

Topic	1. <u>Physical changes</u>	2. <u>Pure and impure substances</u>	3. <u>Atoms, elements and compounds</u>	4. <u>Acids and bases</u>
Unit	The particulate nature of matter	Pure and impure substances	Atoms	Acids and bases
Skills	<ul style="list-style-type: none"> • Can take measurements using a range of scientific equipment. • Understand potential causes of random and systematic errors when collecting data. • Can record data in tables. • Can record data in bar charts. 	<ul style="list-style-type: none"> • Name and use a wide range of scientific apparatus. • Follow simple risk assessments. • Can plan an investigation that will answer a question. • Know what the word “variables” means. • Can take measurements using a range of scientific equipment. 	<ul style="list-style-type: none"> • Take measurements using a range of scientific equipment. • Record data in tables and bar charts. • Record data as a line graph on axis. • Describe patterns shown by data. • Spot anomalies • Calculate averages and differences 	<ul style="list-style-type: none"> • Can take measurements using a range of scientific equipment. • Understand potential causes of random and systematic errors when collecting data. • Can record data in tables. • Can record data in bar charts.
Knowledge	<ul style="list-style-type: none"> • The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure • Changes of state in terms of the particle model, including the energy changes. 	<ul style="list-style-type: none"> • Understand the concept of a pure substance • Understand what is meant by a mixture, including dissolving to form a mixture. • Explain diffusion in terms of the particle model • Carry out and describe simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography • Be able to identify a pure substance. 	<ul style="list-style-type: none"> • A simple (Dalton) atomic model • Differences between atoms, elements and compounds • Chemical symbols and formulae for elements and compounds • Conservation of mass changes of state and chemical reactions 	<ul style="list-style-type: none"> • Defining acids and alkalis, carrying out neutralisation reactions • Using the pH scale for measuring acidity/alkalinity; and indicators. • Investigating the reactions of acids with metals and alkalis, including energy changes. (Exothermic) • The chemical properties of metal and non-metal oxides with respect to acidity
Anchor	From Year 5: <ul style="list-style-type: none"> • Use knowledge of solids, liquids and gases to decide how mixtures might be separated • Demonstrate that dissolving, mixing and changes of state are reversible changes From Y6 <ul style="list-style-type: none"> • The particle model • Link to Physics • Changes of state and the particle model 	From Year 5: <ul style="list-style-type: none"> • Some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • Demonstrate that dissolving, mixing and changes of state are reversible changes • Link to Biology: Diffusion 	From Year 5: <ul style="list-style-type: none"> • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible From Y7: <ul style="list-style-type: none"> • Reactions of acids and alkalis 	Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible
Assessment	Self assessed differentiated plenary every lesson Assessment weeks – recall test based on year 6 and year 7 content Educake Homework set every month			
Values	Through our teaching of investigations and use of CLEAPSS <ul style="list-style-type: none"> • how to recognise and follow health and safety procedures Through our departmental feedback and marking policy <ul style="list-style-type: none"> • to make effective use of constructive feedback • to evaluate their own personal strengths and areas for development and to use this to inform goal setting https://www.pshe-association.org.uk/			

Topic	1. Chemical reactions	2. The periodic table	3. Materials	4. The earth and sustainability
Unit	Reactions of metals	Periodic table	Materials	The earth's atmosphere
Skills	<ul style="list-style-type: none"> Select measuring equipment based on precision and resolution. Evaluate the risks that are linked to different experiments. Identify dependent and independent variables. Understand the purpose of a "control" experiment. Make predictions that are supported by scientific facts. 	<ul style="list-style-type: none"> Select measuring equipment based on precision and resolution. Evaluate the risks that are linked to different experiments. Identify dependent and independent variables. Understand the purpose of a "control" experiment. Make predictions that are supported by scientific facts. 	<ul style="list-style-type: none"> Write and follow a simple risk assessment. Use continuous sampling techniques. Understand why repeat readings can improve accuracy 	<ul style="list-style-type: none"> Correctly construct line graphs. Link anomalies to specific random and systematic errors Calculate percentages. Present explanations for patterns in data Suggest how the accuracy and precision of data can be improved.
