

# Chemical Reactions

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>identify a chemical reaction by a change in appearance of substance</li> </ul>	Chemical Reactions		
	<ul style="list-style-type: none"> <li>identify a chemical reaction by a detectable energy change</li> </ul>			
	<ul style="list-style-type: none"> <li>state that all chemical reactions involve the formation of one or more new substances</li> </ul>	Chemical Reactions		
	<ul style="list-style-type: none"> <li>give examples of chemical reactions which occur in our day-to-day lives</li> </ul>	Chemical Reactions		
	<ul style="list-style-type: none"> <li>state that everything in the world is made from about 100 elements</li> </ul>	Chemical Reactions		
	<ul style="list-style-type: none"> <li>state that each element has a name and a symbol</li> </ul>	Chemical Reactions		
	<ul style="list-style-type: none"> <li>state that compounds are formed then elements react together</li> </ul>	Chemical Reactions		
	<ul style="list-style-type: none"> <li>state that mixtures occur when two or more substances come together without reacting</li> </ul>	Chemical Reactions		
	<ul style="list-style-type: none"> <li>state that a solution is formed when a solute dissolves in a solvent</li> </ul>	Chemical Reactions		
	<ul style="list-style-type: none"> <li>apply the general rules:               <ul style="list-style-type: none"> <li>- the compounds with the name ending in "ide" contain the two elements indicated,</li> <li>- and that the ending "ite" or "ate" indicates the additional element oxygen.</li> </ul> </li> </ul>			

# Speed of Reactions

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>describe how the following affect the speed of a reaction:                             <ul style="list-style-type: none"> <li>- particle size</li> <li>- concentration</li> <li>- temperature</li> </ul> </li> </ul>	Speed of Reactions		
	<ul style="list-style-type: none"> <li>give examples of reactions (both laboratory and everyday) affected by the following:                             <ul style="list-style-type: none"> <li>- particle size</li> <li>- concentration</li> <li>- temperature</li> </ul> </li> </ul>	Speed of Reactions		
	<ul style="list-style-type: none"> <li>state that catalysts are substances which:                             <ul style="list-style-type: none"> <li>- speed up some reactions</li> <li>- are not used up during the reaction</li> <li>- can be recovered chemically unchanged</li> </ul> </li> </ul>	Speed of Reactions		
	<ul style="list-style-type: none"> <li>give everyday examples of uses of catalysts, eg transition metals in car exhaust systems</li> </ul>	Speed of Reactions		

# Atoms and the Periodic Table

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>classify elements in different ways, eg naturally occurring/made by scientists; solid/liquid/gas; metal/non-metal</li> </ul>	How Atoms Combine The Periodic Table		
	<ul style="list-style-type: none"> <li>state that chemists have classified elements by arranging them in the Periodic Table</li> </ul>	Atoms and Atomic Structure How Atoms Combine The Periodic Table		
	<ul style="list-style-type: none"> <li>state that a group is a column of elements in the Periodic Table</li> </ul>	The Periodic Table		
	<ul style="list-style-type: none"> <li>state that elements in one group of the Periodic Table show similar chemical properties</li> </ul>	The Periodic Table		
	<ul style="list-style-type: none"> <li>identify the following families of elements:                             <ul style="list-style-type: none"> <li>- the halogens</li> <li>- the alkali metals</li> <li>- the noble gases</li> <li>- the transition metals</li> </ul> </li> </ul>	How Atoms Combine The Periodic Table		
	<ul style="list-style-type: none"> <li>state that noble gases are a family of very unreactive elements</li> </ul>	The Periodic Table		
	<ul style="list-style-type: none"> <li>state that every element is made up of very small particles called atoms</li> </ul>	Atoms and Atomic Structure		
	<ul style="list-style-type: none"> <li>describe the atom as having a very small positively charged nucleus with negatively charged electrons moving around outside the nucleus</li> </ul>	Atoms and Atomic Structure How Atoms Combine	<ul style="list-style-type: none"> <li>describe the location and charge of the proton, neutron and electron</li> </ul>	Atoms and Atomic Structure
			<ul style="list-style-type: none"> <li>state the relative masses of the proton, neutron and electron</li> </ul>	Atoms and Atomic Structure
	<ul style="list-style-type: none"> <li>state that an atom is neutral because the positive charge of the nucleus is equal to the sum of the negative charges of the electrons</li> </ul>	Atoms and Atomic Structure	<ul style="list-style-type: none"> <li>state that an atom is neutral because the numbers of protons and electrons are equal</li> </ul>	Atoms and Atomic Structure
	<ul style="list-style-type: none"> <li>state that atoms of different elements are different and have a different number on the Periodic Table called the atomic number</li> </ul>	Atoms and Atomic Structure The Periodic Table	<ul style="list-style-type: none"> <li>state that atoms of different elements have a different number of protons, called the atomic number</li> </ul>	Atoms and Atomic Structure The Periodic Table
			<ul style="list-style-type: none"> <li>state that the electrons in an atom are arranged in energy levels</li> </ul>	How Atoms Combine
	<ul style="list-style-type: none"> <li>state the electron arrangements of the first 20 elements</li> </ul>	Atoms and Atomic Structure The Periodic Table		

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>explain the structure of the Periodic Table in terms of the atomic number and chemical properties of the elements</li> </ul>	The Periodic Table		
			<ul style="list-style-type: none"> <li>state that an atom has a mass number which equals the number of protons plus neutrons</li> </ul>	Atoms and Atomic Structure
			<ul style="list-style-type: none"> <li>calculate the number of n, p and e from the mass number and atomic number, and vice versa</li> </ul>	Atoms and Atomic Structure
			<ul style="list-style-type: none"> <li>calculate the number of n, p and e from nuclide notation, including ions</li> </ul>	
			<ul style="list-style-type: none"> <li>state that most elements exist as a mixture of isotopes</li> </ul>	Atoms and Atomic Structure
			<ul style="list-style-type: none"> <li>state what is meant by isotopes</li> </ul>	Atoms and Atomic Structure
	<ul style="list-style-type: none"> <li>state that atoms of different elements vary in size and in mass</li> </ul>	Atoms and Atomic Structure How Atoms Combine The Periodic Table	<ul style="list-style-type: none"> <li>state what is meant by relative atomic mass</li> </ul>	Atoms and Atomic Structure
			<ul style="list-style-type: none"> <li>explain why the average atomic mass of an element is rarely a whole number.</li> </ul>	Atoms and Atomic Structure

