

C1 Atomic structure

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|---|--|--------------------------|---|--------------------------|--|--------------------------|
| C1.1 Atoms | I can define the word element. | <input type="checkbox"/> | I can describe the basic structure of an atom. | <input type="checkbox"/> | I can use chemical symbols of atoms to produce the chemical formulae of a range of elements and compounds. | <input type="checkbox"/> |
| | I can classify familiar substances as elements or compounds. | <input type="checkbox"/> | I can explain in detail, including diagrams, the difference between a pure element, mixture and compound. | <input type="checkbox"/> | I can explain the significance of chemical symbols used in formulae and equations. | <input type="checkbox"/> |
| | I can use the periodic table to find the symbols or names of given elements. | <input type="checkbox"/> | I can name and give the chemical symbol of the first 20 elements in the periodic table. | <input type="checkbox"/> | | |
| C1.2 Chemical equations | I can describe familiar chemical reactions in word equations. | <input type="checkbox"/> | I can explain why mass is conserved in a chemical reaction. | <input type="checkbox"/> | I can justify in detail how mass may appear to change in a chemical reaction. | <input type="checkbox"/> |
| | I can state that mass is conserved in a chemical reaction. | <input type="checkbox"/> | I can describe familiar chemical reactions with balanced symbol equations including state symbols. | <input type="checkbox"/> | I can describe unfamiliar chemical reactions with more complex balanced symbol equations, including state symbols. | <input type="checkbox"/> |
| | | | I can balance given symbol equations. | <input type="checkbox"/> | I can write balanced symbol equations. | <input type="checkbox"/> |
| C1.3 Separating mixtures | I can define the word 'mixture'. | <input type="checkbox"/> | I can explain the difference between a compound and a mixture. | <input type="checkbox"/> | I can use experimental data to explain the classification of a substance as a compound or a mixture. | <input type="checkbox"/> |
| | I can identify a mixture and a compound. | <input type="checkbox"/> | I can explain how the chemical properties of a mixture relate to the chemical it is made from. | <input type="checkbox"/> | I can suggest an appropriate separation or purification technique for an unfamiliar mixture. | <input type="checkbox"/> |
| | I can list different separation techniques. | <input type="checkbox"/> | I can describe different separation techniques. | <input type="checkbox"/> | I can explain in detail how multi-step separation techniques work. | <input type="checkbox"/> |
| C1.4 Fractional distillation and paper chromatography | I can state when fractional distillation would be used. | <input type="checkbox"/> | I can describe the process of fractional distillation. | <input type="checkbox"/> | I can explain in detail how fractional distillation can separate miscible liquids with similar boiling points. | <input type="checkbox"/> |
| | I can safely make a paper chromatogram. | <input type="checkbox"/> | I can explain the main processes occurring in paper chromatography. | <input type="checkbox"/> | I can evaluate separation or purification techniques for a given mixture. | <input type="checkbox"/> |


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| C1.5 History of the atom | I can list the significant models proposed for atoms. | <input type="checkbox"/> | I can describe the differences between the plum-pudding and the nuclear model of the atom. | <input type="checkbox"/> | I can justify why the model of the atom has changed over time. | <input type="checkbox"/> |
| | I can identify the key parts of the plum-pudding model and the nuclear model of the atom. | <input type="checkbox"/> | I can explain how evidence from scattering experiments changed the model of the atom. | <input type="checkbox"/> | I can evaluate the current model of an atom. | <input type="checkbox"/> |
| C1.6 Structure of the atom | I can state the relative charges and masses of subatomic particles. | <input type="checkbox"/> | I can describe atoms using the atomic model. | <input type="checkbox"/> | I can use the periodic table to find atomic number and mass number data and use it to determine the number of each subatomic particle in any given atom. | <input type="checkbox"/> |
| | I can state that atoms have no overall charge (are neutral). | <input type="checkbox"/> | I can explain why atoms have no overall charge. | <input type="checkbox"/> | I can recognise and describe patterns in subatomic particles of elements listed in the periodic table. | <input type="checkbox"/> |
| | I can label the subatomic particles on a diagram of a helium atom. | <input type="checkbox"/> | I can use atomic number and mass numbers of familiar atoms to determine the number of each subatomic particle. | <input type="checkbox"/> | I can explain why we can be confident that there are no missing elements in the first 10 elements of the periodic table. | <input type="checkbox"/> |
| C1.7 Ions, atoms, and isotopes | I can state what an ion is. | <input type="checkbox"/> | I can describe isotopes using the atomic model. | <input type="checkbox"/> | I can use the periodic table to find atomic number and mass number data and use it to determine the number of each subatomic particle in an ion. | <input type="checkbox"/> |
| | I can define an isotope. | <input type="checkbox"/> | I can explain why ions have a charge. | <input type="checkbox"/> | I can use SI units and prefixes to describe the size of an atom and its nucleus in standard form. | <input type="checkbox"/> |
| | I can state the relative sizes of an atom and its nucleus. | <input type="checkbox"/> | I can use atomic number and mass numbers of familiar ions to determine the number of each subatomic particle. | <input type="checkbox"/> | I can explain why chlorine does not have a whole mass number. | <input type="checkbox"/> |
| C1.8 Electronic structures | I can state that electrons are found in energy levels of an atom. | <input type="checkbox"/> | I can write the standard electronic configuration notation from a diagram for the first 20 elements. | <input type="checkbox"/> | I can use the periodic table to find atomic number and determine the electronic structure for the first 20 elements . | <input type="checkbox"/> |
| | I can state the maximum number of electrons in the first three energy levels. | <input type="checkbox"/> | I can explain why elements in the same group react in a similar way . | <input type="checkbox"/> | I can make predictions for how an element will react when given information on another element in the same group. | <input type="checkbox"/> |

C2 - The periodic table

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|---|--|--------------------------|---|--------------------------|---|--------------------------|
| C2.1 Development of the periodic table | I can list the significant models for ordering the elements. | <input type="checkbox"/> | I can describe how the elements are arranged in groups and periods in the periodic table. | <input type="checkbox"/> | I can explain how and why the ordering of the elements has changed over time. | <input type="checkbox"/> |
| | I can state how the elements are ordered in the periodic table. | <input type="checkbox"/> | I can explain why the periodic table was a breakthrough in how to order elements. | <input type="checkbox"/> | | |
| C2.2 Electronic structures and the periodic table | I can define a group and period in the periodic table. | <input type="checkbox"/> | I can describe how the electronic structure of metals and non-metals are different. | <input type="checkbox"/> | I can explain how the electronic structure of metals and non-metals affects their reactivity. | <input type="checkbox"/> |
| | I can describe how electronic structure is linked to the periodic table. | <input type="checkbox"/> | I can explain in terms of electronic structure how the elements are arranged in the periodic table. | <input type="checkbox"/> | I can use the periodic table to make predictions about the electronic structure and reactions of elements. | <input type="checkbox"/> |
| | I can state that noble gases are unreactive. | <input type="checkbox"/> | I can explain why the noble gases are unreactive and the trend in their boiling points. | <input type="checkbox"/> | I can predict the electronic structure of stable ions for the first 20 elements. | <input type="checkbox"/> |
| C2.3 Group 1- the alkali metals | I can name the first three elements in Group 1. | <input type="checkbox"/> | I can recognise trends in supplied data. | <input type="checkbox"/> | I can illustrate the reactions of Group 1 metals with balanced symbol equations. | <input type="checkbox"/> |
| | I can describe the Group 1 metals as having low densities. | <input type="checkbox"/> | I can explain why the elements in Group 1 react similarly and why the first three elements float on water. | <input type="checkbox"/> | I can explain how Group 1 metals form ions with a +1 charge when they react with non-metals. | <input type="checkbox"/> |
| | I can write word equations from descriptions of how Group 1 metals react with water. | <input type="checkbox"/> | I can Describe how you can show that hydrogen and metal hydroxides are made when Group 1 metals react with water. | <input type="checkbox"/> | I can justify how Group 1 metals are stored and the safety precautions used when dealing with them. | <input type="checkbox"/> |
| C2.4 Group 7- the halogens | I can name the first four elements in Group 7. | <input type="checkbox"/> | I can recognise trends in supplied data. | <input type="checkbox"/> | I can illustrate the reactions of Group 7 metals with balanced symbol equations. | <input type="checkbox"/> |
| | I can recognise a halogen displacement reaction. | <input type="checkbox"/> | I can explain why the elements in Group 7 react similarly. | <input type="checkbox"/> | I can explain how Group 7 non-metals form ions with a -1 charge when they react with metals. | <input type="checkbox"/> |
| | I can describe the main properties of halogens. | <input type="checkbox"/> | I can explain how to complete a halogen displacement reaction and explain what happens in the reaction. | <input type="checkbox"/> | I can explain in detail how to compare the reactivity of the Group elements. | <input type="checkbox"/> |
| C2.5 Explaining trends | I can state the trend in reactivity in Group 1. | <input type="checkbox"/> | I can explain how electronic structure affects the trend in reactivity of Group 1 and Group 7 elements. | <input type="checkbox"/> | I can use electronic structure to explain the trends in physical and chemical properties of Group 1 and Group 7 elements. | <input type="checkbox"/> |