Knowledge	<ul style="list-style-type: none"> Chemical reactions as the rearrangement of atoms Representing chemical reactions using formulae and using equations Combustion, thermal decomposition (endothermic), oxidation and displacement reactions (exothermic) 	<ul style="list-style-type: none"> The varying physical and chemical properties of different elements The principles underpinning the Mendeleev periodic table The periodic table: periods and groups; metals and non-metals How patterns in reactions can be predicted The properties of metals and non-metals 	<ul style="list-style-type: none"> The order of metals and carbon in the reactivity series The use of carbon in obtaining metals from metal oxides The properties of ceramics, polymers and composites. 	<ul style="list-style-type: none"> The Earth as a source of limited resources and the importance of recycling The composition of the atmosphere The production of carbon dioxide by human activity and the impact on climate
Anchor	From Y7: <ul style="list-style-type: none"> Reactions of acids and alkalis – (exothermic reactions) The Dalton model of the atom 	From Y7: <ul style="list-style-type: none"> The particle model Atoms and elements 	From Y8: <ul style="list-style-type: none"> The properties of metals 	From Y7 and Y8: <ul style="list-style-type: none"> Examples of exothermic reactions (combustion) Links to Geography: Sustainability Link to Biology: Sustainability
Assessment	Self assessed differentiated plenary every lesson Assessment weeks – recall test based on year 6 and year 7 content Educake Homework set every month			
Values	Through our teaching of investigations and use of CLEAPSS <ul style="list-style-type: none"> how to recognise and follow health and safety procedures Through our departmental feedback and marking policy <ul style="list-style-type: none"> to make effective use of constructive feedback to evaluate their own personal strengths and areas for development and to use this to inform goal setting https://www.pshe-association.org.uk/			

Unit of Learning	C1 ATOMIC STRUCTURE AND THE PERIODIC TABLE C8 ANALYSIS	C2 BONDING AND STRUCTURES	C1 ATOMIC STRUCTURE AND THE PERIODIC TABLE	C8 ANALYSIS	C2 BONDING AND STRUCTURES	C3 QUANTITATIVE CHEMISTRY	C4 CHEMICAL REACTIONS	C2 BONDING AND STRUCTURES
Topic	Atoms and Mixtures	Types of Chemical Bonds	The Periodic Table	Testing for Common Gases	States of Matter	Conservation of Mass	Metal Extraction and Metal Reactions	Nanoparticles
Skills	Describe a procedure for a specified purpose. Read measurements off a scale in a practical context. Record measurements appropriately. Substitute numerical values into algebraic equations. Use an appropriate number of significant figures. Draw conclusions from given observations.	Translate data between graphical and numeric form.	Identify the main hazards in specified practical contexts. Translate data between graphical and numeric form. Recognise or describe patterns and trends in data. Draw conclusions from given observations.	Identify the main hazards in specified practical contexts. Describe a procedure for a specified purpose. Draw conclusions from given observations.	Identify the main hazards in specified practical contexts. Describe a procedure for a specified purpose. Read measurements off a scale in a practical context. Record measurements appropriately. Use the appropriate SI values for quantities. Use an appropriate number of significant figures. Plot two variables from experimental or other data. Translate data between graphical and numeric form. Draw conclusions from given observations.	Identify the main hazards in specified practical contexts. Describe a procedure for a specified purpose. Read measurements off a scale in a practical context. Record measurements appropriately. Use an appropriate number of significant figures. Recognise or describe patterns and trends in data. Draw conclusions from given observations.	Identify the main hazards in specified practical contexts. Describe a procedure for a specified purpose. Identify the dependent and independent variables in a given context. Read measurements off a scale in a practical context. Record measurements appropriately. Use the appropriate SI values for quantities. Find the arithmetic mean and range of a set of data. Use an appropriate number of significant figures. Plot two variables from experimental or other data. Translate data between graphical and numeric form. Recognise or describe patterns and trends in data. Draw conclusions from given observations.	Use an appropriate number of significant figures. Make order of magnitude calculations. Use the appropriate SI values for quantities. Find the arithmetic mean and range of a set of data.
