Paper 1 Chemistry - assessment areas:

Unit 1 – Atomic structure and periodic table

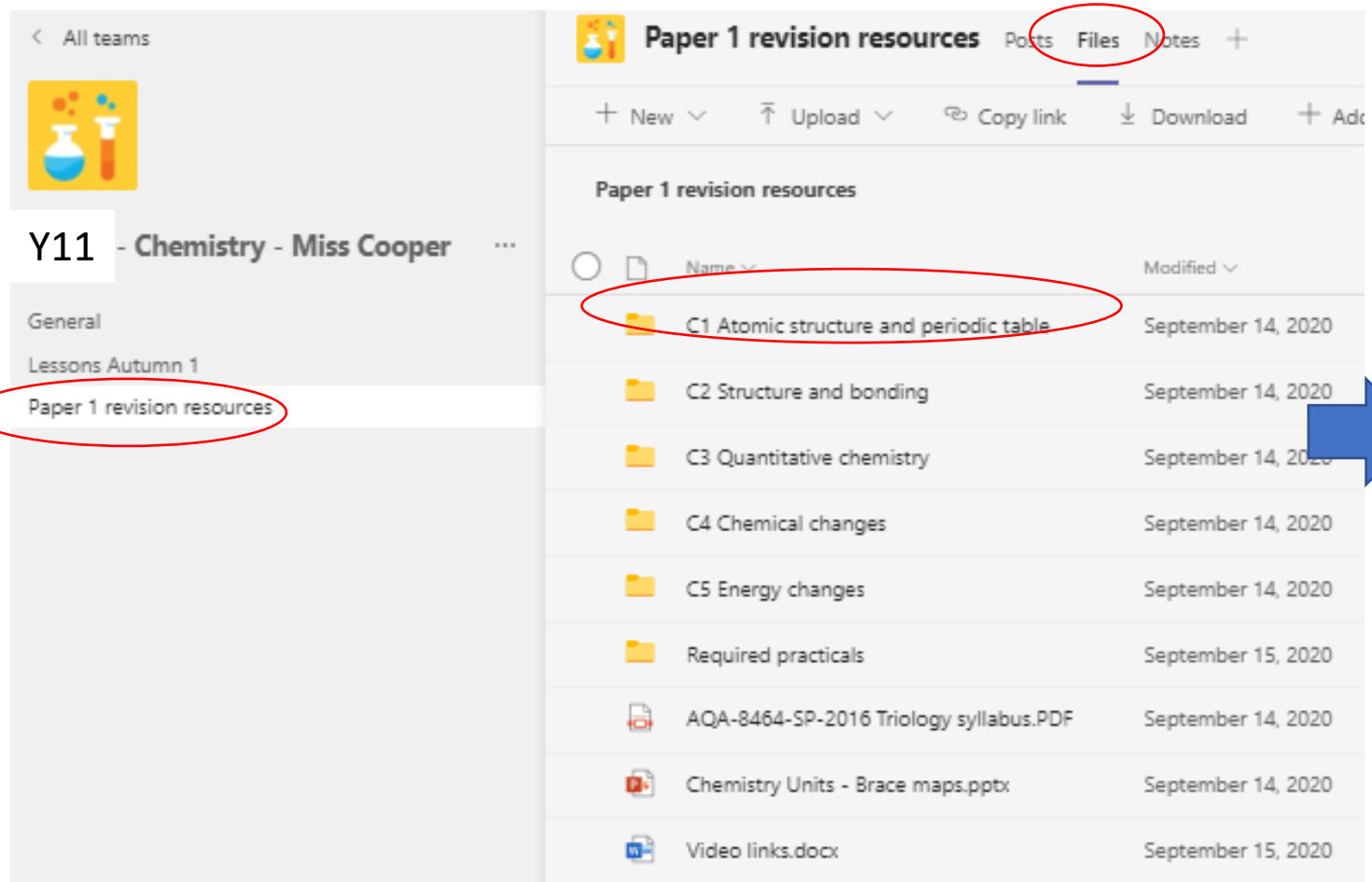
Unit 2 – Bonding, structure and properties of matter