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| | I can state the trend in reactivity in Group 7. | <input type="checkbox"/> | I can use the nuclear model to explain how the outer electrons experience different levels of attraction to the nucleus. | <input type="checkbox"/> | I can apply knowledge of reactivity of Groups 1 and 7 to suggest and explain the trend in reactivity of Group 2 and 6. | <input type="checkbox"/> |
| C2.6 The transition elements | I can list the typical properties of transition metals and their compounds. | <input type="checkbox"/> | I can describe how the properties of Group 1 metals compare with transition metals. | <input type="checkbox"/> | I can justify the use of a transition metal or its compound in terms of its chemical properties. | <input type="checkbox"/> |
| | I can explain why mercury is not a typical transition element. | <input type="checkbox"/> | I can interpret the formula and names of familiar transition metal compounds. | <input type="checkbox"/> | I can suggest why Group 1 metals have different properties compared to transition metals. | <input type="checkbox"/> |

C3 - Structure and bonding

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|-----------------------------|--|--------------------------|--|--------------------------|---|--------------------------|
| C3.1 States of matter | I can identify the three states of matter and their state symbols. | <input type="checkbox"/> | I can use data to determine the state of a substance at a given temperature. | <input type="checkbox"/> | I can use the particle model to describe how energy, movement, and attraction between particles changes as a substance is heated or cooled. | <input type="checkbox"/> |
| | I can describe the process of melting, freezing, boiling, and condensing. | <input type="checkbox"/> | I can explain, in terms of particles, energy and temperature of a substance when it is at the melting point or boiling point. | <input type="checkbox"/> | I can suggest why substances have different melting and boiling points from each other. | <input type="checkbox"/> |
| | I can use the particle model to draw a representation of how particles are arranged in the three states of matter. | <input type="checkbox"/> | I can describe the factors that affect rate of evaporation. | <input type="checkbox"/> | I can evaluate a model, explaining its limitations.  | <input type="checkbox"/> |
| C3.2 Atoms in ions | I can state the particles involved in ionic and covalent bonding. | <input type="checkbox"/> | I can draw dot and cross diagrams of compounds formed between Group 1 and Group 7 elements. | <input type="checkbox"/> | I can draw dot and cross diagrams of unfamiliar ionic compounds. | <input type="checkbox"/> |
| | I can describe, with an example, how a Group 1 metal atom becomes a positive ion. | <input type="checkbox"/> | I can explain how electron transfer allows ionic bonding to occur in the compound formed when a Group 1 metal reacts with a Group 7 non-metal. | <input type="checkbox"/> | I can suggest and explain the charge of a monatomic ion based on its position in the periodic table. | <input type="checkbox"/> |
| | I can describe, with an example, how a Group 7 non-metal atom becomes a negative ion. | <input type="checkbox"/> | | | | |
| C3.3 Ionic bonding | I can state that opposite charges attract. | <input type="checkbox"/> | I can explain how the position of an element on the periodic table relates to the charge on its most stable monatomic ion. | <input type="checkbox"/> | I can suggest the charge on unfamiliar ions using the position of the element in the periodic table. | <input type="checkbox"/> |
| | I can write the charges of ions of Group 1, Group 2, Group 6, and Group 7 elements. | <input type="checkbox"/> | I can explain, in terms of electronic structure, how unfamiliar elements become ions. | <input type="checkbox"/> | I can explain the ratio of metal and non-metal ions in compounds. | <input type="checkbox"/> |
| | I can describe an ionic lattice. | <input type="checkbox"/> | I can interpret formula of familiar ionic compounds to determine the number and type of each ion present. | <input type="checkbox"/> | I can generate formula of a wide range of ionic compounds when the charges of the ions are given. | <input type="checkbox"/> |
| C3.4 Giant ionic structures | I can state that ionic compounds have high melting points and can dissolve in water. | <input type="checkbox"/> | I can explain why ionic compounds have a high melting point. | <input type="checkbox"/> | I can explain in detail why ionic compounds cannot conduct electricity when they are solid but can when molten or in solution. | <input type="checkbox"/> |
| | I can state that ionic compounds can conduct electricity when molten or dissolved in water. | <input type="checkbox"/> | I can describe, in terms of ions, how an ionic compound can conduct electricity. | <input type="checkbox"/> | I can justify in terms of properties that a compound has ionic bonding. | <input type="checkbox"/> |

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| | I can describe an ionic lattice. | <input type="checkbox"/> | I can explain the movement of ions in solutions or when molten. | <input type="checkbox"/> | I can apply the ionic model to make predictions of the physical properties of ionic compounds. | <input type="checkbox"/> |
| C3.5 Covalent bonding | I can describe a covalent bond. | <input type="checkbox"/> | I can explain how a covalent bond forms in terms of electronic structure. | <input type="checkbox"/> | I can draw dot and cross diagrams and ball and stick diagrams for unfamiliar small molecules. | <input type="checkbox"/> |
| | I can recognise a covalent compound from its formula, name, or diagram showing bonds. | <input type="checkbox"/> | I can draw dot and cross diagrams and ball and stick diagrams for H ₂ , Cl ₂ , O ₂ , N ₂ , HCl, H ₂ O, NH ₃ , and CH ₄ . | <input type="checkbox"/> | I can suggest how double and triple covalent bonds can be formed. | <input type="checkbox"/> |
| | I can name familiar examples of small molecules which contain covalent bonds. | <input type="checkbox"/> | I can describe a double bond in a diatomic molecule. | <input type="checkbox"/> | I can suggest how the properties of a double bond could be different to the properties of a single covalent bond. | <input type="checkbox"/> |
| C3.6 Simple molecules | I can state that small molecules have low melting and boiling points. | <input type="checkbox"/> | I can explain how the size of molecules affects melting and boiling points | <input type="checkbox"/> | I can predict the physical properties of unfamiliar covalently bonded substances. | <input type="checkbox"/> |
| | I can state that small molecules do not conduct electricity. | <input type="checkbox"/> | I can explain why small molecules and polymers do not conduct electricity. | <input type="checkbox"/> | I can compare and contrast the properties of substances with different bonding. | <input type="checkbox"/> |
| | I can describe an intermolecular force. | <input type="checkbox"/> | I can identify substances that would have weak intermolecular forces. | <input type="checkbox"/> | I can justify the use of a model to explain the physical properties of a small molecule and discuss the limitations of various molecular models. | <input type="checkbox"/> |
| C3.7 Giant covalent structures | I can list the main physical properties of diamond and graphite. | <input type="checkbox"/> | I can recognise the structure of diamond and graphite from information provided in written or diagrammatic form. | <input type="checkbox"/> | I can use a molecular model of an unfamiliar giant covalent structure to predict and explain its physical properties. | <input type="checkbox"/> |
| | I can state that giant covalent structures have high melting points. | <input type="checkbox"/> | I can explain the properties of diamond in terms of its bonding. | <input type="checkbox"/> | I can justify in detail a use for graphite based on its properties. | <input type="checkbox"/> |
| | I can describe the structure of graphite in terms of layers of carbon atoms. | <input type="checkbox"/> | I can explain the properties of graphite in terms of its bonding. | <input type="checkbox"/> | I can justify in detail a use for diamond based on its properties. | <input type="checkbox"/> |
| C3.8 Fullerenes and graphene | I can describe the relationship between graphite and graphene. | <input type="checkbox"/> | I can recognise the structure of a fullerene or nanotube in diagrams and prose. | <input type="checkbox"/> | I can describe and explain the applications of fullerenes. | <input type="checkbox"/> |
| | I can list the main physical properties of fullerenes. | <input type="checkbox"/> | I can explain the structure of fullerenes. | <input type="checkbox"/> | I can use molecular models of graphene, nanotubes, and fullerenes to explain their properties. | <input type="checkbox"/> |
| | I can state the molecular formula of buckminsterfullerene. | <input type="checkbox"/> | I can list the properties and consequent uses of fullerenes and carbon nanotubes. | <input type="checkbox"/> | I can justify in detail a use for graphene, nanotubes and fullerenes, based on their properties. | <input type="checkbox"/> |