Knowledge	The development of the <u>atomic</u> model. Atomic structure, including <u>isotopes</u> , <u>mass number</u> , <u>atomic number</u> and <u>electron configuration</u> . <u>Pure</u> substances, <u>formulations</u> , <u>mixtures</u> and <u>chromatography</u> . Chromatography Required Practical	<u>Covalent</u> , <u>ionic</u> and <u>metallic</u> bonds. <u>Alloys</u> and the conductive properties of <u>metals</u>	The history of the <u>Periodic Table</u> . The properties of <u>groups</u> in the Periodic Table. (group 1, group 7, group 0 and <u>Transition Metals</u>) Comparing the properties of group 1 and group 7.	Testing for H ₂ , O ₂ , Cl ₂ , CO ₂	How states of matter link to the properties of materials.	Reactions and the <u>conservation of mass</u> .	Investigating the reactivity of metals. (Including <u>oxidation</u> , <u>reduction</u> and <u>displacement</u>) <u>Extraction</u> of metals using <u>phytomining</u> and <u>bioleaching</u> . <u>Corrosion</u> of metals and the use of <u>alloys</u> .	The properties and uses of <u>nanoparticles</u>
Anchor	Y7 Chromatography and separation techniques Y7 and Y8 Dalton model of the atom Physics Atomic Structure and Isotopes	Y8 Properties and reactions of metals Y7 Compounds and symbols Y7 and Y9 The model of the atom Y9 Electron configurations Engineering	Y8 The periodic table Properties and reactions of metals Y9 Atoms, isotopes, electron configuration, atomic number, mass number	Y7 and Y8 Endothermic and exothermic reactions Chemical reactions	Y7 Changes of state and states of matter Physics States of matter and changes of state Y8 and Y9 Formulae and symbols	Y7, Y8 and Y9 Chemical Reactions Y7, Y9 Conservation of mass Formulae and symbols Y9 Mass number State symbols	Y7 and Y9 Types of chemical bonds Y8 The properties and reactions of metals Y9 Metallic bonding Engineering Alloys and corrosion Biology – Bacteria and plant organisation Y9 Conservation of mass	Y7 and Y9 Properties of different substances Y7, Y8 and Y9 Atoms
Assessment	RECALL QUIZZES ATOMIC STRUCTURE ATOMS, COMPOUNDS AND MIXTURES FORMULATIONS AND CHROMATOGRAPHY	RECALL QUIZZES ATOMIC STRUCTURE (FROM Y9 ATOMS AND MIXTURES) BONDS AND IONS	RECALL QUIZZES ATOMS AND THE PERIODIC TABLE GROUP 0,7 AND 1	RECALL QUIZZES CHROMATOGRAPHY AND GAS TESTS		RECALL QUIZZES ATOMS AND THE PERIODIC TABLE (FROM Y9 PERIODIC TABLE TOPIC)	RECALL QUIZZES BONDS AND IONS (FROM Y9 TYPES OF CHEMICAL BOND) METAL EXTRACTION	RECALL QUIZZES ATOMIC STRUCTURE (FROM Y9 ATOMS AND MIXTURES) TRANSITION METALS AND NANOPARTICLES
Ecco Values	Particle model	Covalent Bonding Metals and Alloys			Properties of matter	Quantitative chemistry		Nanoparticles


YEAR 10 CHEMISTRY



Unit of Learning	C4 / C5 / C2	C2	C7	C9 / C10	C3	C4 / C3	C6/C3	C5	C9
Topic	ELECTROLYSIS	COVALENT MOLECULES	CRUDE OIL	HUMAN IMPACTS ON THE ENVIRONMENT	MOLES AND MASSES	REACTIONS OF ACIDS AND METALS	CHANGING REACTION RATES AND REACTION YIELDS	ENERGY CHANGES IN REACTIONS	EVOLUTION OF THE ATMOSPHERE
Skills Introduced	Suggest methods of reducing harm in practical contexts. Suggest and describe an appropriate sampling technique in a given context.	Identify which of two or more hypotheses provides a better explanation of data in a given context. Comment on the extent to which data is consistent with a given hypothesis.	Use data to make predictions.	Use data to make predictions. Comment on the extent to which data is consistent with a given hypothesis.	Suggest methods of reducing harm in practical contexts. Select the apparatus to be used for a specific technique or purpose. Suggest and describe an appropriate sampling technique in a given context. Assess whether sufficient measurements have been taken in an experiment. Change the subject of an equation Use data to make predictions.	