# How Atoms Combine

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that atoms can be held together by bonds</li> </ul>	How Atoms Combine	<ul style="list-style-type: none"> <li>state that atoms can achieve a stable electron arrangement</li> </ul>	How Atoms Combine The Periodic Table
	<ul style="list-style-type: none"> <li>describe the covalent bond in terms of atoms sharing pairs of electrons</li> </ul>	How Atoms Combine		
	<ul style="list-style-type: none"> <li>state that a molecule is a group of atoms held together by covalent bonds</li> </ul>	How Atoms Combine	<ul style="list-style-type: none"> <li>explain the covalent bond as a situation in which two positive nuclei are held together by their common attraction for the shared pair of electrons</li> </ul>	How Atoms Combine
	<ul style="list-style-type: none"> <li>state that the chemical formula gives the number of atoms of each element in a molecule of a covalent substance</li> </ul>	How Atoms Combine		
	<ul style="list-style-type: none"> <li>state that (usually) only atoms of nonmetal elements bond to form molecules</li> </ul>	How Atoms Combine		
	<ul style="list-style-type: none"> <li>state that a diatomic molecule is made up of two atoms</li> </ul>	How Atoms Combine		
	<ul style="list-style-type: none"> <li>give examples of elements which exists as diatomic molecules</li> </ul>	How Atoms Combine		
			<ul style="list-style-type: none"> <li>draw a diagram to show how the outer electrons form a covalent bond</li> </ul>	How Atoms Combine
			<ul style="list-style-type: none"> <li>draw diagrams to show the shape of simple two-element molecules</li> </ul>	How Atoms Combine

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that a fuel is a chemical which burns giving out energy</li> </ul>	Fuels		
	<ul style="list-style-type: none"> <li>state that combustion is a reaction of a substance with oxygen, giving out energy</li> </ul>	Fuels		
	<ul style="list-style-type: none"> <li>state the test for oxygen</li> </ul>	Fuels		
	<ul style="list-style-type: none"> <li>state that the main components of air are oxygen and nitrogen in proportion of 1:4</li> </ul>			
	<ul style="list-style-type: none"> <li>state that an exothermic reaction is one in which energy is released</li> </ul>	Fuels		
	<ul style="list-style-type: none"> <li>state what is meant by finite resource and fuel crisis in relation to the amount of coal, oil and natural gas in the earth</li> </ul>	Fuels Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state what is meant by a fossil fuel</li> </ul>	Fuels Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>describe the formation of coal, oil and natural gas</li> </ul>	Fuels		
	<ul style="list-style-type: none"> <li>give examples of the pollution problems associated with oil and coal and explain their occurrence</li> </ul>	Fuels		
	<ul style="list-style-type: none"> <li>state that crude oil is a mixture of compounds</li> </ul>	Fuels Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state that substances have specific melting points and boiling points</li> </ul>	Fuels Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state that a fraction is a group of compounds with boiling points within a given range</li> </ul>	Fuels Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state that fractional distillation is the process used to separate crude oil into fractions</li> </ul>	Fuels Structures and Reactions of Hydrocarbons		

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>explain why fractions can be separated by distillation</li> </ul>	Fuels Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state what is meant by flammability and viscosity</li> </ul>			
	<ul style="list-style-type: none"> <li>give examples of how the products of fractional distillation of crude oil can be used</li> </ul>	Fuels Structures and Reactions of Hydrocarbons	<ul style="list-style-type: none"> <li>state the typical ranges of chain length of the molecules in each fraction and relate this to their use</li> </ul>	Fuels Structures and Reactions of Hydrocarbons
	<ul style="list-style-type: none"> <li>state that the chemical compounds which are found in oil and natural gas are mainly hydrocarbons</li> </ul>	Fuels Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state that a hydrocarbon is a compound which contains hydrogen and carbon only</li> </ul>	Fuels Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state the tests for carbon dioxide and water</li> </ul>	Fuels		
	<ul style="list-style-type: none"> <li>state that hydrocarbons burn completely to produce only carbon dioxide and water</li> </ul>	Fuels Structures and Reactions of Hydrocarbons	<ul style="list-style-type: none"> <li>explain why the production of carbon dioxide and water, on burning, indicates the presence of carbon and hydrogen in the original fuel</li> </ul>	Fuels
	<ul style="list-style-type: none"> <li>state that carbon, and carbon monoxide are produced when hydrocarbons burn in a supply of oxygen with incomplete combustion</li> </ul>	Fuels		
	<ul style="list-style-type: none"> <li>state that the burning of some fuels releases sulphur dioxide</li> </ul>	Fuels		
	<ul style="list-style-type: none"> <li>state that removing sulphur compounds reduces air pollution</li> </ul>			
	<ul style="list-style-type: none"> <li>state that nitrogen and oxygen from the air react inside a car engine to form nitrogen oxides (poisonous gases)</li> </ul>	Fuels		
	<ul style="list-style-type: none"> <li>state that lead compounds which are added to petrol cause pollution</li> </ul>			
	<ul style="list-style-type: none"> <li>state that air pollution from the burning of hydrocarbons can be reduced by special exhaust systems or by altering the fuel to air ratio</li> </ul>	Fuels	<ul style="list-style-type: none"> <li>explain that transition metal catalysts can convert the pollutant gases to harmless gases</li> </ul>	Fuels
			<ul style="list-style-type: none"> <li>explain that decreasing the fuel to air ratio improves the efficiency of combustion thus decreasing pollution.</li> </ul>	