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| C3.9 Bonding in metals | I can state that metals form a giant structure. | <input type="checkbox"/> | I can describe metallic bonding. | <input type="checkbox"/> | I can explain how metal atoms form giant structures. | <input type="checkbox"/> |
| | I can recognise metallic bonding in diagrams. | <input type="checkbox"/> | I can recognise and represent metallic bonding diagrammatically. | <input type="checkbox"/> | I can evaluate different models of metallic bonding. | <input type="checkbox"/> |
| C3.10 Bonding in metals | I can list the physical properties of metals. | <input type="checkbox"/> | I can explain key physical properties of metals using the model of metallic bonding. | <input type="checkbox"/> | I can explain in detail, including labelled diagrams, how alloying affects the structure and bonding in metals and its effect on properties. | <input type="checkbox"/> |
| | I can describe the structure of a pure metal. | <input type="checkbox"/> | I can describe why metals are alloyed. | <input type="checkbox"/> | I can justify in detail why alloys are more often used than pure metals. | <input type="checkbox"/> |
| C3.11 Nanoparticles | I can state a definition of nanoscience. | <input type="checkbox"/> | I can describe the size of nanoparticles. | <input type="checkbox"/> | I can classify a particle as coarse, fine, or nanoparticles based on their size. | <input type="checkbox"/> |
| | I can describe how surface area to volume increases as particle size reduces. | <input type="checkbox"/> | I can explain why surface area to volume ratio increases as particle size decrease. | <input type="checkbox"/> | I can quantitatively explain the relationship between surface area to volume ratio and particle size and its effect on properties. | <input type="checkbox"/> |
| | I can recognise that the negative indices in standard form used in nanoscience are very small numbers. | <input type="checkbox"/> | I can convert lengths into standard form. | <input type="checkbox"/> | I can convert standard form into a variety of length units. | <input type="checkbox"/> |
| C3.12 Applications of nanoscience | I can state that nanoparticles can be used in sun cream. | <input type="checkbox"/> | I can list the advantages and disadvantages of using nanoparticles. | <input type="checkbox"/> | I can evaluate the use of nanoparticles in their applications, including sun cream. | <input type="checkbox"/> |
| | I can list a variety of uses of nanoparticles. | <input type="checkbox"/> | I can explain why nanoparticles can have new applications. | <input type="checkbox"/> | I can decide and justify in detail why nanotechnology research should continue. | <input type="checkbox"/> |

C 4 - Chemical calculations

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|---|--|--------------------------|--|--------------------------|--|--------------------------|
| C4.1 Relative masses and moles | I can use the periodic table to identify the relative atomic mass for the first 20 elements. | <input type="checkbox"/> | I can use the periodic table to find the relative atomic mass of all elements. | <input type="checkbox"/> | I can explain why some elements have the same relative atomic mass as each other and why relative atomic masses may not be a whole number. | <input type="checkbox"/> |
| | I can calculate the relative formula mass for familiar compounds when the formula is supplied and is without brackets. | <input type="checkbox"/> | I can calculate the relative formula mass for unfamiliar compounds when the formula is given. | <input type="checkbox"/> | I can calculate the number of moles or mass of a substance from data supplied. | <input type="checkbox"/> |
| | | | I can state the units for the amount of substance. | <input type="checkbox"/> | I can convert between units in calculations. | <input type="checkbox"/> |
| C4.2 Equations and calculations Ⓜ | | | I can explain why chemical equations must be balanced. | <input type="checkbox"/> | I can interpret balanced symbol equations in terms of mole ratios. | <input type="checkbox"/> |
| | | | I can calculate the relative formula mass for one substance when the relative formula masses are given for all the other substances in a balanced symbol equation. | <input type="checkbox"/> | I can use balanced symbol equations to calculate reacting masses. | <input type="checkbox"/> |
| C4.3 From masses to balanced equations Ⓜ | | | I can explain why chemical equations must be balanced. | <input type="checkbox"/> | I can explain the effect of a limiting reactant on the amount of product made. | <input type="checkbox"/> |
| | | | I can identify the limiting reactant in a chemical reaction. | <input type="checkbox"/> | I can use balanced symbol equations to calculate reacting masses when there is a limiting reactant. | <input type="checkbox"/> |
| C4.4 Yield of a chemical reaction | I can state the definition of theoretical yield, actual yield, and percentage yield. | <input type="checkbox"/> | I can calculate percentage yield when the actual yield is given and the mass of the limiting reactant is given. | <input type="checkbox"/> | I can calculate the percentage yield using a variety of units and conversions. | <input type="checkbox"/> |
| | I can calculate percentage yield when actual yield and theoretical yield are given. | <input type="checkbox"/> | I can list reasons why actual yield is often lower than theoretical yield. | <input type="checkbox"/> | I can justify why percentage yield can never be above 100%. | <input type="checkbox"/> |
| C4.5 Atom economy | I can calculate the formula mass of substances when the formula is given. | <input type="checkbox"/> | I can calculate the atom economy for a given chemical reaction. | <input type="checkbox"/> | I can evaluate different reactions to decide the best production method of a chemical. | <input type="checkbox"/> |
| | I can recognise a covalent compound from its formula, name, or diagram showing bonds. | <input type="checkbox"/> | I can explain why using reactions with high atom economy is important. | <input type="checkbox"/> | I can explain why the sum of the formula masses of the reactants is the same as the sum of the formula masses of the products. | <input type="checkbox"/> |

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| | I can state a definition of atom economy. | <input type="checkbox"/> | | | | |
| C4.6 Expressing concentrations Ⓜ | | | I can explain how concentration of a solution can be changed. | <input type="checkbox"/> | I can calculate the concentration of a solution when the number of moles and volume in cm ³ is given. | <input type="checkbox"/> |
| | | | I can calculate the concentration, in mol/dm ³ , of a solution when the number of moles and volume in dm ³ is given. | <input type="checkbox"/> | I can calculate the mass of a chemical when any volume and concentration is given and independently express their answers to an appropriate number of significant figures. | <input type="checkbox"/> |
| | | | I can calculate the concentration of a solution in g/dm ³ of a solution when the number of moles and volume in dm ³ is given. | <input type="checkbox"/> | I can calculate the amount of solute in a solution using the concentration of the solution. | <input type="checkbox"/> |
| C4.7 Titrations | | | I can calculate a titre. | <input type="checkbox"/> | I can justify the use of a pipette and burette for a titration, evaluating the errors involved in reading these instruments. | <input type="checkbox"/> |
| | | | I can describe how an indicator can be used to determine the end point. | <input type="checkbox"/> | I can explain how precise results are obtained in a titration. | <input type="checkbox"/> |
| | | | I can explain how accuracy can be improved in a titration. | <input type="checkbox"/> | I can justify the use of an indicator in an acid-base titration. | <input type="checkbox"/> |
| C4.8 Titration calculations Ⓜ | | | I can calculate the amount of acid or alkali needed in a neutralisation reaction. | <input type="checkbox"/> | I can calculate the unknown concentration of a reactant in a neutralisation reaction when the volumes are known and the concentration of one reactant is also known. | <input type="checkbox"/> |
| | | | I can convert units. | <input type="checkbox"/> | I can extract data from given information to perform multi-step calculations independently. | <input type="checkbox"/> |
| C4.9 Volumes of gases Ⓜ | | | I can calculate the amount in moles of gas in a given volume at room temperature and pressure. | <input type="checkbox"/> | I can suggest how the volume of gas would change when temperature or pressure was changed. | <input type="checkbox"/> |
| | | | I can convert units. | <input type="checkbox"/> | I can calculate the moles or volume of a gaseous substance involved in a chemical reaction. | <input type="checkbox"/> |




C5 Chemical Changes

| <i>Can you...?</i> |  |  |  |
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| Metal oxides | | | |
| Recall that metals react with oxygen to produce metal oxides. | | | |
| Describe reduction and oxidation in terms of loss or gain of oxygen. | | | |
| The reactivity series | | | |
| Explain what determines the reactivity of a metal. | | | |
| Explain why displacement reactions occur. | | | |
| State and describe the reactions, if any, of potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper with water. | | | |
| State and describe the reactions, if any, of potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper with dilute acids | | | |
| Place these metals in order of reactivity. | | | |
| Deduce an order of reactivity of metals based on experimental results. | | | |
| Extraction of metals and reduction | | | |
| Explain why some metals such as gold are found in the Earth as the metal itself but most metals are found as compounds that require chemical reactions to extract the metal. | | | |
| State what determines whether a metal can be extracted from its oxide by reduction carbon. | | | |
| Interpret or evaluate specific metal extraction processes when given appropriate information | | | |
| Identify the substances which are oxidised or reduced in terms of gain or loss of oxygen. | | | |
| Oxidation and reduction in terms of electrons (HT only) | | | |
| Describe reduction and oxidation in terms of loss or gain of electrons. | | | |
| Write ionic equations for displacement reactions. | | | |
| Identify in a given reaction, symbol equation or half equation which species are oxidised and which are reduced. | | | |
| Reactions of acids with metals | | | |
| Recall that acids react with some metal to produce salts and hydrogen. | | | |
| Explain in terms of gain or loss of electrons, that these are redox reactions. | | | |
| Identify which species are oxidised and which are reduced in given chemical equations. | | | |
| Neutralisation of acids and salt production | | | |
| Recall that acids are neutralised by alkalis (eg soluble metal hydroxides) and bases (eg insoluble metal hydroxides and metal oxides) to produce salts and water. | | | |