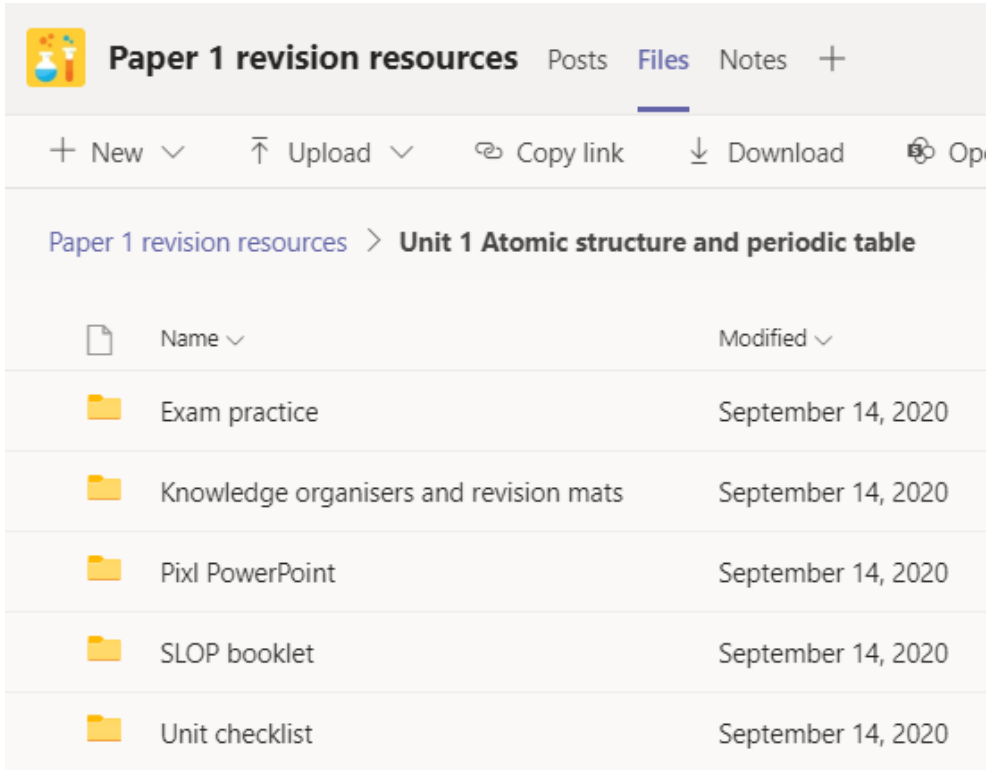
Unit 3 – Quantitative chemistry

Unit 4 – Chemical changes

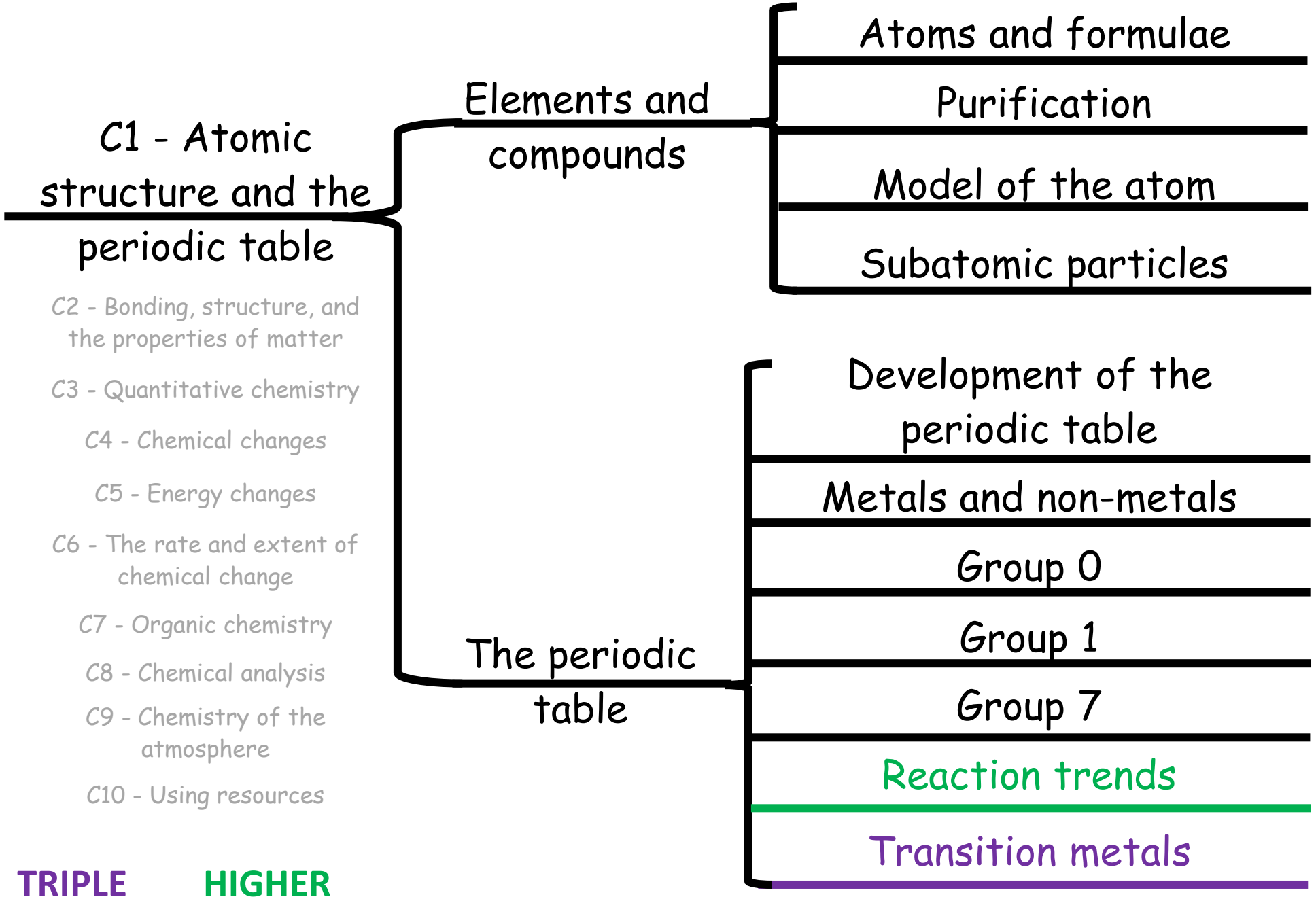
Unit 5 – Energy changes

All the resources are on our Teams page:





C1 - Atomic structure and the periodic table



C1 - Atomic structure and the periodic table

HT only =
higher tier only

Chem only =
triple only

Topic	C1 Atomic structure: Student Checklist
4.1.1 A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes	State that everything is made of atoms and recall what they are
	Describe what elements and compounds are
	State that elements and compounds are represented by symbols; and use chemical symbols and formulae to represent elements and compounds
	Write word equations and balanced symbol equations for chemical reactions, including using appropriate state symbols
	HT ONLY: Write balanced half equations and ionic equations
	Describe what a mixture is
	Name and describe the physical processes used to separate mixtures and suggest suitable separation techniques