# Structures and Reactions of Hydrocarbons

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that the alkanes are a subset of the set of hydrocarbons</li> </ul>	Structures and Reactions of Hydrocarbons	<ul style="list-style-type: none"> <li>state what is meant by a homologous series</li> </ul>	Structures and Reactions of Hydrocarbons
	<ul style="list-style-type: none"> <li>identify an alkane from the -ane ending</li> </ul>	Structures and Reactions of Hydrocarbons	<ul style="list-style-type: none"> <li>explain that the alkane family is an example of a homologous series</li> </ul>	Structures and Reactions of Hydrocarbons
	<ul style="list-style-type: none"> <li>state the name for each alkane up to octane</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>give examples of uses of alkanes</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>for straight chain alkanes, (C1 to C8), work out the names from molecular formulae, shortened and full structural formulae</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>for straight chain alkanes (C1 to C8), construct full and shortened structural formulae and molecular formulae given the name</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>for alkanes, use the general formula to work out the molecular formulae</li> </ul>	Structures and Reactions of Hydrocarbons	<ul style="list-style-type: none"> <li>derive a general formula for alkanes</li> </ul>	Structures and Reactions of Hydrocarbons
			<ul style="list-style-type: none"> <li>explain in terms of increasing molecular size why the boiling point increases as the number of carbon atoms in an alkane increases</li> </ul>	Structures and Reactions of Hydrocarbons
			<ul style="list-style-type: none"> <li>state the name of each cycloalkane up to cyclohexane</li> </ul>	
			<ul style="list-style-type: none"> <li>explain that the cycloalkane family is an example of a homologous series</li> </ul>	
			<ul style="list-style-type: none"> <li>state what is meant by isomers</li> </ul>	
	<ul style="list-style-type: none"> <li>state that the alkanes are a subset of the set of hydrocarbons</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>identify an alkene from the -ene ending</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state the name for each alkene up to hexene (isomers are not required, eg only butene is expected not but-1-ene, etc)</li> </ul>	Structures and Reactions of Hydrocarbons	<ul style="list-style-type: none"> <li>explain that the alkene family is an example of a homologous series</li> </ul>	Structures and Reactions of Hydrocarbons
<ul style="list-style-type: none"> <li>for alkenes, (C1 to C6), work out names from molecular, shortened or full structural formulae</li> </ul>	Structures and Reactions of Hydrocarbons			

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>for alkenes, C1 to C6 construct full and shortened structural and molecular formulae given the name</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>for alkenes, use a general formula to work out molecular formulae</li> </ul>	Structures and Reactions of Hydrocarbons	<ul style="list-style-type: none"> <li>derive a general formula for alkenes</li> </ul>	Structures and Reactions of Hydrocarbons
	<ul style="list-style-type: none"> <li>identify from a structural formula the following types of compound: alkanes and alkenes</li> </ul>	Structures and Reactions of Hydrocarbons	<ul style="list-style-type: none"> <li>for simple organic molecules, including alkanes, alkenes and cycloalkanes, construct appropriate isometric forms, given a molecular formula</li> </ul>	
	<ul style="list-style-type: none"> <li>state what is meant by a saturated hydrocarbon</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>explain that the alkanes are saturated hydrocarbons</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state what is meant by an unsaturated hydrocarbon</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>explain that the alkenes are a sub-set of the set of unsaturated hydrocarbons</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state that it is possible to distinguish an unsaturated hydrocarbon from a saturated hydrocarbon using bromine (solution)</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state the name of the alkane formed by the reaction of an alkene with hydrogen</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state what is meant by an addition reaction</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>explain that the reactions of alkenes with bromine and hydrogen are addition reactions</li> </ul>	Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state that fractional distillation of crude oil yields more long chain hydrocarbons than are useful for present-day industrial purposes</li> </ul>	Fuels Structures and Reactions of Hydrocarbons		
	<ul style="list-style-type: none"> <li>state that cracking is an industrial method for producing smaller, more useful molecules</li> </ul>	Structures and Reactions of Hydrocarbons		
			<ul style="list-style-type: none"> <li>state that the catalyst allows the reaction to take place at a lower temperature</li> </ul>	Structures and Reactions of Hydrocarbons
<ul style="list-style-type: none"> <li>state that the cracking produces smaller hydrocarbons, some of which are unsaturated</li> </ul>	Structures and Reactions of Hydrocarbons	<ul style="list-style-type: none"> <li>explain why cracking produces a mixture of saturated and unsaturated products.</li> </ul>	Structures and Reactions of Hydrocarbons	

# Properties of Substances

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that metal elements and carbon (graphite) are conductors of electricity and that most non-metal elements are non-conductors of electricity</li> </ul>	Properties of Substances		
	<ul style="list-style-type: none"> <li>state that covalent compounds (solid, liquid, solution) do not conduct electricity</li> </ul>	Properties of Substances		
	<ul style="list-style-type: none"> <li>state that compounds made from metal elements do not conduct electricity in solid state, and that these compounds do conduct electricity when dissolved in water or when molten</li> </ul>	Properties of Substances		
	<ul style="list-style-type: none"> <li>state that electric current is a flow of charged particles</li> </ul>			
	<ul style="list-style-type: none"> <li>state that electrons flow through metals and that ions flow through solutions</li> </ul>	Properties of Substances		
	<ul style="list-style-type: none"> <li>state that electrical energy chemically changes a solution which conducts</li> </ul>		<ul style="list-style-type: none"> <li>state that a d.c. supply must be used if the products are to be identified</li> </ul>	
	<ul style="list-style-type: none"> <li>describe the formation of ions in terms of atoms losing and gaining electrons</li> </ul>	Properties of Substances		
	<ul style="list-style-type: none"> <li>state that solid compounds can be ionic or covalent and that compounds which exist as liquids or gases at room temperature are covalent</li> </ul>	Properties of Substances		
	<ul style="list-style-type: none"> <li>state that ionic solids exist as networks/lattices of oppositely charged ions</li> </ul>	Properties of Substances	<ul style="list-style-type: none"> <li>explain why ionic and covalent network substances are solid, and why covalent substances can be solid, liquid or gas</li> </ul>	Properties of Substances
	<ul style="list-style-type: none"> <li>give examples of covalent substances which are insoluble in water but which dissolve in other solvents</li> </ul>			
	<ul style="list-style-type: none"> <li>state that when ionic compounds dissolve in water, the lattice breaks up completely</li> </ul>			
	<ul style="list-style-type: none"> <li>identify the elements which are formed when an ionic solution is changed by electrical energy, explaining the products at each electrode, in terms of positive metal ions being attracted to the negative electrode and negative non-metal ions being attracted to the positive electrode</li> </ul>	Properties of Substances	<ul style="list-style-type: none"> <li>explain the formation of atoms/molecules at each electrode in terms of positive ions gaining electrons and negative ions losing electrons</li> </ul>	Properties of Substances
	<ul style="list-style-type: none"> <li>state that electrical energy chemically changes a molten ionic compound</li> </ul>			