C5 Chemical Changes

| <i>Can you...?</i> | 😊 | 😐 | 😞 |
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| Recall that Acids are neutralised by metal carbonates to produce salts, water and carbon dioxide. | | | |
| Name salts produced by these reactions. | | | |
| Predict products from given reactants. | | | |
| Use the formulae of common ions to deduce the formulae of salts. | | | |
| Soluble salts | | | |
| State the reactions that can be used to make soluble salts. | | | |
| Describe how to make pure, dry samples of named soluble salts from information provided. | | | |
| The pH scale and neutralisation | | | |
| Recall that acids produce hydrogen ions (H ⁺) in aqueous solutions. | | | |
| Recall that aqueous solutions of alkalis contain hydroxide ions (OH ⁻). | | | |
| Describe what the pH scale is and how it is used. | | | |
| Recall that in neutralisation reactions between an acid and an alkali, hydrogen ions react with hydroxide ions to produce water. | | | |
| State the ionic equation for a neutralisation reaction. | | | |
| Describe the use of universal indicator or a wide range indicator to measure the approximate pH of a solution. | | | |
| Use the pH scale to identify acidic or alkaline solutions. | | | |
| Titration (Chemistry only) | | | |
| Recall that the volumes of acid and alkali solutions that react with each other can be measured by titration using a suitable indicator. | | | |
| Describe how to carry out titrations using strong acids and strong alkalis only (sulfuric, hydrochloric and nitric acids only) to find the reacting volumes accurately | | | |
| Calculate the chemical quantities in titrations involving concentrations in mol/dm ³ and in g/dm ³ . (HT Only) | | | |
| Strong and weak acids (HT only) | | | |
| State what a strong acid is and give examples. | | | |
| State what a weak acid is and give examples. | | | |
| Recall that for a given concentration of aqueous solutions, the stronger an acid, the lower the pH. | | | |
| Recall that as the pH decreases by one unit, the hydrogen ion concentration of the solution increases by a factor of 10. | | | |
| Use and explain the terms dilute and concentrated, and weak and strong in relation to acids | | | |

C5 Chemical Changes

| <i>Can you...?</i> |  |  |  |
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| Describe neutrality and relative acidity in terms of the effect on hydrogen ion concentration and the numerical value of pH (whole numbers only). | | | |

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|-----------------------------------|--|--------------------------|---|--------------------------|--|--------------------------|
| C6.1 Introduction to electrolysis | I can define electrolysis. | <input type="checkbox"/> | I can describe electrolysis in terms of movement of ions. | <input type="checkbox"/> | I can explain why electrolysis can only occur when an ionic compound is molten or in aqueous solution. | <input type="checkbox"/> |
| | I can write a word equation to describe the electrolysis of a molten ionic compound. | <input type="checkbox"/> | I can write a balanced symbol equation including state symbols for the overall electrolysis of a molten ionic compound. | <input type="checkbox"/> | I can describe electrolysis with half equations at the electrodes. | <input type="checkbox"/> |
| | | | I can predict the products at each electrode for the electrolysis of a molten ionic compound. | <input type="checkbox"/> | I can explain the classification of the reactions at each electrode as oxidation or reduction. | <input type="checkbox"/> |
| C6.2 Changes at the electrodes | I can state that oxygen can be produced at the anode when some solutions are electrolysed. | <input type="checkbox"/> | I can describe electrolysis of solutions in terms of movement of ions. | <input type="checkbox"/> | I can explain how hydrogen ions and hydroxide ions can be present in solutions, including a balanced symbol equation with state symbols, for the reversible reaction in which water ionises. | <input type="checkbox"/> |
| | I can state that hydrogen can be produced at the cathode when some solutions are electrolysed. | <input type="checkbox"/> | I can write a balanced symbol equation including state symbols for the overall electrolysis of a solution. | <input type="checkbox"/> | I can describe electrolysis with half equations at the electrodes. | <input type="checkbox"/> |
| | I can write a word equation to describe electrolysis of a solution. | <input type="checkbox"/> | I can predict the products at each electrode for the electrolysis of a molten ionic compound or its solution. | <input type="checkbox"/> | I can explain the classification of reactions at the electrodes as oxidation or reduction. | <input type="checkbox"/> |

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|--|--|--------------------------|--|--------------------------|---|--------------------------|
| C6.3 Extraction of aluminium | I can state that aluminium can be extracted from aluminium oxide using electrolysis. | <input type="checkbox"/> | I can describe the electrolysis of aluminium oxide. | <input type="checkbox"/> | I can explain why electrolysis is used to extract aluminium from compounds. | <input type="checkbox"/> |
| | I can write a word equation to describe the electrolysis of aluminium oxide. | <input type="checkbox"/> | I can explain why electrolysis is an expensive metal extraction method and illustrate this with the extraction of aluminium. | <input type="checkbox"/> | I can describe electrolysis with half equations at the electrodes. | <input type="checkbox"/> |
| | | | I can explain why cryolite is added to aluminium oxide in the industrial extraction of aluminium. | <input type="checkbox"/> | I can explain the classification of the reactions at each electrode as oxidation or reduction. | <input type="checkbox"/> |
| C6.4 Electrolysis of aqueous solutions | I can state the products of the electrolysis of brine and a use for each. | <input type="checkbox"/> | I can describe how to electrolyse brine in terms of ions moving. | <input type="checkbox"/> | I can explain the electrolysis of brine using half equations, classifying reactions at the electrode as oxidation or reduction. | <input type="checkbox"/> |
| | I can safely electrolyse a solution, with guidance provided. | <input type="checkbox"/> | I can predict the products of electrolysis of a solution. | <input type="checkbox"/> | I can evaluate in detail an investigation we have planned and carried out, commenting on our methodology and quality of the data collected. | <input type="checkbox"/> |
| | | | I can plan and carry out an electrolysis investigation. | <input type="checkbox"/> | I can explain the classification of the reactions at each electrode as oxidation or reduction. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C7 Energy changes

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|--|---|--------------------------|---|--------------------------|---|--------------------------|
| C7.1 Exothermic and endothermic reactions | I can define exothermic and endothermic reactions. | <input type="checkbox"/> | I can describe examples of exothermic and endothermic reactions. | <input type="checkbox"/> | I can explain a chemical reaction in terms of energy transfer. | <input type="checkbox"/> |
| | I can state that energy is conserved in a chemical reaction. | <input type="checkbox"/> | I can explain, using observations from calorimetry, how to classify a reaction as exothermic or endothermic. | <input type="checkbox"/> | I can plan, carry out, and evaluate the errors in a calorimetry investigation. | <input type="checkbox"/> |
| | I can safely complete a calorimetry experiment for a reaction that takes place in solution. | <input type="checkbox"/> | I can explain in detail how to carry out a calorimetry experiment. | <input type="checkbox"/> | | |
| C7.2 Using energy transfers from reactions | I can state a use of an exothermic reaction and an endothermic reaction. | <input type="checkbox"/> | I can explain how an energy change from a chemical reaction can be used. | <input type="checkbox"/> | I can suggest a chemical reaction for a specific purpose based on the energy change for the reaction. | <input type="checkbox"/> |
| | I can write word equations for familiar reactions. | <input type="checkbox"/> | I can write balanced symbol equations for familiar reactions. | <input type="checkbox"/> | I can evaluate in detail the uses of exothermic and endothermic reactions. | <input type="checkbox"/> |
| C7.3 Reaction profiles | I can define activation energy. | <input type="checkbox"/> | I can label activation energy on a reaction profile diagram. | <input type="checkbox"/> | I can explain why chemical reactions need activation energy to start them. | <input type="checkbox"/> |
| | I can sketch a generic reaction profile diagram for an exothermic or endothermic reaction. | <input type="checkbox"/> | I can generate a specific reaction profile diagram for a given chemical reaction when its energy change is also supplied. | <input type="checkbox"/> | I can use the particle model to explain how a chemical reaction occurs. | <input type="checkbox"/> |
| | | | I can identify bonds broken in reactants and new bonds made in products of a reaction. | <input type="checkbox"/> | I can explain energy change in terms of the balance between bond making and bond breaking. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C7 Energy changes

Name Class Date

| Lesson | Aiming for 4 | Aiming for 6 | | Aiming for 8 | |
|-------------------------------|--------------|---|--------------------------|--|--------------------------|
| C7.4 Bond energy calculations | | I can explain, using the particle model, how reactants become products in a chemical reaction. | <input type="checkbox"/> | I can calculate the energy needed to break the reactant bonds and the energy released when the product bonds are made. | <input type="checkbox"/> |
| | | I can explain why bond breaking is endothermic and bond making is exothermic. | <input type="checkbox"/> | I can calculate the energy change for a reaction, including the correct unit. | <input type="checkbox"/> |
| | | I can define bond energy and identify all the bonds that break and are made in a chemical reaction. | <input type="checkbox"/> | I can explain in terms of bond energies how a reaction is either exothermic or endothermic. | <input type="checkbox"/> |