	Describe how the atomic model has changed over time due to new experimental evidence, inc discovery of the atom and scattering experiments (inc the work of James Chadwick)
	Describe the difference between the plum pudding model of the atom and the nuclear model of the atom
	State the relative charge of protons, neutrons and electrons and describe the overall charge of an atom
	State the relative masses of protons, neutrons and electrons and describe the distribution of mass in an atom
	Calculate the number of protons, neutrons and electrons in an atom when given its atomic number and mass number
	Describe isotopes as atoms of the same element with different numbers of neutrons
	Define the term relative atomic mass and why it takes into account the abundance of isotopes of the element
	Calculate the relative atomic mass of an element given the percentage abundance of its isotopes
	Describe how electrons fill energy levels in atoms, and represent the electron structure of elements using diagrams and numbers

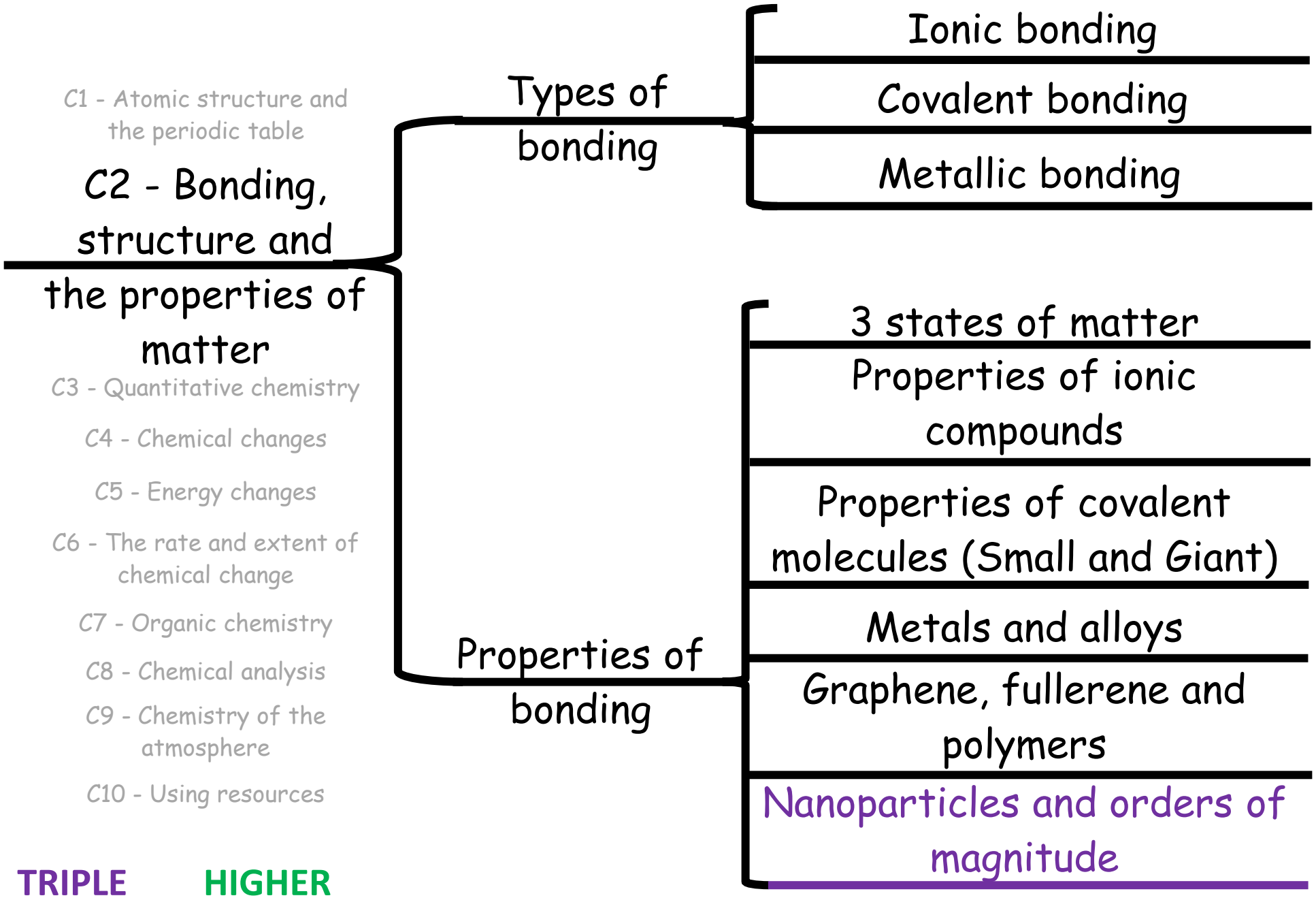
C1 - Atomic structure and the periodic table