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>explain why the melt conducts but the solid does not</li> </ul>			
	<ul style="list-style-type: none"> <li>state what is meant by an electrolyte</li> </ul>	Properties of Substances		
	<ul style="list-style-type: none"> <li>state what is meant by electrolysis</li> </ul>	Properties of Substances		
	<ul style="list-style-type: none"> <li>relate the colour of an ionic compound to the colour of the positive and/or negative ions</li> </ul>		<ul style="list-style-type: none"> <li>explain why the process is only applicable to ionic compounds.</li> </ul>	
	<ul style="list-style-type: none"> <li>explain the results of experiments involving the migration of coloured ions</li> </ul>			

# Acids and Alkalis

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that non-metal oxides which dissolve in water produce acid solutions</li> </ul>	Acids and Alkalis The Reactions of Acids		
	<ul style="list-style-type: none"> <li>state that sulphur dioxide reacts with water in the atmosphere to produce acid rain</li> </ul>	Acids and Alkalis The Reactions of Acids		
	<ul style="list-style-type: none"> <li>give examples of the damaging effects of acid rain on buildings, other structures, soils and plant and animal life</li> </ul>	Acids and Alkalis The Reactions of Acids		
	<ul style="list-style-type: none"> <li>state that the pH scale is a continuous range</li> </ul>	Acids and Alkalis The Reactions of Acids		
	<ul style="list-style-type: none"> <li>state that:               <ul style="list-style-type: none"> <li>acids have a pH of less than 7</li> <li>alkalis have a pH of more than 7</li> <li>pure water and neutral solutions have a pH equal to 7</li> </ul> </li> </ul>	Acids and Alkalis The Reactions of Acids		
	<ul style="list-style-type: none"> <li>give examples of common acids and alkalis used in the laboratory and in the home</li> </ul>	Acids and Alkalis The Reactions of Acids		
	<ul style="list-style-type: none"> <li>state that:               <ul style="list-style-type: none"> <li>ions are present in an acid solution</li> <li>ions are present in an alkali solution</li> <li>the concentration of ions in water is small</li> </ul> </li> </ul>	Acids and Alkalis The Reactions of Acids	<ul style="list-style-type: none"> <li>state that in water and a neutral solution, the concentration of <math>H^+(aq)</math> and <math>OH^-(aq)</math> ions is the same</li> </ul>	Acids and Alkalis The Reactions of Acids
	<ul style="list-style-type: none"> <li>state the test for hydrogen</li> </ul>	Acids and Alkalis The Reactions of Acids		
	<ul style="list-style-type: none"> <li>state that an acidic solution is one which contains hydrogen ions (<math>H^+(aq)</math>)</li> </ul>	Acids and Alkalis The Reactions of Acids	<ul style="list-style-type: none"> <li>explain that an acidic solution contains more <math>H^+(aq)</math> ions than does pure water</li> </ul>	Acids and Alkalis The Reactions of Acids
	<ul style="list-style-type: none"> <li>state that an alkaline solution is one which contains hydroxide ions (<math>OH^-(aq)</math>)</li> </ul>	Acids and Alkalis The Reactions of Acids	<ul style="list-style-type: none"> <li>explain that an alkaline solution contains more <math>OH^-(aq)</math> ions than does pure water</li> </ul>	Acids and Alkalis The Reactions of Acids
	<ul style="list-style-type: none"> <li>state that metal oxides or hydroxides which dissolve in water produce alkaline solutions</li> </ul>	Acids and Alkalis The Reactions of Acids		
	<ul style="list-style-type: none"> <li>for an acid and an alkali, describe the effect of dilution on:               <ul style="list-style-type: none"> <li>the acidity or alkalinity</li> <li>the pH</li> </ul> </li> </ul>	Acids and Alkalis	<ul style="list-style-type: none"> <li>explain dilution in terms of the decreasing concentration of hydrogen and hydroxide ions</li> </ul>	

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Learning Outcomes			<ul style="list-style-type: none"> <li>calculate the formula mass of a substance</li> </ul>	Acids and Alkalis
			<ul style="list-style-type: none"> <li>state that the gram formula mass of any substance is known as one mole</li> </ul>	Acids and Alkalis
			<ul style="list-style-type: none"> <li>state that the concentration of a solution is expressed in <math>\text{mol/l}</math> (<math>\text{mol/dm}^3</math>)</li> </ul>	Acids and Alkalis
			<ul style="list-style-type: none"> <li>calculate moles to mass and masses to moles</li> </ul>	Acids and Alkalis
			<ul style="list-style-type: none"> <li>carry out calculations involving mass from <math>\text{mol/l}</math> and mass per volume for a requested concentration.</li> </ul>	Acids and Alkalis