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|--|--|--------------------------|---|--------------------------|---|--------------------------|
| 8.1 Rate of reaction | I can recall a definition for rate of reaction. | <input type="checkbox"/> | I can explain how there can be different units for measuring rate of reaction. | <input type="checkbox"/> | I can plot and use a graph to calculate the gradient to measure the initial rate of reaction. | <input type="checkbox"/> |
| | I can safely describe and follow a method to monitor rate of reaction. | <input type="checkbox"/> | I can calculate the mean rate of reaction. | <input type="checkbox"/> | I can justify a chosen method for a given reaction to monitor the rate of reaction. | <input type="checkbox"/> |
| | I can state the units for rate of reaction. | <input type="checkbox"/> | I can calculate the rate of reaction at a specific time. | <input type="checkbox"/> | I can explain why there is more than one unit for rate of reaction. | <input type="checkbox"/> |
| C8.2 Collision theory and surface area | I can describe how surface area of a solid can be increased. | <input type="checkbox"/> | I can describe how changing the surface area changes the rate of reaction. | <input type="checkbox"/> | I can use collision theory to explain in detail how increasing surface area increases the rate of reaction. | <input type="checkbox"/> |
| | I can state that chemical reactions can only occur when a collision occurs with enough energy. | <input type="checkbox"/> | I can describe what the activation energy of a reaction is. | <input type="checkbox"/> | I can use a graph to calculate the rate of reaction at specific times in a chemical reaction. | <input type="checkbox"/> |
| | I can list the factors that can affect the rate of a chemical reaction. | <input type="checkbox"/> | I can calculate the surface area to volume ratio. | <input type="checkbox"/> | I can explain why many collisions do not lead to a chemical reaction. | <input type="checkbox"/> |
| C8.3 The effect of temperature | I can describe how temperature affects the rate of reaction. | <input type="checkbox"/> | I can use collision theory to explain how changing temperature alters the rate of reaction. | <input type="checkbox"/> | I can use a graph to calculate the rate of reaction at specific times in a chemical reaction. | <input type="checkbox"/> |
| | I can safely an experiment on how temperature affects the rate of a reaction. | <input type="checkbox"/> | I can calculate mean rates of reaction. | <input type="checkbox"/> | I can calculate $(1/t)$ and plot a graph with a more meaningful line of best fit. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C8 Rates and equilibrium

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|--|--|--------------------------|---|--------------------------|---|--------------------------|
| C8.4 The effect of concentration or pressure | I can describe how changing concentration affects the rate of reaction. | <input type="checkbox"/> | I can use collision theory to explain how changing concentration or pressure alters the rate of reaction. | <input type="checkbox"/> | I can interpret a rate of reaction graph, including calculating the rate of reaction at specific times in a chemical reaction. | <input type="checkbox"/> |
| | I can describe how changing pressure affects the rate of gas phase reactions. | <input type="checkbox"/> | I can calculate mean rates of reaction. | <input type="checkbox"/> | I can explain why changing pressure has no effect on the rate of reaction for some reactions. | <input type="checkbox"/> |
| | | | I can explain how to change gas pressure. | <input type="checkbox"/> | I can justify quantitative predictions and evaluate in detail their investigation into the effect of concentration on rate of reaction. | <input type="checkbox"/> |
| C8.5 The effect of catalysts | I can define a catalyst. | <input type="checkbox"/> | I can use collision theory to explain how adding a catalyst alters the rate of reaction. | <input type="checkbox"/> | I can use a reaction profile diagram to explain in detail the effect of adding a catalyst. | <input type="checkbox"/> |
| | I can describe how adding a catalyst affects the rate of reaction. | <input type="checkbox"/> | I can explain, with an example, the industrial use of a catalyst. | <input type="checkbox"/> | I can justify the use of catalysts in industry and in household products. | <input type="checkbox"/> |
| | I can describe and carry out a method to safely investigate which catalyst is best for a reaction. | <input type="checkbox"/> | I can calculate the mean rate of reaction. | <input type="checkbox"/> | I can explain what an enzyme is and how it works. | <input type="checkbox"/> |
| C8.6 Reversible reactions | I can define a reversible reaction. | <input type="checkbox"/> | I can explain, using a familiar reaction, how a reaction can be reversible. | <input type="checkbox"/> | I can describe an unfamiliar reversible reaction, using a balanced symbol equation with state symbols. | <input type="checkbox"/> |
| | I can write a word equation for a familiar reversible reaction. | <input type="checkbox"/> | I can describe a familiar reversible reaction using a balanced symbol equation. | <input type="checkbox"/> | I can justify the use of reversible reactions in the lab and items available in the home. | <input type="checkbox"/> |
| | I can state an example of a reversible reaction. | <input type="checkbox"/> | I can predict the observations of a familiar reversible reaction when the conditions are changed. | <input type="checkbox"/> | I can justify the classification of a reaction as reversible. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C8 Rates and equilibrium




Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|--|---|--------------------------|--|--------------------------|---|--------------------------|
| C8.7 The effect of concentration or pressure | I can state whether a reversible reaction is exothermic or endothermic in the reverse direction if the forward direction is stated. | <input type="checkbox"/> | I can explain why the energy change in a reversible reaction is exothermic in one direction and endothermic in the reverse | <input type="checkbox"/> | I can explain in detail the energy changes in an equilibrium system. | <input type="checkbox"/> |
| | I can write the word equation for the reversible reaction of dehydration/hydration of copper | <input type="checkbox"/> | I can generate balanced symbol equations for reversible reactions from information provided. | <input type="checkbox"/> | I can suggest and explain a simple laboratory test which could be completed using a reversible reaction. | <input type="checkbox"/> |
| | | | I can make predictive observations of familiar reversible reactions when information is supplied. | <input type="checkbox"/> | I can make predictive observations of unfamiliar reversible reactions when information is supplied. | <input type="checkbox"/> |
| C8.8 The effect of catalysts | I can define a dynamic equilibrium. | <input type="checkbox"/> | I can describe how to achieve dynamic equilibrium. | <input type="checkbox"/> | I can explain dynamic equilibrium. | <input type="checkbox"/> |
| | I can define a dynamic equilibrium. | <input type="checkbox"/> | I can describe how the rate of the forward reaction compares to the rate of the backward reaction in dynamic equilibrium. | <input type="checkbox"/> | I can explain why the concentration of chemicals in a dynamic equilibrium remains constant. | <input type="checkbox"/> |
| | | | I can describe Le Chatelier's Principle. | <input type="checkbox"/> | I can predict the effect on the rate forward and reverse reactions by applying the Le Chatelier's Principle | <input type="checkbox"/> |
| C8.9 Reversible reactions | | | I can explain how changing conditions for a system at dynamic equilibrium affects the rate of the forward and reverse | <input type="checkbox"/> | I can explain why changing pressure has no effect on some systems. | <input type="checkbox"/> |
| | | | I can predict the effect on yield of changing temperature, concentration, or pressure in a given equilibrium system. | <input type="checkbox"/> | I can justify, in detail, the compromise conditions chosen in given industrial processes. | <input type="checkbox"/> |

C9 Crude oil

| Can you...? | 😊 | 😐 | 😞 |
|---|---|---|---|
| Crude oil, hydrocarbons and alkanes | | | |
| State what crude oil was formed from. | | | |
| Describe what crude oil contains. | | | |
| State what a hydrocarbon is. | | | |
| Define the term saturated in relation to a hydrocarbon. | | | |
| State the general formula for an alkane and identify them from their name, formula or structure. | | | |
| State the names of the first four members of the homologous series of alkanes and represent their structure in the following forms. <div style="text-align: center; margin: 10px 0;"> $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ </div> C_2H_6 | | | |
| Explain what a homologous series is. | | | |
| Fractional distillation and petrochemicals | | | |
| Explain the process of fractional distillation of crude oil in terms of evaporation and condensation. | | | |
| Describe what a fraction is and state the uses of fractions. | | | |
| State the name of fuels we depend on which are produced from crude oil. | | | |
| State useful materials which are produced by the petrochemical industry and describe their function. | | | |
| State why there is large variety of natural and synthetic carbon compounds. | | | |
| Properties of hydrocarbons | | | |
| Explain how the size of hydrocarbon molecules affect their boiling point, viscosity and flammability. | | | |
| Explain how the properties of a hydrocarbon affects its use as a fuel. | | | |
| Describe what happens during the combustion of a hydrocarbon. | | | |
| Write balanced equations for the complete combustion of hydrocarbons with a given formula. | | | |
| Cracking and alkenes | | | |
| Describe cracking in general terms as an example of thermal decomposition. | | | |
| Describe in general terms the conditions for catalytic cracking. | | | |
| Describe in general terms the conditions for steam cracking. | | | |
| Identify the products of cracking. | | | |