Suggest methods of reducing harm in practical contexts. Suggest and describe an appropriate sampling technique in a given context. Explain the need to manipulate and control variables. Assess whether sufficient measurements have been taken in an experiment. Calculate uncertainty of data and understand what it means. Understand that any anomalous values should be examined to try to identify the cause and, if a product of a poor measurement, ignored. Understand that measurements are affected by random error due to results varying in unpredictable ways. Understand that systematic error is due to results differing from the true value by a consistent amount each time. Understand that measurements are precise if they cluster closely. Understand that an accurate measurement is one that is close to the true value.	Suggest methods of reducing harm in practical contexts. Suggest and describe an appropriate sampling technique in a given context. Explain the need to manipulate and control variables. Assess whether sufficient measurements have been taken in an experiment. Change the subject of an equation Comment on the extent to which data is consistent with a given hypothesis. Understand that any anomalous values should be examined to try to identify the cause and, if a product of a poor measurement, ignored. Understand that measurements are affected by random error due to results varying in unpredictable ways. Understand that systematic error is due to results differing from the true value by a consistent amount each time. Change the subject of an equation Use data to make predictions.	Understand that any anomalous values should be examined to try to identify the cause and, if a product of a poor measurement, ignored. Understand that measurements are affected by random error due to results varying in unpredictable ways. Understand that systematic error is due to results differing from the true value by a consistent amount each time. Understand that measurements are precise if they cluster closely. Understand that an accurate measurement is one that is close to the true value.	Assess whether sufficient measurements have been taken in an experiment. Identify which of two or more hypotheses provides a better explanation of data in a given context.
Knowledge	Properties of ionic compounds The process of electrolysis, electrolysis of molten ionic compounds, using electrolysis to extract metals, electrolysis of aqueous solutions Representation of reactions at electrodes as half equations (HT only) <i>Cells and batteries, fuel cells</i> Electrolysis Required Practical	Properties of small molecules Polymers, giant covalent structures (diamond, graphite, graphene and fullerenes)	Crude oil, hydrocarbons and alkanes Fractional distillation and petrochemicals Properties of hydrocarbons Cracking and alkenes	Greenhouse gases Human activities which contribute to an increase in greenhouse gases in the atmosphere Global climate change, the carbon footprint and its reduction Atmospheric pollutants from fuels, properties and effects of atmospheric pollutants	Moles (HT only) Amounts of substances in equations (HT only) Using moles to balance equations (HT only) Limiting reactants (HT only) Concentration of solutions	Reactions of acids with metals, including neutralisation of acids and salt production Soluble salts The pH scale and neutralisation Titrations (chemistry only) Using concentrations of solutions in mol/dm ³ (chemistry only) (HT only) Strong and weak acids (HT only) Making Soluble Salts Required Practical Energy Changes – Neutralisation Required Practical Titrations Required Practical (Triple Only)	Percentage yield and Atom economy <i>Use of amount of substance in relation to volumes of gases (chemistry only) (HT only)</i> Calculating the overall rates of reactions Factors which affect the rates of chemical reactions, collision theory and activation energy, catalysts How Concentration Effects Rate Required Practical	Energy transfer during exothermic and endothermic reactions Reaction profiles The energy change of reactions (HT only) Energy Changes – The effect of concentration Required Practical	The proportions of different gases in the atmosphere The Earth's early atmosphere, including, how oxygen increased and how carbon dioxide decreased