# Reactions of Acids

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that neutralisation is the reaction of acids with neutralisers</li> </ul>	The Reactions of Acids		
	<ul style="list-style-type: none"> <li>give everyday examples of neutralisation, including:               <ul style="list-style-type: none"> <li>- reducing acidity in soil by adding lime</li> <li>- the use of lime to reduce acidity in lakes caused by rain treatment of acid indigestion</li> </ul> </li> </ul>	The Reactions of Acids		
	<ul style="list-style-type: none"> <li>state that neutralisation moves the pH of an acid toward 7</li> </ul>	The Reactions of Acids		
	<ul style="list-style-type: none"> <li>state that the reaction of acids with alkalis is an example of neutralisation</li> </ul>	The Reactions of Acids		
	<ul style="list-style-type: none"> <li>state that neutralisation moves the pH of an alkali towards 7</li> </ul>	Acids and Alkalis The Reactions of Acids		
	<ul style="list-style-type: none"> <li>state that the reaction of <math>H^+(aq)</math> to form water is an example of neutralisation</li> </ul>	Acids and Alkalis The Reactions of Acids	<ul style="list-style-type: none"> <li>state that the reaction of hydrogen ions and hydroxide ions form water</li> </ul>	Acids and Alkalis The Reactions of Acids
	<ul style="list-style-type: none"> <li>name the products formed in the reaction of a neutraliser with dilute hydrochloric, nitric or sulphuric acid</li> </ul>	Acids and Alkalis The Reactions of Acids	<ul style="list-style-type: none"> <li>define a salt as a substance in which the hydrogen ion of an acid has been replaced by a metal ion (or the ammonium ion).</li> </ul>	
	<ul style="list-style-type: none"> <li>state that an acid reacts with a metal carbonate to give off carbon dioxide</li> </ul>	The Reactions of Acids	<ul style="list-style-type: none"> <li>state that the reaction of hydrogen ions and carbonate ions forms water and carbon dioxide</li> <li>explain why, in the preparation of a given salt, it is often easier to use an insoluble metal carbonate or metal oxide as the neutraliser</li> </ul>	The Reactions of Acids
			<ul style="list-style-type: none"> <li>define a base as a substance which neutralises an acid</li> </ul>	Acids and Alkalis The Reactions of Acids
			<ul style="list-style-type: none"> <li>state that bases which dissolve in water form alkalis</li> </ul>	Acids and Alkalis The Reactions of Acids
	<ul style="list-style-type: none"> <li>explain the effect of acid rain on buildings and carbonate rocks</li> </ul>	Acids and Alkalis The Reactions of Acids		
	<ul style="list-style-type: none"> <li>state that in the reaction, hydrogen ions form hydrogen molecules</li> </ul>			
	<ul style="list-style-type: none"> <li>name the products formed when dilute hydrochloric or sulphuric acid reacts with a metal</li> </ul>	Acids and Alkalis		

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>explain the effect of acid rain on structures made from iron</li> </ul>			
	<ul style="list-style-type: none"> <li>state that precipitation is the reaction of two solutions to form an insoluble product called a precipitate</li> </ul>		<ul style="list-style-type: none"> <li>state that insoluble salts can be formed by precipitation</li> </ul>	
	<ul style="list-style-type: none"> <li>name the insoluble product formed by the reaction of two solutions</li> </ul>			
			<ul style="list-style-type: none"> <li>carry out calculations to find the concentration of acids/alkalis from volumetric titration.</li> </ul>	

# Making Electricity

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that, in a battery, electricity comes from a chemical reaction</li> </ul>	Making Electricity		
	<ul style="list-style-type: none"> <li>state that electricity passing along metal wires is a flow of electrons</li> </ul>	Making Electricity		
	<ul style="list-style-type: none"> <li>explain the need to replace batteries in terms of the chemicals being used up in the reaction</li> </ul>	Making Electricity		
	<ul style="list-style-type: none"> <li>state that some batteries are rechargeable, eg the lead-acid battery</li> </ul>	Making Electricity		
	<ul style="list-style-type: none"> <li>explain that ammonium chloride in a cell is an example of an electrolyte</li> </ul>			
	<ul style="list-style-type: none"> <li>explain that the purpose of the electrolyte is to complete the circuit</li> </ul>	Making Electricity		
	<ul style="list-style-type: none"> <li>state that electricity can be produced by connecting different metals together (with an electrolyte) to form a cell</li> </ul>	Making Electricity		
	<ul style="list-style-type: none"> <li>state that the voltage between different pairs of metals varies and that this leads to the electrochemical series</li> </ul>	Making Electricity		
	<ul style="list-style-type: none"> <li>use an electrochemical series showing metals only to explain why displacement reactions occur and describe the experimental observations</li> </ul>	Making Electricity	<ul style="list-style-type: none"> <li>use an electrochemical series to predict whether or not displacement reactions occur; and predict the experimental observations</li> </ul>	Making Electricity
			<ul style="list-style-type: none"> <li>state that the reactions of metals with acids can establish the position of hydrogen in an electrochemical series</li> </ul>	Making Electricity
	<ul style="list-style-type: none"> <li>state that electricity can be produced in a cell by connecting two different metals in solutions of their metal ions</li> </ul>	Making Electricity	<ul style="list-style-type: none"> <li>state that electricity can be produced in a cell when at least one of the half-cells does not involve metal atoms</li> </ul>	Making Electricity
	<ul style="list-style-type: none"> <li>state that the purpose of the “ion bridge” is to complete the circuit</li> </ul>	Making Electricity	<ul style="list-style-type: none"> <li>explain that the movement of ions in the ion bridge is to provide ions to complete the circuit</li> </ul>	Making Electricity
	<ul style="list-style-type: none"> <li>compare batteries and mains electricity sources in relation to ease of transport, safety, costs and uses of finite resources</li> </ul>			
			<ul style="list-style-type: none"> <li>state that a metal element reacting to form a compound is an example of oxidation</li> </ul>	Making Electricity
			<ul style="list-style-type: none"> <li>state that oxidation is a loss of electrons by a reactant in any reaction</li> </ul>	Making Electricity

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes			<ul style="list-style-type: none"> <li>state that a compound reacting to form a metal element is an example of reduction</li> </ul>	Making Electricity
			<ul style="list-style-type: none"> <li>state that reduction is a gain of electrons by a reactant in any reaction</li> </ul>	Making Electricity
			<ul style="list-style-type: none"> <li>state that, in a redox reaction, reduction and oxidation go on together</li> </ul>	Making Electricity
			<ul style="list-style-type: none"> <li>apply terms oxidation and reduction to more complex ion-electron equations, eg <math>\text{SO}_4^{2-}/\text{SO}_3^{2-}</math></li> </ul>	

