favoured but this can slow the rate of reaction so a higher temperature is needed.

	<b>Electrolysis</b>	
1	Define electrolysis.	A substance is decomposed (broken down) using electricity.
2	Why can electrolysis only occur if an ionic substance is molten or aqueous?	The ions are free to move.
3	What is the name of the negative and positive electrode?	Negative: Cathode Positive: Anode
4	Which ions are attracted to the anode and which to the cathode?	<ul style="list-style-type: none"> <li>Anode = negative</li> <li>Cathode = positive</li> </ul>
5	Define electrolyte.	Ions in a solution that are free to move and can conduct electricity.
6	What happens when ions get to an electrode?	Gain or lose electrons becoming neutral atoms again.
7	What happens at the anode?	Electrons transferred from the ion to the anode and the non-metal forms.
8	What happens at the cathode?	Electrons transferred from the cathode to the ion and a metal is formed.

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9	When is hydrogen formed from an aqueous solution?	If the metal is MORE reactive than hydrogen.
10	When is a metal (not hydrogen) formed from an aqueous solution?	If the metal is LESS reactive than hydrogen.
11	State one use of electrolysis.	Extracting a reactive metal from its ore.
12	Which useful product could be removed from the solution left after electrolysis of dilute sodium chloride solution?	Sodium hydroxide (bleach)
13	What would be formed at the anode in electrolysis of dilute sodium chloride solution?	Chlorine gas
14	What would be formed at the cathode in electrolysis of dilute sodium chloride solution?	Hydrogen
15	When will oxygen be produced at the anode?	When the solution does NOT contain HALIDE ions. Otherwise the halogen is produced.
<b>Electrolysis and half equations (HT only)</b>		
1	Write an ionic half equation for the reaction of the cathode in electrolysis of dilute sodium chloride solution (HT only)	$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$
2	Write an ionic half equation for the reaction of the anode in electrolysis of dilute sodium chloride solution (HT only)	$2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$
3	What would be produced at the anode in electrolysis of molten aluminium oxide? (HT only)	Oxygen
4	What would be produced at the cathode in electrolysis of molten aluminium oxide? (HT only)	Aluminium
5	Write an ionic half equation for the reaction at the anode in electrolysis of molten aluminium oxide (HT only)	$2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$
6	Write an ionic half equation for the reaction at the cathode in electrolysis of molten aluminium oxide (HT only)	$\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$

<b>Acids</b>		
1	Which ions make a solution alkaline?	$\text{OH}^-$ (hydroxide)
2	Which ions make a solution acidic?	$\text{H}^+$
3	Give 3 ways to measure the pH of a substance	Litmus paper, universal indicator, pH meter, Phenolphthalein, Methyl Orange
4	What pH and colour is universal indicator in a strongly ACIDIC solution?	pH 1 - 3 (red)
5	What pH and colour is universal indicator in a strongly ALKALINE solution?	pH 10-14 (purple)
6	What pH and colour is universal indicator in a weak ACID?	pH 4-6 (orange/yellow)

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7	What pH and colour is universal indicator in a weak ALKALI?	pH 8-9 (blue)
8	What colour is methyl orange in acid and alkali?	Red (acid), orange (alkali)
9	What colour is phenolphthalein in acids and alkali?	Colourless (acid), pink (alkali)
10	What is the difference between the solubility of alkalis and bases?	Alkalis are soluble and bases are insoluble.
11	What is the definition of a strong acid? (HT only)	Strong acid completely ionises (breaks down into its ions) in water.
12	What is the definition of a weak acid? (HT only)	Weak acid partially ionises in water.
13	Give 3 examples of a strong acid (HT only)	Hydrochloric acid, sulfuric acid, nitric acid
14	Write the empirical formula for the following acids: a) Hydrochloric acid b) Nitric acid c) Sulphuric acid	a) HCl b) HNO <sub>3</sub> c) H <sub>2</sub> SO <sub>4</sub>
15	State three examples of weak acids (HT only)	Ethanoic acid, citric acid and carbonic acid
16	What does a decrease in pH by one-unit mean? (HT only)	The hydrogen ion concentration increases by a factor of 10.
17	acid + alkali (or base) →	salt + water
18	metal carbonate + acid →	salt + water + carbon dioxide
19	Metal oxide + acid →	salt + water
20	Metal hydroxide + acid →	salt + water
21	Metal + acid →	salt + hydrogen (H <sub>2</sub> )
22	If nitric acid reacts with a metal, what will the salt end in?	_____ nitrate
23	If sulfuric acid reacts with a metal, what will the salt end in?	_____ sulfate
24	If hydrochloric acid reacts with a metal, what will the salt end in?	_____ chloride
25	State the observation in a test tube when a metal reacts with an acid.	Fizzing (bubbles, effervescence)
26	What is the test for hydrogen gas?	A lit splint will make a squeaky pop sound
27	What is the test for carbon dioxide gas?	Bubble gas through limewater and it will turn cloudy
28	List the steps in making a soluble salt from an insoluble base.	1) Add solid to heated acid until no more reacts (in excess) 2) Filter excess solid 3) Leave for 24hrs for water to evaporate (crystallisation) 4) Pat dry
29	What is the ionic equation for a neutralisation reaction?	H <sup>+</sup> (aq) + OH <sup>-</sup> (aq) → H <sub>2</sub> O (l)

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30	What is an advantage of using a pH probe rather than universal indicator?	pH probe is more precise and more accurate
31	Which salts are soluble in water?	The <b>SPANCS</b> salt
32	What does soluble mean?	Can dissolve in solvent (water)
33	Name the soluble salts	<b>Sodium salts</b> <b>Potassium salts</b> <b>Ammonium salts</b> <b>Nitrate salts</b> <b>Chloride salts</b> , except silver chloride and lead chloride <b>Sulfate salts</b> , except barium sulfate, lead sulfate and calcium sulfate
34	What are the 4 state symbols?	(aq) (s) (l) (g)
35	Name the insoluble salts	<b>Carbonate salts</b> , expect sodium carbonate, potassium carbonate and ammonium carbonate. <b>Hydroxide salts</b> , expect sodium hydroxide, potassium hydroxide and ammonium hydroxide.
36	How can you prepare pure dry soluble salt from an alkali (a soluble base)?	<ol style="list-style-type: none"> <li>1. Complete a titration using a single point indicator such as phenolphthalein.</li> <li>2. Record the exact volume of acid needed to neutralise the alkali.</li> <li>3. Carry out a titration, this time without the indicator and add the exact volume of acid needed.</li> <li>4. Evaporate the water slowly away from the salt.</li> <li>5. Leave the salt to dry in a warm room, pat dry.</li> </ol>