Anchor	Y9 – Ionic bonding, Metal Extraction, Displacement, reactivity of metals Y9 – (Physics) Charged particles Y8 – Decomposition	Y9 – Covalent bonding, Conductive Properties of Metals (delocalised electrons), Linking States of Matter to Properties Y9 (Biology) Digestion of proteins	Y10 – The properties of covalent molecules (size, boiling point, IM forces) Y8 – The Earth as a Resource, Combustion as an Exothermic Reaction. Y7 – Separation Techniques (Distillation)	Y10 – Hydrocarbons Y9 – Testing for CO ₂ , Y8 – Climate change, Recycling, Combustion	Y9 – Conservation of mass, Periodic Table, Atomic Structure, Y8 – Chemical reactions Y7 – Chemical Formulae and conservation of mass	Y10 – Moles and concentration calculations, Salts and Ionic Compounds. Y9 – Reactions of Metals Y7 – Acids, Alkalis and Neutralisation	Y10 – Reactions of acids with metals, Concentration as a chemical measure Y8 – Different types of chemical reactions Y10 – Moles, Rates of Reactions Y9 – Linking States of Matter to Properties	Y10 – Combustion as an exothermic reaction, Activation Energy Y9 – Testing for H ₂ (example of an exothermic reaction) Y8 – Endothermic and exothermic reactions Y7 – Exothermic reactions	Y10 – Greenhouse Gases, Combustion Y8 – Climate and Atmosphere
Assessment	RECALL QUIZZES BONDS AND IONS (Y9) METAL EXTRACTION (Y9) ELECTROLYSIS CHEMICAL AND FUEL CELLS	RECALL QUIZZES COVALENT COMPOUNDS CARBON ALLOTROPES	RECALL QUIZZES HYDROCARBONS FRACTIONAL DISTILLATION AND CRACKING ALKENES	RECALL QUIZZES COVALENT COMPOUNDS (Y9) GAS TESTS AND CHROMATOGRAPHY (Y9) CARBON CYCLE AND THE GREENHOUSE EFFECT	RECALL QUIZZES ATOMS, COMPOUNDS AND MIXTURES (Y9) MOLES AND MASSES	RECALL QUIZZES METAL EXTRACTION (Y9) ACIDS, SALTS AND ELECTROLYTES METALS AND NEUTRALISATION	RECALL QUIZZES CHANGING REACTION RATES MEASURING REACTION RATES MOLES AND MASSES (Y10) YIELDS AND ATOM ECONOMY	RECALL QUIZZES HYDROCARBONS (Y9) ENERGY CHANGES	RECALL QUIZZES CARBON CYCLE AND THE GREENHOUSE EFFECT (Y9) EVOLUTION OF THE ATMOSPHERE
Eco Values	Electrolysis Chemical cells and fuel cells	Polymers Graphene and Fullerenes							

YEAR 11 CHEMISTRY



Unit of Learning	C6	C10 (TRIPLE ONLY)	C7 (TRIPLE ONLY)	C10	C8 (TRIPLE ONLY)	C10
Topic	Chemical Equilibrium and Rates	The Haber Process Triple Only	Applications of Organic Molecules (Triple only)	Sustainability	Testing for Ions (Triple only)	Water as a Resources
New Skills	Assess the precision of measurements taken in an experiment. Draw and use the slope of a tangent to a curve as a measure of rate of change. Determine the slope and intercept of a linear graph Understand that measurements are repeatable when repetition, under the same conditions by the same investigator, gives similar results. Understand that measurements are reproducible if similar results are obtained by different investigators with different equipment.	Draw and use the slope of a tangent to a curve as a measure of rate of change.	Explain why a given practical procedure is well designed for its specified purpose.	Assess the precision of measurements taken in an experiment. Understand that measurements are repeatable when repetition, under the same conditions by the same investigator, gives similar results. Understand that measurements are reproducible if similar results are obtained by different investigators with different equipment.	Understand that measurements are repeatable when repetition, under the same conditions by the same investigator, gives similar results. Understand that measurements are reproducible if similar results are obtained by different investigators with different equipment.	Select and justify the apparatus to be used for a specific technique or purpose. Apply understanding of apparatus and techniques to suggest a procedure. Assess the precision of measurements taken in an experiment. Understand that measurements are repeatable when repetition, under the same conditions by the same investigator, gives similar results. Understand that measurements are reproducible if similar results are obtained by different investigators with different equipment.