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that metals conduct electricity when solid or liquid</li> </ul>	Metals - Extraction and Recycling		
	<ul style="list-style-type: none"> <li>relate specific properties of metals, eg density, thermal and electrical conductivity, malleability, strength, to their uses</li> </ul>	Metals - Properties and Corrosion		
	<ul style="list-style-type: none"> <li>explain the need for recycling metals in terms of the finite nature of the metal resources</li> </ul>	Metals - Extraction and Recycling		
	<ul style="list-style-type: none"> <li>describe the reactions of different metals with oxygen, water and dilute acid</li> </ul>	Acids and Alkalis The Reactions of Acids Metals - Properties and Corrosion		
	<ul style="list-style-type: none"> <li>state that these reactions give an indication of the reactivity of the metal</li> </ul>	Metals - Extraction and Recycling		
	<ul style="list-style-type: none"> <li>state that ores are naturally-occurring compounds of metals</li> </ul>	Metals - Extraction and Recycling Metals - Properties and Corrosion		
	<ul style="list-style-type: none"> <li>state that the less reactive metals are found uncombined in the earth's crust and that the more reactive metals have to be extracted from ores</li> </ul>	Metals - Extraction and Recycling Metals - Properties and Corrosion		
			<ul style="list-style-type: none"> <li>explain that the extract of a metal from its ore is an example of reduction</li> </ul>	Metals - Extraction and Recycling
	<ul style="list-style-type: none"> <li>explain why the inactive metals were among the first to be discovered</li> </ul>	Metals - Extraction and Recycling		
	<ul style="list-style-type: none"> <li>give examples of social and industrial factors which resulted in large scale extraction of more reactive metals</li> </ul>	Metals - Extraction and Recycling		
	<ul style="list-style-type: none"> <li>state that some metals can be obtained from metal oxides by heat alone; some by heating with carbon; and some need other methods</li> </ul>	Metals - Extraction and Recycling	<ul style="list-style-type: none"> <li>explain in terms of the reactivity of the metal why some metals can be obtained from metal oxides by heat alone; and why some metal oxides need to be heated with other substances, eg carbon or carbon monoxide; and why some metals cannot be obtained by these methods</li> </ul>	Metals - Extraction and Recycling
	<ul style="list-style-type: none"> <li>state that iron is produced from iron ore in the blast furnace</li> </ul>	Metals - Extraction and Recycling		

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state the two key reactions which take place in the blast furnace:               <ul style="list-style-type: none"> <li>production of carbon monoxide</li> <li>reduction of iron oxide</li> </ul> </li> </ul>	Metals - Extraction and Recycling		
	<ul style="list-style-type: none"> <li>state that an alloy is a mixture of metals or of metals with non-metals</li> </ul>	Metals - Properties and Corrosion		
	<ul style="list-style-type: none"> <li>give examples of the important uses of alloys, eg brass, solder, "stainless" steel</li> </ul>	Metals - Properties and Corrosion		
			<ul style="list-style-type: none"> <li>work out empirical (or molecular) formulae from masses or percentage composition</li> </ul>	
			<ul style="list-style-type: none"> <li>work out percentage masses of elements in compounds from their names or formulae</li> </ul>	

# Corrosion

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that corrosion is a chemical reaction which involves the surface of a metal changing from an element to a compound</li> </ul>	Metals - Properties and Corrosion		
	<ul style="list-style-type: none"> <li>give examples to show that different metals corrode at different rates</li> </ul>	Metals - Properties and Corrosion		
			<ul style="list-style-type: none"> <li>explain that corrosion is an example of oxidation</li> </ul>	Metals - Properties and Corrosion
	<ul style="list-style-type: none"> <li>apply the term rusting to the corrosion of iron</li> </ul>	Metals - Properties and Corrosion		
	<ul style="list-style-type: none"> <li>state that both water and oxygen (from the air) are required for rusting</li> </ul>	Metals - Properties and Corrosion	<ul style="list-style-type: none"> <li>state that water, oxygen and dissolved carbon dioxide, or another electrolyte, are required for rusting</li> </ul>	Metals - Properties and Corrosion
	<ul style="list-style-type: none"> <li>state that when iron rusts, initially the iron atoms lose two electrons to form <math>\text{Fe}^{2+}</math> ions</li> </ul>	Metals - Properties and Corrosion	<ul style="list-style-type: none"> <li>state that the iron (II) ions can be further oxidised to give iron (III) ions</li> </ul>	Metals - Properties and Corrosion
			<ul style="list-style-type: none"> <li>state that electrons lost by the iron during rusting are accepted by the water and oxygen to form hydroxide ions</li> </ul>	Metals - Properties and Corrosion
	<ul style="list-style-type: none"> <li>state that ferroxyl indicator for <math>\text{Fe}^{2+}(\text{aq})</math> can be used to show the extent of the rusting process</li> </ul>	Metals - Properties and Corrosion		
	<ul style="list-style-type: none"> <li>state that salt spread on roads increases the rate of corrosion on car bodywork</li> </ul>	Metals - Properties and Corrosion		
	<ul style="list-style-type: none"> <li>explain that salt acts as an electrolyte</li> </ul>			
	<ul style="list-style-type: none"> <li>state that iron does not rust when attached to the negative terminal of a battery</li> </ul>			
	<ul style="list-style-type: none"> <li>state that electrons flowing to the iron prevents rusting</li> </ul>			
			<ul style="list-style-type: none"> <li>explain the reaction at the iron in an iron/carbon cell using the colour change of <math>\text{Fe}^{2+}</math> indicator and direction of electron flow</li> </ul>	
	<ul style="list-style-type: none"> <li>state that with metals higher in the electrochemical series, electrons flow to the iron, and with metals lower in the series, electrons flow from the iron</li> </ul>	Metals - Properties and Corrosion	<ul style="list-style-type: none"> <li>explain the reactions in a cell using the colour change <math>\text{Fe}^{2+}</math> indicator and the direction of electron flow</li> </ul>	
	<ul style="list-style-type: none"> <li>explain what is meant by the following:               <ul style="list-style-type: none"> <li>- electroplating</li> <li>- galvanising</li> <li>- tin-plating</li> </ul> </li> </ul>			

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>explain that a surface barrier to air and water can provide physical protection against corrosion, eg               <ul style="list-style-type: none"> <li>- painting</li> <li>- greasing</li> <li>- electroplating</li> <li>- galvanising</li> <li>- tin-plating</li> <li>- coating with plastic</li> </ul> </li> </ul>	Metals - Properties and Corrosion		
	<ul style="list-style-type: none"> <li>explain the effect of sacrificial protection in terms of electron flow (eg galvanising, scrap magnesium)</li> </ul>		<ul style="list-style-type: none"> <li>explain the effect of scratching tinfoil in increasing the rate of rusting of iron.</li> </ul>	
	<ul style="list-style-type: none"> <li>give everyday examples of anti-corrosion</li> </ul>			