HT only =
higher tier only

Chem only =
triple only

Topic	C1 Atomic structure: Student Checklist
4.1.2 The periodic table	Recall how the elements in the periodic table are arranged
	Describe how elements with similar properties are placed in the periodic table
	Explain why elements in the same group have similar properties and how to use the periodic table to predict the reactivity of elements
	Describe the early attempts to classify elements
	Explain the creation and attributes of Mendeleev's periodic table
	Identify metals and non-metals on the periodic table, compare and contrast their properties
	Explain how the atomic structure of metals and non-metals relates to their position in the periodic table
	Describe nobel gases (group 0) and explain their lack of reactivity
	Describe the properties of noble gases, including boiling points, predict trends down the group and describe how their properties depend on the outer shell of electrons
	Describe the reactivity and properties of group 1 alkali metals with reference to their electron arrangement and predict their reactions
	Describe the properties of group 7 halogens and how their properties relate to their electron arrangement, including trends in molecular mass, melting and boiling points and reactivity
	Describe the reactions of group 7 halogens with metals and non-metals
	Triple ONLY: Describe the properties of transition metals and compare them with group 1 elements, including melting points and densities, strength and hardness, and reactivity (for CR, Mn Fe, Co, Ni & Cu)

C2 - Bonding, structure and the properties of matter



TRIPLE HIGHER

C2 - Bonding, structure and the properties of matter

HT only =
higher tier only

Chem only =
triple only

Topic	C2 Structure and bonding: Student Checklist
4.2.1 Chemical bonds, ionic, covalent and metallic	Describe the three main types of bonds: ionic bonds, covalent bonds and metallic bonds in terms of electrostatic forces and the transfer or sharing of electrons
	Describe how the ions produced by elements in some groups have the electronic structure of a noble gas and explain how the charge of an ion relates to its group number
	Describe the structure of ionic compounds, including the electrostatic forces of attraction, and represent ionic compounds using dot and cross diagrams
	Describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent a giant ionic structure
	Work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure
	Describe covalent bonds and identify different types of covalently bonded substances, such as small molecules, large molecules and substances with giant covalent structures
	Represent covalent bonds between small molecules, repeating units of polymers and parts of giant covalent structures using diagrams
	Draw dot and cross diagrams for the molecules of hydrogen, chlorine, oxygen, nitrogen, hydrogen chloride, water, ammonia and methane
	Deduce the molecular formula of a substance from a given model or diagram in these forms showing the atoms and bonds in the molecule
	Describe the arrangement of atoms and electrons in metallic bonds and draw diagrams the bonding in metals