Knowledge	Calculating rates of reactions (gradients of curves) Reversible reactions, energy changes and reversible reactions <u>Equilibrium</u> The effect of changing conditions on <u>equilibrium</u> (concentration, temperature, pressure) (HT Only)	<i>The Haber process</i> <i>Production and uses of NPK <u>fertilisers</u></i> <i>(Chemistry only)</i>	<i>Structure and formulae of alkenes</i> <i>Reactions of alkenes</i> <i>Alcohols</i> <i>Carboxylic acids</i> <i>Addition <u>polymerisation</u></i> <i>Condensation <u>polymerisation</u> (HT only)</i> <i>Amino acids (HT only)</i> <i>DNA (deoxyribonucleic acid) and other naturally occurring polymers</i> <i>(Chemistry Only)</i>	Life cycle assessment Ways of reducing the use of resources <i>Ceramics, polymers and composites (Triple only)</i>	<i>Flame tests</i> <i>Identifying - Metal hydroxides, Carbonates, Halides, Sulfates</i> <i>Chemistry Only</i> <i>Identifying ions Required Practical (Chemistry Only)</i>	Using the Earth's resources and <u>sustainable development</u> <u>Potable water</u> Waste water treatment Water Analysis Required Practical
	Y10 – Changing Reaction Rates, the concept of concentration, Moles, Gas Laws Y9 – Conservation of mass in reactions, Balancing Equations	Y11 – Equilibrium Y10 – Changing the Rates of Reactions, Gas Laws	Y10 – the properties of covalent molecules, Polymers, Crude Oil, Alkanes and Cracking, Combustion	Y11 - Polymers Y10 – Polymers Y8 – Ceramics, Composites, Polymers and Metals, Sustainability	Y9 – Testing for Gases, Periodic Table (Halogens), Transition Metals	Y11 – Testing for Ions, Lifecycle Assessments and Uses of Resources Y10 – Greenhouse gases Y8 - Sustainability
Assessment	RECALL QUIZZES MEASURING REACTION RATES (Y10) MOLES AND MASSES REVERSIBLE REACTIONS	RECALL QUIZZES CHANGING REACTION RATES (Y10)	RECALL QUIZZES HYDROCARBONS (Y10) FRACTIONAL DISTILLATION AND CRACKING (Y10) ALKENES ALKENES AND CARBOXYLIC ACIDS	RECALL QUIZZES COVALENT COMPOUNDS (Y10) BONDS AND IONS (Y9) COMPOSITES, HABER AND POLYMERS	RECALL QUIZZES CHROMATOGRAPHY AND GAS TESTS (Y9) IDENTIFYING IONS SPECTROSCOPY AND MATERIALS	RECALL QUIZZES CARBON CYCLE AND GREENHOUSE EFFECT (Y10) NATURAL, SYNTHETIC AND WATER
Ecco Values	<p>Through our teaching of investigations and use of CLEAPSS how to recognise and follow health and safety procedures</p> <p>Through our departmental feedback and marking policy to make effective use of constructive feedback to evaluate their own personal strengths and areas for development and to use this to inform goal setting https://www.pshe-association.org.uk/</p>					