C9 Crude oil

| <i>Can you...?</i> |  |  |  |
|--|---|---|---|
| Balance chemical equations as examples of cracking given the formulae of the reactants and products. | | | |
| Explain how to test for an alkene. | | | |
| Explain why cracking is used and give examples to illustrate its usefulness. | | | |
| State what the alkenes produced from cracking are used for. | | | |
| Explain how modern life depends on the use of hydrocarbons. | | | |

AQA Chemistry

GCSE Student Checklist

C10 Organic reactions

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|--|---|--------------------------|--|--------------------------|---|--------------------------|
| C10.1 Reactions of the alkenes | I can state a definition of an alkene. | <input type="checkbox"/> | I can draw the displayed structural formulae for the first four alkenes. | <input type="checkbox"/> | I can predict the word and balanced symbol equations to describe reactions between alkenes and hydrogen, water (steam), or a halogen. | <input type="checkbox"/> |
| | I can name the first four alkenes. | <input type="checkbox"/> | I can draw the displayed structural formulae for the products of the addition reactions between alkenes and hydrogen, water (steam), or a halogen. | <input type="checkbox"/> | I can compare and contrast the reactivity of alkanes and alkenes. | <input type="checkbox"/> |
| | I can state the product of a combustion and an addition reaction of an alkene. | <input type="checkbox"/> | I can predict the word and balanced symbol equations for the complete combustion of an alkene when the number of carbon atoms is given. | <input type="checkbox"/> | I can predict the general formula of an alkene. | <input type="checkbox"/> |
| C10.2 Structures of alcohols, carboxylic acids, and esters | I can recognise the functional group in an alcohol and a carboxylic acid. | <input type="checkbox"/> | I can classify an organic compound as an alcohol a carboxylic acid, or an ester. | <input type="checkbox"/> | I can predict the structure for primary alcohols or carboxylic acids when the number of carbon atoms is given. | <input type="checkbox"/> |
| | I can name the first four primary alcohols and the first four carboxylic acids. | <input type="checkbox"/> | I can draw the structural and displayed formulae for the first four primary alcohols and the first four carboxylic acids. | <input type="checkbox"/> | I can suggest a general formula for a homologous series. | <input type="checkbox"/> |
| | I can name ethyl ethanoate from its formula. | <input type="checkbox"/> | I can draw the structural and displayed formulae for ethyl ethanoate. | <input type="checkbox"/> | Can suggest why an organic acid is not an alcohol even though it contains an -OH functional group. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C10 Organic reactions

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|-------------------------------------|--|--------------------------|---|--------------------------|---|--------------------------|
| 10.3 Reactions and uses of alcohols | I can state that fermentation can be used to make ethanol. | <input type="checkbox"/> | I can describe fermentation to make aqueous solutions of ethanol, including a word equation. | <input type="checkbox"/> | I can explain why solutions of ethanol have a pH of 7. | <input type="checkbox"/> |
| | I can list some chemical properties of the first four alcohols. | <input type="checkbox"/> | I can describe the reactions of alcohols, including using word equations. | <input type="checkbox"/> | I can describe complete combustion reactions of a range of alcohols using balanced symbol equations. | <input type="checkbox"/> |
| | I can recognise the formula and structure of ethanol and state some of its uses. | <input type="checkbox"/> | I can explain the relationship between ethanol and ethanoic acid. | <input type="checkbox"/> | I can plan an investigation to determine the relative energy transferred to the surroundings by the combustion of | <input type="checkbox"/> |
| C10.4 Carboxylic acids and esters | I can recognise a carboxylic acid from its name or formula. | <input type="checkbox"/> | I can describe why carboxylic acids are acidic. | <input type="checkbox"/> | I can explain, using ionic equations, why carboxylic acids are weak acids. | <input type="checkbox"/> |
| | I can list some chemical properties of carboxylic acids. | <input type="checkbox"/> | I can use word equations to describe the reactions of carboxylic acids with metal carbonates and with alcohols. | <input type="checkbox"/> | I can predict the products of the reactions of a range of carboxylic acids with metal carbonates and with alcohols. | <input type="checkbox"/> |
| | I can describe an ester and state some uses of this class of compounds. | <input type="checkbox"/> | I can describe how to make an ester. | <input type="checkbox"/> | I can explain the term volatile in terms of molecular forces. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C11 Polymers

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|-----------------------------------|--|--------------------------|--|--------------------------|---|--------------------------|
| C11.1 Addition polymerisation | I can define a monomer and polymer. | <input type="checkbox"/> | I can describe how monomers become polymers. | <input type="checkbox"/> | I can explain why monomers for addition polymers must be unsaturated. | <input type="checkbox"/> |
| | I can state some uses of poly(ethene) and poly(propene). | <input type="checkbox"/> | I can draw the monomer for an addition polymer when the structure of the polymer is given. | <input type="checkbox"/> | I can explain the process of addition polymerisation in detail including using balanced symbol equations and the concept of atom economy. | <input type="checkbox"/> |
| | I can write a word equation for the formation of poly(ethene) and poly(propene). | <input type="checkbox"/> | I can draw an addition polymer structure when the structure of the monomer is given. | <input type="checkbox"/> | I can explain how the repeating unit of a polymer relates to the monomer. | <input type="checkbox"/> |
| C11.2 Condensation polymerisation | | | I can describe condensation polymerisation. | <input type="checkbox"/> | I can predict the products of condensation polymerisation. | <input type="checkbox"/> |
| | | | I can draw a simplified structure of the monomers for a condensation polymer when the structure of the polymer is given. | <input type="checkbox"/> | I can explain the process of condensation polymerisation in detail, including using equations. | <input type="checkbox"/> |
| | | | I can draw a simplified structure of a condensation polymer when the structure of the monomers are given. | <input type="checkbox"/> | I can compare and contrast in detail, giving appropriate examples, the two methods of polymerisation. | <input type="checkbox"/> |
| C11.3 Natural polymers | I can state an example of a natural polymer. | <input type="checkbox"/> | I can identify the monomer from the structural formula of a polymer. | <input type="checkbox"/> | I can predict the products of condensation polymerisation using natural monomers. | <input type="checkbox"/> |
| | I can describe the relationship between sugar as a monomer and starch or cellulose as a polymer. | <input type="checkbox"/> | I can describe the structure of an amino acid. | <input type="checkbox"/> | I can explain in detail the process of condensation polymerisation with natural monomers, including using equations. | <input type="checkbox"/> |
| | I can describe the relationship between amino acids as a monomer and protein as a polymer. | <input type="checkbox"/> | | <input type="checkbox"/> | I can explain how amino acids react together in an acid-base reaction. | <input type="checkbox"/> |

AQA Chemistry




GCSE Student Checklist

C11 Polymers




Name Class Date

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|-----------|--|--------------------------|--|--------------------------|---|--------------------------|
| C11.4 DNA | I can state that DNA is an example of a natural polymer. | <input type="checkbox"/> | I can describe the main structure of DNA. | <input type="checkbox"/> | I can explain the shape of the DNA polymer. | <input type="checkbox"/> |
| | I can state what DNA stands for. | <input type="checkbox"/> | I can describe the importance of DNA for living systems. | <input type="checkbox"/> | I can explain how nucleotides form DNA. | <input type="checkbox"/> |
| | I can name the type of monomers used to make DNA. | <input type="checkbox"/> | I can sketch the shape of a DNA strand. | <input type="checkbox"/> | I can explain the purpose of DNA. | <input type="checkbox"/> |

C12 Chemical Analysis

| <i>Can you...?</i> |  |  |  |
|---|---|---|---|
| Pure Substances | | | |
| Describe what a that a pure substance is. | | | |
| Explain how melting and boiling point data can be used to identify pure and impure substances. | | | |
| Use melting and boiling point data to distinguish pure substances from impure substances. | | | |
| Describe what a 'pure substance' can mean in everyday language. | | | |
| Formulations | | | |
| Describe what a formulation is. | | | |
| Describe how a formulation is made. | | | |
| State examples of formulations. | | | |
| Identify formulations given appropriate information. | | | |
| Chromatography | | | |
| State the uses of chromatography. | | | |
| Describe how paper chromatography is carried out. | | | |
| Explain how paper chromatography separates substances. | | | |
| Explain how chromatography can be used to distinguish pure substances from impure substances. | | | |
| Interpret chromatograms and calculate R _f values. | | | |
| Explain how R _f values can be used to identify substances. | | | |
| Test for common gases | | | |
| Describe and explain the test for hydrogen. | | | |
| Describe and explain the test for oxygen. | | | |
| Describe and explain the test for carbon dioxide. | | | |
| Describe and explain the test for chlorine. | | | |
| Interpret the results of gas tests. | | | |
| Flame tests [Chemistry only] | | | |
| Describe how to test for metal ions using flame tests. | | | |
| Identify the following metal ions from the colours that their compounds produce in flame tests: lithium, sodium, potassium, calcium and copper. | | | |
| Explain why it can be hard to identify metal ions in a mixture. | | | |