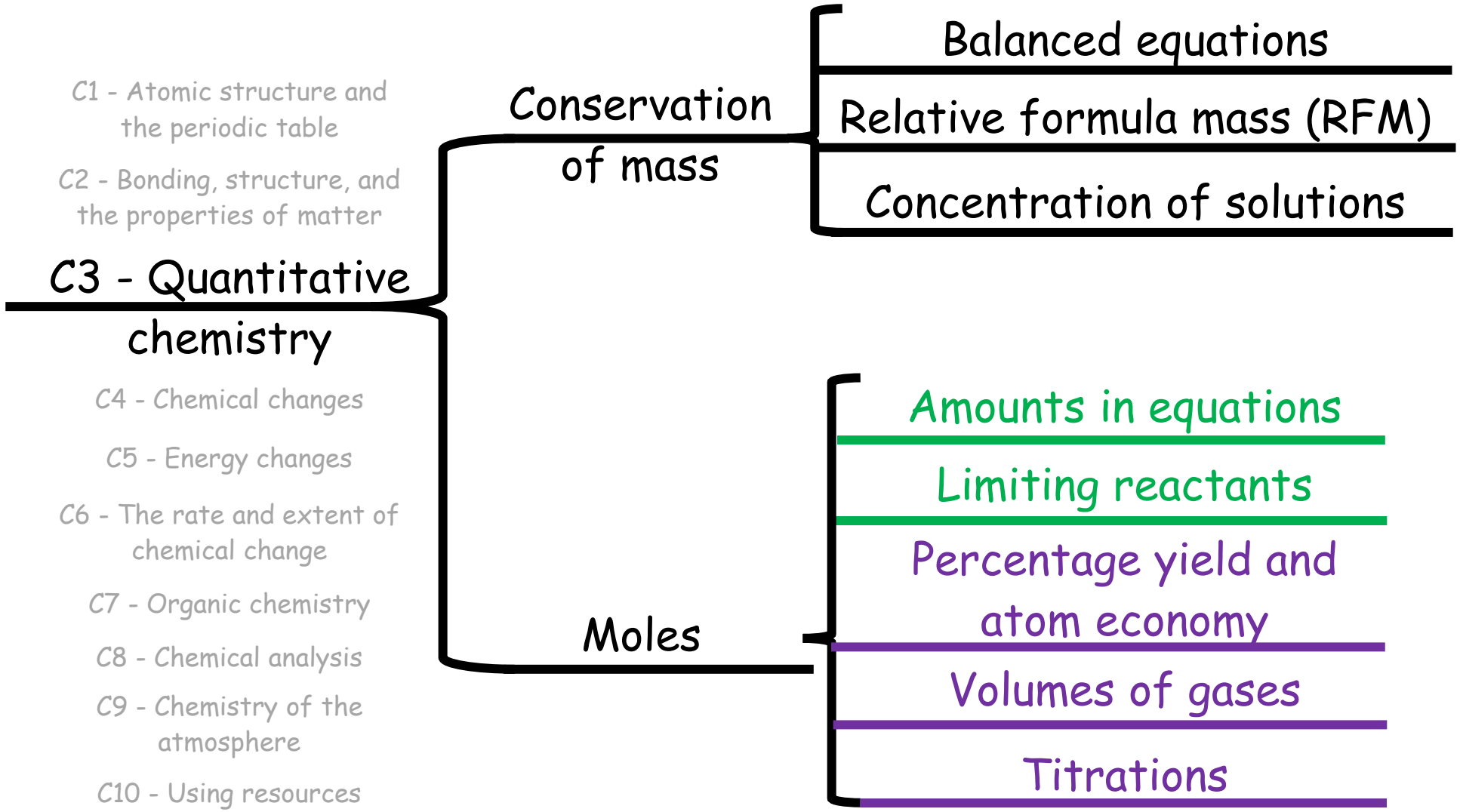
C2 - Bonding, structure and the properties of matter

HT only =
higher tier only

Chem only =
triple only

Topic	C2 Structure and bonding: Student Checklist
4.2.2 How bonding and structure are related to the properties of substances	Name the three States of matter, identify them from a simple model and state which changes of state happen at melting and boiling points
	Explain changes of state using particle theory and describe factors that affect the melting and boiling point of a substance
	HT ONLY: Discuss the limitations of particle theory
	Recall what (s), (l), (g) and (aq) mean when used in chemical equations and be able to use them appropriately
	Explain how the structure of ionic compounds affects their properties, including melting and boiling points and conduction of electricity (sodium chloride structure only)
	Explain how the structure of small molecules affects their properties
	Explain how the structure of polymers affects their properties
	Explain how the structure of giant covalent structures affects their properties
	Explain how the structure of metals and alloys affects their properties, including explaining why they are good conductors
	Explain why alloys are harder than pure metals in terms of the layers of atoms
	Explain the properties of graphite, diamond and graphene in terms of their structure and bonding
	Describe the structure of fullerenes, and their uses, including Buckminsterfullerene and carbon nanotubes
	Chem ONLY: Compare the dimensions of nanoparticles to other particles and explain the effect of their surface area to volume ratio on their properties
	Chem ONLY: Discuss the applications of nanoparticles and their advantages and disadvantages, including uses in medicine, cosmetics, fabrics and the development of catalysts