# Plastics and Synthetic Fibres

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that most plastics and synthetic fibres are made from oil</li> </ul>	Plastics and Synthetic Fibres		
	<ul style="list-style-type: none"> <li>state what is meant by synthetic as used in “synthetic fibre”</li> </ul>	Plastics and Synthetic Fibres		
	<ul style="list-style-type: none"> <li>give examples of how the properties of plastics, eg lightness, durability and insulation relate to their uses</li> </ul>	Plastics and Synthetic Fibres		
	<ul style="list-style-type: none"> <li>give examples of advantages and disadvantages of natural and synthetic materials</li> </ul>	Plastics and Synthetic Fibres		
	<ul style="list-style-type: none"> <li>state what is meant by biodegradable</li> </ul>	Plastics and Synthetic Fibres		
	<ul style="list-style-type: none"> <li>state that most plastics are not biodegradable and that their durability can cause environmental problems</li> </ul>	Plastics and Synthetic Fibres		
	<ul style="list-style-type: none"> <li>state that some plastics burn or smoulder to give off toxic fumes</li> </ul>	Plastics and Synthetic Fibres		
	<ul style="list-style-type: none"> <li>state that a thermoplastic plastic is one which can be melted or reshaped; and that a thermosetting plastic is one which cannot be shaped in this way</li> </ul>	Plastics and Synthetic Fibres	<ul style="list-style-type: none"> <li>relate the toxic gases given off, during burning or smouldering, to the elements present in the plastic, eg carbon monoxide, hydrogen chloride (PVC)</li> </ul>	Plastics and Synthetic Fibres
	<ul style="list-style-type: none"> <li>give examples of uses of thermosetting plastics</li> </ul>	Plastics and Synthetic Fibres		
	<ul style="list-style-type: none"> <li>state what is meant by:               <ul style="list-style-type: none"> <li>monomer</li> <li>polymer</li> <li>polymerisation</li> </ul> </li> </ul>	Plastics and Synthetic Fibres		
	<ul style="list-style-type: none"> <li>state that plastics are examples of polymers</li> </ul>	Plastics and Synthetic Fibres	<ul style="list-style-type: none"> <li>describe how small unsaturated molecules join together</li> </ul>	Plastics and Synthetic Fibres
	<ul style="list-style-type: none"> <li>state that many plastics are made from small unsaturated molecules produced by cracking</li> </ul>			
	<ul style="list-style-type: none"> <li>give examples of plastics formed from alkenes</li> </ul>	Plastics and Synthetic Fibres	<ul style="list-style-type: none"> <li>state what is meant by addition polymerisation</li> </ul>	Plastics and Synthetic Fibres
	<ul style="list-style-type: none"> <li>explain that the making of plastics is an example of polymerisation</li> </ul>	Plastics and Synthetic Fibres	<ul style="list-style-type: none"> <li>explain that the making of polyalkenes is an example of addition polymerisation</li> </ul>	Plastics and Synthetic Fibres
	<ul style="list-style-type: none"> <li>given the name of a monomer, state the name of the addition polymer</li> </ul>	Plastics and Synthetic Fibres		
	<ul style="list-style-type: none"> <li>state that fibres, both natural and synthetic, are examples of polymers</li> </ul>	Plastics and Synthetic Fibres		
<ul style="list-style-type: none"> <li>explain, using full structural formulae, how ethene forms polythene</li> </ul>	Plastics and Synthetic Fibres	<ul style="list-style-type: none"> <li>given the structure of an addition monomer, construct the polymer</li> <li>given the structure of an addition polymer, work out the repeating unit and monomer structures</li> </ul>	Plastics and Synthetic Fibres	

# Fertilizers

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that the increasing world population has led to a need for more efficient food production</li> </ul>			
	<ul style="list-style-type: none"> <li>state that growing plants require nutrients, including compounds of phosphorus and potassium as well as nitrogen</li> </ul>	Fertilizers	<ul style="list-style-type: none"> <li>state that different crops need fertilisers containing different proportions of nitrogen, phosphorus and potassium</li> </ul>	Fertilizers
			<ul style="list-style-type: none"> <li>work out percentage mass of elements in compounds from formulae</li> </ul>	
	<ul style="list-style-type: none"> <li>state that nitrogen-fixing bacteria in root nodules of some plants can convert atmospheric nitrogen into nitrogen compounds</li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>explain the importance of such plants in increasing soil fertility</li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>state that fertilisers are substances which restore the essential elements for plant growth to the soil</li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>give examples of the effect of artificial fertilisers on lochs and rivers</li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>explain the importance of the decomposition of plant and animal protein in the recycling of nitrogen</li> </ul>	Fertilizers	<ul style="list-style-type: none"> <li>state that bacterial methods of fixing nitrogen are cheaper than chemical methods</li> </ul>	
	<ul style="list-style-type: none"> <li>explain in terms of solubility and essential elements why the following are useful, synthetic fertilisers:               <ul style="list-style-type: none"> <li>ammonium salts</li> <li>potassium salts</li> <li>nitrates</li> <li>phosphates</li> </ul> </li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>describe the nitrogen cycle in terms of recycling of nitrogen between plants and animals</li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>describe the various pathways by which nitrogen is gained and lost in the nitrogen cycle</li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>state that ammonia and nitric acid are nitrogen compounds which are used to make fertilisers</li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>describe the industrial manufacture of ammonia from nitrogen and hydrogen (Haber Process)</li> </ul>	Fertilizers	<ul style="list-style-type: none"> <li>explain why the reaction is carried out at moderately high temperature</li> </ul>	Fertilizers
			<ul style="list-style-type: none"> <li>explain why all the nitrogen and hydrogen are not converted to ammonia</li> </ul>	Fertilizers