C12 Chemical Analysis

| <i>Can you...?</i> |  |  |  |
|--|---|---|---|
| Interpret the results of flame tests. | | | |
| Metal Hydroxides [Chemistry only] | | | |
| Describe and explain how to test for metal ions using precipitation reactions and state the name of the precipitates formed. | | | |
| Describe the appearance of the precipitates that are formed from the reactions of aluminium, calcium and magnesium ions. | | | |
| State which of the above precipitates dissolves in excess sodium hydroxide. | | | |
| Identify copper (II), iron (II) and iron (III) ions from the colours of precipitates that they form. | | | |
| Interpret the results of metal hydroxide tests. | | | |
| Carbonates [Chemistry only] | | | |
| Describe and explain how to test for carbonate ions. | | | |
| Interpret the results of carbonate tests. | | | |
| Halides [Chemistry only] | | | |
| Describe and explain how to test for halide ions. | | | |
| Identify halide ions in solution from the colours of precipitates formed. | | | |
| Interpret the results of halide tests. | | | |
| Sulfates [Chemistry only] | | | |
| Describe and explain how to test for sulfate ions. | | | |
| Interpret the results of sulfate tests. | | | |
| Instrumental methods [Chemistry only] | | | |
| Describe the advantages of using instrumental methods over chemical tests. | | | |
| Flame emission spectroscopy [Chemistry only] | | | |
| Describe the how flame emission spectroscopy is carried out. | | | |
| Explain what a flame emission spectrum shows and how it can be used. | | | |
| Interpret flame emission spectroscopy data. | | | |

AQA Chemistry

GCSE Student Checklist

C13 The Earth's atmosphere

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|---------------------------------|---|--------------------------|--|--------------------------|--|--------------------------|
| C13.1 History of our atmosphere | I can describe the Earth's early atmosphere. | <input type="checkbox"/> | I can state the composition, including formulae, of the Earth's early atmosphere. | <input type="checkbox"/> | I can use a theory to explain in detail how the atmosphere developed. | <input type="checkbox"/> |
| | I can describe how oxygen was formed in the development of the atmosphere. | <input type="checkbox"/> | I can describe a theory for the development of the Earth's atmosphere. | <input type="checkbox"/> | I can explain the limits of the theory for the development of the Earth's atmosphere and why it has changed. | <input type="checkbox"/> |
| | | | I can explain, using word equations, how gases were formed in the atmosphere and oceans were formed. | <input type="checkbox"/> | I can use balanced symbol equations to explain how gases were formed in the atmosphere and explain how oceans were formed. | <input type="checkbox"/> |
| C13.2 Our evolving atmosphere | I can state that the levels of carbon dioxide have decreased in the atmosphere. | <input type="checkbox"/> | I can describe how the proportion of carbon dioxide in the early atmosphere was reduced. | <input type="checkbox"/> | I can use a theory to explain in detail how the early atmosphere developed to form the atmosphere today. | <input type="checkbox"/> |
| | I can list the names and symbols of the gases in dry air. | <input type="checkbox"/> | I can state the composition of dry air. | <input type="checkbox"/> | I can explain why the compositions of the Earth's atmosphere has not changed much for 200 million years. | <input type="checkbox"/> |
| | I can state where methane and ammonia in the atmosphere may have come from. | <input type="checkbox"/> | I can use word equations to show how carbon dioxide can form sedimentary rocks. | <input type="checkbox"/> | I can use balanced symbol equations to explain how carbon dioxide forms sedimentary rock and how methane and ammonia were removed from the atmosphere. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C13 The Earth's atmosphere

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|------------------------------|--|--------------------------|--|--------------------------|--|--------------------------|
| C13.3 Greenhouse gases | I can describe the greenhouse effect. | <input type="checkbox"/> | I can explain the greenhouse effect. | <input type="checkbox"/> | I can justify why scientists, as well as the public, disagree about the cause of climate change. | <input type="checkbox"/> |
| | I can name three greenhouse gases. | <input type="checkbox"/> | I can explain how greenhouse gases increase the temperature of the atmosphere. | <input type="checkbox"/> | I can explain the difference between global warming and the greenhouse effect. | <input type="checkbox"/> |
| | I can state some human activities that affect the proportion of greenhouse gases. | <input type="checkbox"/> | I can explain how human activity can change the proportion of greenhouse gases in the atmosphere. | <input type="checkbox"/> | I can evaluate evidence to suggest if global warming is man-made or natural. | <input type="checkbox"/> |
| C13.4 Global climate change | I can list some of the possible outcomes of climate change. | <input type="checkbox"/> | I can explain the possible effects of global climate change and why they are difficult to predict. | <input type="checkbox"/> | I can evaluate the scale, risk, and environmental impact of global climate change. | <input type="checkbox"/> |
| | I can state a definition for carbon footprint. | <input type="checkbox"/> | I can explain possible methods to reduce greenhouse gas emissions. | <input type="checkbox"/> | I can justify why reducing greenhouse gas emissions can be difficult to achieve. | <input type="checkbox"/> |
| | I can list some ways to reduce a carbon footprint. | <input type="checkbox"/> | I can explain some of the problems in trying to reduce greenhouse gas emissions. | <input type="checkbox"/> | I can evaluate the use of products, services, or events in terms of their carbon footprint. | <input type="checkbox"/> |
| C13.5 Atmospheric pollutants | I can list some atmospheric pollutants. | <input type="checkbox"/> | I can explain how sulphur dioxide and nitrogen oxides are made when fossil fuels are combusted. | <input type="checkbox"/> | I can predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used. | <input type="checkbox"/> |
| | I can describe how carbon monoxide and soot (carbon) can be made from the incomplete combustion of fossil fuels. | <input type="checkbox"/> | I can describe the health impacts of atmospheric pollutants. | <input type="checkbox"/> | I can evaluate the negative social, economic, and environmental consequences of atmospheric pollution. | <input type="checkbox"/> |
| | I can complete word equations to describe how atmospheric pollutants can be made. | <input type="checkbox"/> | I can use balanced symbol equations to show how atmospheric pollutants are formed. | <input type="checkbox"/> | I can suggest and explain methods to reduce atmospheric pollution. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C14 The Earth's resources

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|--------------------------------------|---|--------------------------|---|--------------------------|---|--------------------------|
| C14.1 Finite and renewable resources | I can list some human uses of the Earth's resources. | <input type="checkbox"/> | I can describe and classify a resource as finite or renewable when information is given. | <input type="checkbox"/> | I can understand data and interpret information using orders of magnitude to compare. | <input type="checkbox"/> |
| | I can give examples of a finite and a renewable resource. | <input type="checkbox"/> | I can explain the use of natural, sustainable, and finite resources. | <input type="checkbox"/> | I can explain the role of chemistry in improving agricultural and industrial processes. | <input type="checkbox"/> |
| | I can state an example of a natural product that is supplemented or replaced by agricultural or synthetic products. | <input type="checkbox"/> | I can interpret information from different formats including graphs, charts, tables, and prose. | <input type="checkbox"/> | I can draw conclusions consistent with information provided from graphs, charts, tables, and prose and evaluate the validity of the data. | <input type="checkbox"/> |
| C14.2 Water safe to drink | I can describe why potable water is important. | <input type="checkbox"/> | I can explain the method of obtaining potable water depends on the local conditions. | <input type="checkbox"/> | I can explain the difference between pure water and potable water. | <input type="checkbox"/> |
| | I can list the key processes to make drinking water. | <input type="checkbox"/> | I can explain reasons for filtration and sterilisation in water treatment. | <input type="checkbox"/> | I can justify the choice of potable water supply in a given scenario. | <input type="checkbox"/> |
| | I can safely distil salty water. | <input type="checkbox"/> | I can describe and explain in detail how to safely distil salty water. | <input type="checkbox"/> | I can explain in detail why desalination is not often used to generate safe clean drinking water and justify when it is used. | <input type="checkbox"/> |
| C14.3 Treating waste water | I can list what is removed from waste water before it can be released. | <input type="checkbox"/> | I can explain why waste water should be treated before it is released into the environment. | <input type="checkbox"/> | I can evaluate the ease of obtaining potable water from waste, ground, or salt water. | <input type="checkbox"/> |
| | I can state the main processes in sewage treatment. | <input type="checkbox"/> | I can describe the main processes in sewage treatment. | <input type="checkbox"/> | I can explain in detail how and why waste water is processed before it is released into the environment. | <input type="checkbox"/> |
| | I can state uses of sewage slurry. | <input type="checkbox"/> | I can explain the uses of sewage slurry. | <input type="checkbox"/> | I can evaluate the use of sewage slurry. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C14 The Earth's resources