C3 - Quantitative chemistry



TRIPLE **HIGHER**

C3 - Quantitative chemistry

HT only =
higher tier only

Chem only =
triple only

Topic	C3 Quantitative chemistry: Student Checklist
4.3.1 Chemical measurements, conservation of mass and the quantitative interpretation	State that mass is conserved and explain why, including describing balanced equations in terms of conservation of mass
	Explain the use of the multipliers in equations in normal script before a formula and in subscript within a formula
	Describe what the relative formula mass (Mr) of a compound is and calculate the relative formula mass of a compound, given its formula
	Calculate the relative formula masses of reactants and products to prove that mass is conserved in a balanced chemical equation
	Explain observed changes of mass during chemical reactions in non-enclosed systems using the particle model when given the balanced symbol equation
	Explain why whenever a measurement is made there is always some uncertainty about the result obtained
4.3.2 Use of amount of substance in relation to masses of pure substances	Calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution
	HT ONLY: State that chemical amounts are measured in moles (mol) and explain what a mol is with reference to relative formula mass and Avogadro's constant
	HT ONLY: Use the relative formula mass of a substance to calculate the number of moles in a given mass of the substance
	HT ONLY: Calculate the masses of reactants and products when given a balanced symbol equation
	HT ONLY: Use moles to write a balanced equation when given the masses of reactants and products (inc changing the subject of the equation)
	HT ONLY: Explain the effect of limiting the quantity of a reactant on the amount of products in terms of moles or masses in grams
	HT ONLY: Explain how the mass of a solute and the volume of a solution is related to the concentration of the solution

C3 - Quantitative chemistry

HT only =
higher tier only

Chem only =
triple only

Topic	C3 Quantitative chemistry: Student Checklist
4.3.3 Yield and atom economy of chemical reactions	*Chem ONLY: Explain why it is not always possible to obtain the calculated or expected amount of a product*
	Chem ONLY: Calculate the theoretical amount of a product and percentage yield of a product using the formula % yield = mass of product made/max theoretical mass of product x 100
	Chem & HT ONLY: Calculate the theoretical mass of a product from a given mass of reactant and the balanced equation for the reaction
	Chem ONLY: Describe atom economy as a measure of the amount of reactants that end up as useful products
	Chem ONLY: Calculate the percentage atom economy of a reaction to form a desired product using the equation % atom economy = RFM of desired product/sum of RFM of all reactants x 100
	Chem & HT ONLY: Explain why a particular reaction pathway is chosen to produce a specified product, given appropriate data
4.3.4 Using concentrations of solutions in mol/dm^3	*Chem & HT ONLY: Calculate the amount of solute (in moles or grams) in a solution from it's concentration in mol/dm^3*
	Chem & HT ONLY: Calculate the concentration of a solution when it reacts completely with another solution of a known concentration
	Chem & HT ONLY: Describe how to carry out titrations of strong acids and strong alkalis and calculate quantities in titrations involving concentrations in mol/dm^3 and g/dm^3
	Chem & HT ONLY: Explain how the concentration of a solution in mol/dm3 is related to the mass of the solute and the volume of the solution
	Chem & HT ONLY: Explain what the volume of one mole of any gas at room temperature is
	Chem & HT ONLY: Calculate the volume of a gas at room temperature and pressure from its mass and relative formula mass

C4 - Chemical Changes

C1 - Atomic structure and the periodic table

C2 - Bonding, structure, and the properties of matter

C3 - Quantitative chemistry

C4 - Chemical changes

C5 - Energy changes

C6 - The rate and extent of chemical change

C7 - Organic chemistry

C8 - Chemical analysis

C9 - Chemistry of the atmosphere

C10 - Using resources

Reactivity

- Reactivity series
- Oxidation and reduction (in terms of electrons)
- Reactions of metals, metal oxides and metal carbonates with acids
- pH scale and neutralisation
- Strong and weak acids

Electrolysis

- Electrolysis of molten ionic compounds
- Electrolysis of aqueous ionic compounds
- Electrolysis of aluminium oxide

TRIPLE **HIGHER**

C4 - Chemical Changes

HT only =
higher tier only

Chem only =
triple only

Topic	C4 Chemical changes: Student Checklist
4.4.1 Reactivity of metals	Describe how metals react with oxygen and state the compound they form, define oxidation and reduction
	Describe the arrangement of metals in the reactivity series, including carbon and hydrogen, and use the reactivity series to predict the outcome of displacement reactions
	Recall and describe the reactions, if any, of potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper with water or dilute acids
	Relate the reactivity of metals to its tendency to form positive ions and be able to deduce an order of reactivity of metals based on experimental results
	Recall what native metals are and explain how metals can be extracted from the compounds in which they are found in nature by reduction with carbon
	Evaluate specific metal extraction processes when given appropriate information and identify which species are oxidised or reduced