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that ammonia can be converted to an ammonium compound</li> </ul>	Fertilizers		
			<ul style="list-style-type: none"> <li>state that ammonia can be prepared in the laboratory by the reaction of ammonium compound with alkali</li> </ul>	Fertilizers
	<ul style="list-style-type: none"> <li>describe the following properties of ammonia:               <ul style="list-style-type: none"> <li>appearance</li> <li>smell</li> <li>solubility</li> <li>effect on damp pH paper/universal indicator</li> </ul> </li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>state that nitric acid is formed when nitrogen dioxide, in the presence of air, dissolves in water</li> </ul>			
	<ul style="list-style-type: none"> <li>state that nitrogen gas is not very reactive</li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>state that nitrogen dioxide is produced in the air during lightning storms</li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>explain in energy terms why nitrogen and oxygen can combine during lightning storms or in a car engine</li> </ul>			
	<ul style="list-style-type: none"> <li>explain the effect of nitrogen oxides in rain in terms of:               <ul style="list-style-type: none"> <li>replacing nitrogen compounds in the soil</li> <li>increasing the acidity of the soil</li> </ul> </li> </ul>	Fertilizers		
	<ul style="list-style-type: none"> <li>state that the combination of nitrogen and oxygen does not provide an economic industrial route to nitric acid</li> </ul>			
	<ul style="list-style-type: none"> <li>describe the catalytic oxidation of ammonia to form nitrogen dioxide – a step in the industrial manufacture of nitric acid (Ostwald Process)</li> </ul>		<ul style="list-style-type: none"> <li>explain why the reaction is carried out at a moderately high temperature</li> </ul>	

# Carbohydrates and Related Substances

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that photosynthesis is the process by which plants make carbohydrates from carbon dioxide and water, using light energy in the presence of chlorophyll; oxygen is released in the process</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>state that the role of chlorophyll in photosynthesis is to absorb light energy</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>state that the carbohydrates made in plants during photosynthesis are an important food for animals</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>state that respiration is the process by which animals and plants obtain a supply of energy by breaking down carbohydrates (using oxygen) to give carbon dioxide and water</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>state that carbohydrates release energy, producing carbon dioxide and water when burned</li> </ul>	Carbohydrates	<ul style="list-style-type: none"> <li>explain why the production of carbon dioxide and water, on burning, indicates the presence of carbon and hydrogen in a carbohydrate</li> </ul>	Carbohydrates
	<ul style="list-style-type: none"> <li>give examples of how energy can be used by animals</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>explain the importance of respiration and photosynthesis in maintaining the balance of carbon dioxide and oxygen in the air</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>explain why the extensive clearing of forests could present dangers to life on earth</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>give examples of carbohydrates to include glucose, sucrose and starch</li> </ul>	Carbohydrates	<ul style="list-style-type: none"> <li>explain why glucose/fructose and maltose/ sucrose are pairs of isomers</li> </ul>	
	<ul style="list-style-type: none"> <li>state that carbohydrates contain the elements carbon, hydrogen and oxygen</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>state that glucose is sweet and dissolves in water and that starch is not sweet and does not dissolve well in water</li> </ul>			
	<ul style="list-style-type: none"> <li>explain what is seen when a beam of light is passed through:                             <ul style="list-style-type: none"> <li>- glucose solution</li> <li>- starch in water</li> </ul> </li> </ul>			
	<ul style="list-style-type: none"> <li>state that it is possible to distinguish starch from other carbohydrates using iodine solution</li> </ul>	Carbohydrates		

	General Level	Presentation	Credit Level	Presentation
Learning Outcomes	<ul style="list-style-type: none"> <li>state that Benedict's or Fehling's Reagent is used to test for glucose but not for sucrose</li> </ul>	Carbohydrates	<ul style="list-style-type: none"> <li>state that Benedict's or Fehling's Reagent is used to test for glucose, fructose, maltose and other sugars but not for sucrose</li> </ul>	Carbohydrates
	<ul style="list-style-type: none"> <li>state that glucose is a carbohydrate built up in photosynthesis</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>state that starch is a polymer made in plants from glucose monomer units</li> </ul>	Carbohydrates	<ul style="list-style-type: none"> <li>state that the glucose molecules join together with loss of water</li> </ul>	Carbohydrates
	<ul style="list-style-type: none"> <li>explain that the joining up of glucose molecules to form starch is an example of polymerisation</li> </ul>	Carbohydrates	<ul style="list-style-type: none"> <li>explain that the joining up of glucose molecules is an example of condensation polymerisation</li> </ul>	Carbohydrates
	<ul style="list-style-type: none"> <li>state that during digestion starch molecules are broken down in the body into small glucose molecules</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>state that the breakdown of starch can be carried out in the laboratory using acid or amylase</li> </ul>	Carbohydrates	<ul style="list-style-type: none"> <li>state that starch molecules break down by reacting with water molecules</li> </ul>	Carbohydrates
			<ul style="list-style-type: none"> <li>state what is meant by hydrolysis</li> </ul>	Carbohydrates
			<ul style="list-style-type: none"> <li>explain that the breakdown of starch and sucrose are examples of hydrolysis</li> </ul>	Carbohydrates
	<ul style="list-style-type: none"> <li>state the enzymes act as biological catalysts in the breakdown of complex food molecules</li> </ul>	Carbohydrates		
			<ul style="list-style-type: none"> <li>write the molecular formulae for monosaccharides and disaccharides</li> </ul>	Carbohydrates
	<ul style="list-style-type: none"> <li>state that glucose reacts with oxygen during respiration</li> </ul>	Carbohydrates		
	<ul style="list-style-type: none"> <li>state that alcoholic drinks can be made from any fruit or vegetable which is a source of starch or sugars</li> </ul>			
	<ul style="list-style-type: none"> <li>give examples to show that the type of alcoholic drink varies with the plant source of the carbohydrate</li> </ul>			
	<ul style="list-style-type: none"> <li>state that a yeast enzyme acts as the catalyst for fermentation</li> </ul>			
	<ul style="list-style-type: none"> <li>state that fermentation is the breakdown of glucose to form alcohol and carbon dioxide</li> </ul>		<ul style="list-style-type: none"> <li>describe the effect of changes in pH and temperature on the optimum efficiency of an enzyme</li> </ul>	
	<ul style="list-style-type: none"> <li>state that distillation is a method of increasing the concentration</li> </ul>		<ul style="list-style-type: none"> <li>explain why there is a limit to the alcohol concentration of fermentation products</li> </ul>	
	<ul style="list-style-type: none"> <li>explain why water and alcohol can be separated by distillation</li> </ul>			
<ul style="list-style-type: none"> <li>state that alcohol is a member of the alkanol family and is called ethanol</li> </ul>				