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|-----------------------------------|---|--------------------------|---|--------------------------|--|--------------------------|
| C14.4 Extracting metals from ores | | | I can describe the processes of phytomining and bioleaching. | <input type="checkbox"/> | I can explain in detail how phytomining and bioleaching extract metals. | <input type="checkbox"/> |
| | | | I can write balanced symbol equations to explain metal extraction techniques. | <input type="checkbox"/> | I can write ionic equations to explain metal extraction techniques and identify the species being oxidised or reduced. | <input type="checkbox"/> |
| | | | I can explain the need for new ways of extracting metals (in particular copper). | <input type="checkbox"/> | I can evaluate biological methods of metal extraction. | <input type="checkbox"/> |
| C14.5 Life Cycle Assessments | I can state the different stages of an LCA in the correct order. | <input type="checkbox"/> | I can explain the importance of LCA and how it can be misused. | <input type="checkbox"/> | I can explain the limits of LCAs. | <input type="checkbox"/> |
| | I can carry out an LCA for shopping bags made from plastic or paper with support. | <input type="checkbox"/> | I can carry out LCAs for different products when data is supplied. | <input type="checkbox"/> | I can evaluate products in detail using LCAs. | <input type="checkbox"/> |
| C14.6 Reduce, reuse, and recycle | I can list some products that can be reused or recycled. | <input type="checkbox"/> | I can explain the importance of reusing and recycling products. | <input type="checkbox"/> | I can evaluate the environmental, economic, and social impacts of reusing and recycling products. | <input type="checkbox"/> |
| | I can describe how metal can be reused and recycled. | <input type="checkbox"/> | I can explain why some recycling can be difficult. | <input type="checkbox"/> | I can evaluate ways of reducing the use of limited resources. | <input type="checkbox"/> |
| | I can describe how glass can be reused and recycled. | <input type="checkbox"/> | I can evaluate ways of reducing the use of limited resources when information is given. | <input type="checkbox"/> | I can suggest ways of minimising the environmental impact of exploiting raw materials. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C15 Using our resources

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|------------------------------|--|--------------------------|--|--------------------------|---|--------------------------|
| C15.1 Rusting | I can define the term corrosion. | <input type="checkbox"/> | I can describe an experiment to investigate the conditions required for rusting to occur. | <input type="checkbox"/> | I can explain in detail why corrosion is a problem. | <input type="checkbox"/> |
| | I can state what is required for iron to rust. | <input type="checkbox"/> | I can, with the help of equations, describe the process of rusting. | <input type="checkbox"/> | I can write balanced equations to describe rusting and identify species that are oxidised and reduced. | <input type="checkbox"/> |
| | I can list some ways to prevent rusting. | <input type="checkbox"/> | I can explain how different corrosion prevention techniques work. | <input type="checkbox"/> | I can evaluate rust prevention techniques and suggest which is best for a specific purpose. | <input type="checkbox"/> |
| C15.2 Useful alloys | I can state the difference between a metal before and after being alloyed. | <input type="checkbox"/> | I can explain in detail why pure metals are often alloyed before they are used. | <input type="checkbox"/> | I can explain the term carat. | <input type="checkbox"/> |
| | I can state the elements in steel and bronze. | <input type="checkbox"/> | I can describe how different amounts of carbon affect the properties of iron. | <input type="checkbox"/> | I can use data on the properties of unfamiliar alloys to explain a suitable alloy for a given purpose. | <input type="checkbox"/> |
| | I can list some common examples of alloys and their uses. | <input type="checkbox"/> | I can identify an appropriate purpose for an alloy when given data on its properties. | <input type="checkbox"/> | I can evaluate an alloy in terms of its properties and uses. | <input type="checkbox"/> |
| C15.3 Properties of polymers | I can describe the properties of a thermosetting plastic. | <input type="checkbox"/> | I can explain how thermosetting plastics and thermosoftening plastics are different in terms of structure and bonding. | <input type="checkbox"/> | I can explain in detail, giving examples, how the properties of plastics can be changed. | <input type="checkbox"/> |
| | I can describe the properties of a thermosoftening plastic. | <input type="checkbox"/> | I can describe the different conditions used to make poly(ethene). | <input type="checkbox"/> | I can, when data about the properties of plastics is given, suggest a suitable plastic for a given purpose. | <input type="checkbox"/> |
| | I can describe the difference between LD and HD poly(ethene). | <input type="checkbox"/> | I can explain how the structure of poly(ethene) affects its properties and therefore its uses. | <input type="checkbox"/> | I can evaluate a plastics in terms of its properties and uses. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C15 Using our resources

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|--|--|--------------------------|--|--------------------------|---|--------------------------|
| C15.4 Glass, ceramic, and composites | I can describe how to make soda-lime glass and borosilicate glass. | <input type="checkbox"/> | I can describe what a composite is. | <input type="checkbox"/> | I can explain the properties of ceramics and composites in terms of structure and bonding. | <input type="checkbox"/> |
| | I can describe how to make clay ceramics. | <input type="checkbox"/> | I can explain the difference between a composite and an advanced composite. | <input type="checkbox"/> | I can, when data about the properties of a material is provided, classify it and suggest a suitable material for a given purpose. | <input type="checkbox"/> |
| | I can state examples of clay ceramics and composites. | <input type="checkbox"/> | I can compare quantitatively the physical properties of glass and clay ceramics, polymers, composites, and metals. | <input type="checkbox"/> | I can evaluate materials in terms of their properties and uses. | <input type="checkbox"/> |
| C15.5 Making ammonia – the Haber process | I can state the purpose of the Haber process. | <input type="checkbox"/> | I can describe how the raw materials are turned into the reactants for the Haber process. | <input type="checkbox"/> | I can evaluate the Haber process using atom economy and LCA to determine its environmental impact. | <input type="checkbox"/> |
| | I can state the conditions for the Haber process. | <input type="checkbox"/> | I can describe how the Haber process is a reversible reaction. | <input type="checkbox"/> | I can explain how costs are kept to a minimum in the Haber process. | <input type="checkbox"/> |
| | I can write a word equation to describe the Haber process. | <input type="checkbox"/> | I can describe the Haber process with the help of a balanced symbol equations including state symbols. | <input type="checkbox"/> | I can explain, with the use of balanced symbol equations, where the reactants come from for the Haber process. | <input type="checkbox"/> |
| C15.6 The economics of the Haber process | | | I can explain the effect of changing temperature on yield of the Haber process. | <input type="checkbox"/> | I can justify why the conditions used in the Haber process are a compromise. | <input type="checkbox"/> |
| | | | I can explain the effect of changing pressure on the yield of the Haber process. | <input type="checkbox"/> | I can explain the effect of an iron catalyst on the rate and position of equilibrium in the Haber process. | <input type="checkbox"/> |
| | | | I can explain why the conditions used in the Haber process are a compromise. | <input type="checkbox"/> | I can use data to predict and explain the effect on the equilibrium and rate of reaction of changing conditions in the Haber process. | <input type="checkbox"/> |

AQA Chemistry

GCSE Student Checklist

C15 Using our resources

Name _____ Class _____ Date _____

| Lesson | Aiming for 4 | | Aiming for 6 | | Aiming for 8 | |
|--------------------------------------|--|--------------------------|--|--------------------------|---|--------------------------|
| C15.7 Making fertilisers in the lab | I can state what a fertiliser is. | <input type="checkbox"/> | I can explain the importance of fertilisers for agriculture. | <input type="checkbox"/> | I can evaluate different processes to make NPK fertilisers. | <input type="checkbox"/> |
| | I can identify the fertiliser produced from a reaction. | <input type="checkbox"/> | I can describe in detail how fertilisers are produced in the laboratory. | <input type="checkbox"/> | I can write ionic equations for reactions to make fertilisers. | <input type="checkbox"/> |
| | I can write a word equation for the formation of the chemicals in the NPK fertilisers. | <input type="checkbox"/> | I can write balanced symbol equations for the reactions to make components of NPK fertilisers. | <input type="checkbox"/> | I can calculate the concentration of an ammonia solution from the results of a titration. | <input type="checkbox"/> |
| C15.8 Making fertilisers in industry | I can name the elements in NPK fertilisers. | <input type="checkbox"/> | I can describe production of fertilisers in industry. | <input type="checkbox"/> | I can evaluate the composition of fertilisers. | <input type="checkbox"/> |
| | I can describe where the raw materials for NPK fertilisers come from. | <input type="checkbox"/> | I can compare and contrast the industrial and laboratory production of fertilisers. | <input type="checkbox"/> | I can evaluate different processes to make NPK fertilisers. | <input type="checkbox"/> |
| | I can name and give the formulae of the chemicals in the NPK fertilisers. | <input type="checkbox"/> | I can write balanced symbol equations or the reactions to make components of NPK fertilisers. | <input type="checkbox"/> | I can write ionic equations to illustrate the reactions to make NPK fertilisers. | <input type="checkbox"/> |