C4 - Chemical Changes

HT only = *higher tier only*

Chem only = *triple only*

Topic	C4 Chemical changes: Student Checklist
4.4.2 Reactions of acids	**HT ONLY: Describe oxidation and reduction in terms of loss and gain of electrons**
	HT ONLY: Write ionic equations for displacement reactions, and identify which species are oxidised and reduced from a symbol or half equation
	HT ONLY: Explain in terms of gain or loss of electrons that the reactions between acids and some metals are redox reactions, and identify which species are oxidised and which are reduced (Mg,Zn, Fe + HCl & H_2SO_4)
	Explain that acids can be neutralised by alkalis, bases and metal carbonates and list the products of each of these reactions
	Predict the salt produced in a neutralisation reaction based on the acid used and the positive ions in the base, alkali or carbonate and use the formulae of common ions to deduce the formulae of the salt
	Describe how soluble salts can be made from acids and how pure, dry samples of salts can be obtained
	Required practical 1: *preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution*
	Recall what the pH scale measures and describe the scale used to identify acidic, neutral or alkaline solutions
	Define the terms acid and alkali in terms of production of hydrogen ions or hydroxide ions (in solution), define the term base
	Describe the use of universal indicator to measure the approximate pH of a solution and use the pH scale to identify acidic or alkaline solutions
	Chem ONLY: Describe how to carry out titrations using strong acids and strong alkalis only (sulfuric, hydrochloric and nitric acids to find the reacting volumes accurately
	Chem & HT ONLY: Calculate the chemical quantities in titrations involving concentrations in mol/dm^3 and in g/dm^3
	Chem ONLY: ***Required practical 2:*** *determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration*
	HT ONLY: Use and explain the terms dilute and concentrated (in terms of amount of substance) and weak and strong (in terms of the degree of ionisation) in relation to acids
	HT ONLY: Explain how the concentration of an aqueous solution and the strength of an acid affects the pH of the solution and how pH is related to the hydrogen ion concentration of a solution

C4 - Chemical Changes

HT only *=*
higher tier only

Chem only *=*
triple only

Topic	C4 Chemical changes: Student Checklist
4.4.3 Electrolysis	Describe how ionic compounds can conduct electricity when dissolved in water and describe these solutions as electrolytes
	Describe the process of electrolysis
	Describe the electrolysis of molten ionic compounds and predict the products at each electrode of the electrolysis of binary ionic compounds
	Explain how metals are extracted from molten compounds using electrolysis and use the reactivity series to explain why some metals are extracted with electrolysis instead of carbon
	Describe the electrolysis of aqueous solutions and predict the products of the electrolysis of aqueous solutions containing single ionic compounds
	Required practical 3: *investigate what happens when aqueous solutions are electrolysed using inert electrodes*
	HT ONLY: Describe the reactions at the electrodes during electrolysis as oxidation and reduction reactions and write balanced half equations for these reactions

C5 – Energy Changes

C1 - Atomic structure and the periodic table

C2 - Bonding, structure, and the properties of matter

C3 - Quantitative chemistry

C4 - Chemical changes

C5 - Energy changes

C6 - The rate and extent of chemical change

C7 - Organic chemistry

C8 - Chemical analysis

C9 - Chemistry of the atmosphere

C10 - Using resources

- Temperature changes of reactions
  - Endo- and exothermic reactions
  - Reaction profiles
  - Energy changes of reactions
- Cells
  - Cells and batteries
  - Fuel cells

TRIPLE **HIGHER**

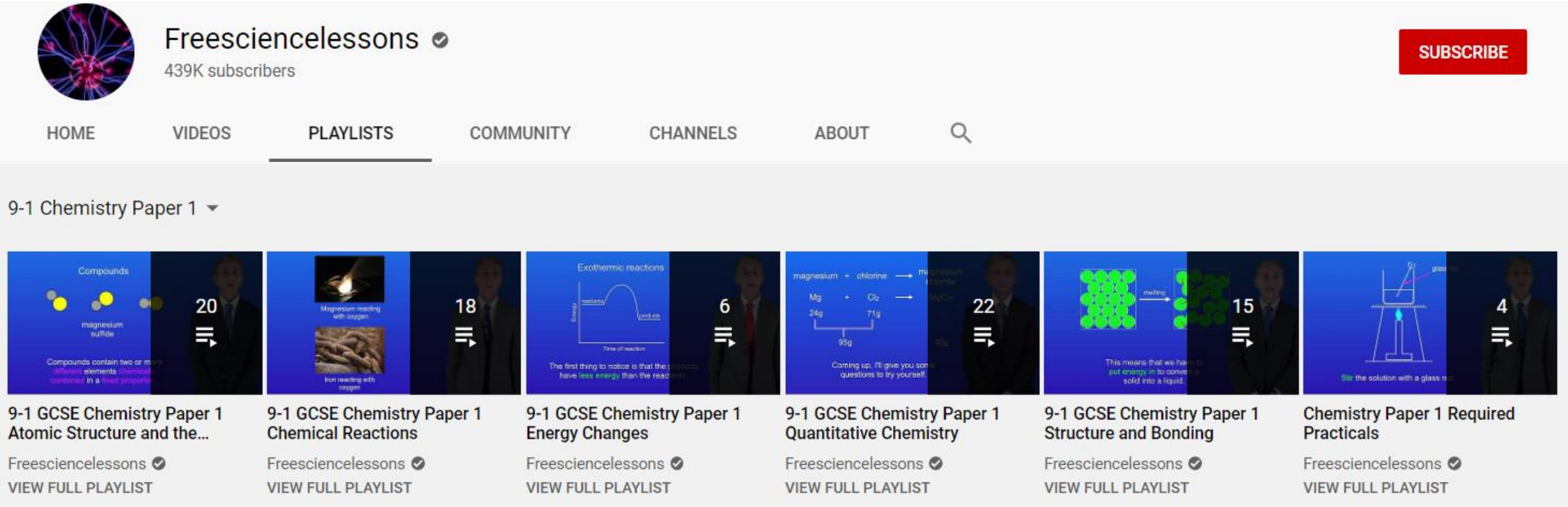
C5 – Energy Changes

HT only =
higher tier only

Chem only =
triple only

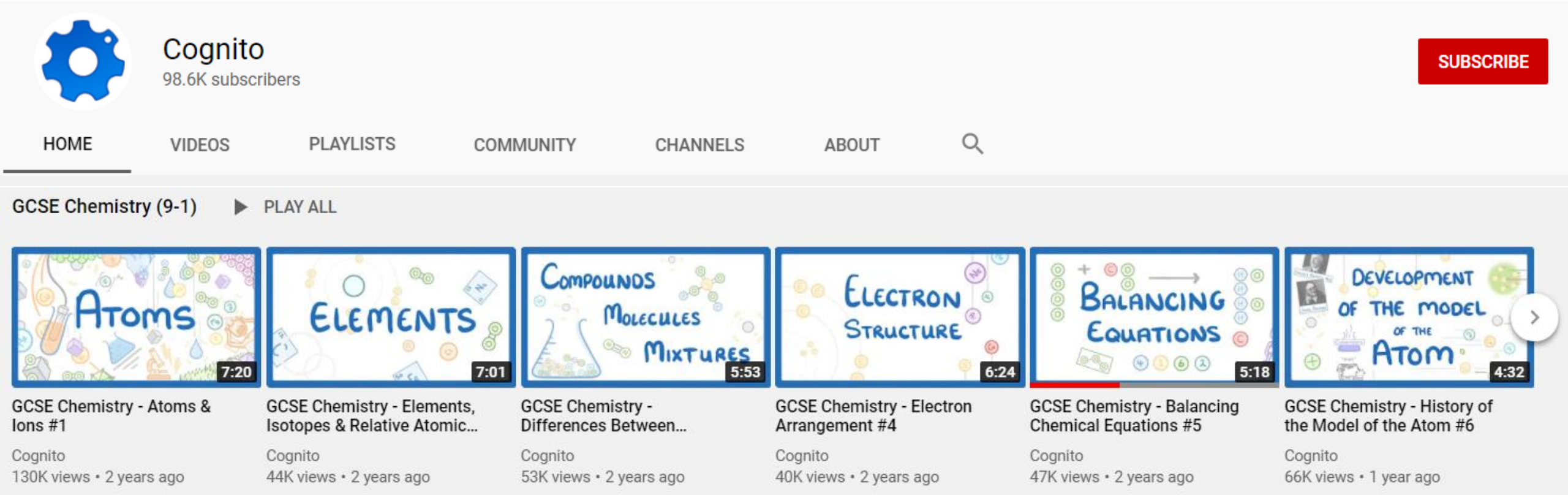
Topic	C5 Energy changes: Student Checklist
4.5.1 Exothermic and endothermic reactions	Describe how energy is transferred to or from the surroundings during a chemical reaction
	Explain exothermic and endothermic reactions on the basis of the temperature change of the surroundings and give examples of everyday uses
	***Required practical 4**: investigate the variables that affect temperature changes in reacting solutions*
	Describe what the collision theory is and define the term activation energy
	Interpret and draw reaction profiles of exothermic and endothermic reactions, including identifying the relative energies of reactants and products, activation energy and overall energy change
	HT ONLY: Explain the energy changes in breaking and making bonds and calculate the overall energy change using bond energies
4.5.2 Chemical cells and fuel cells	***Chem ONLY: Describe what a simple cell and a battery is and how they produce electricity***
	Chem ONLY: Describe why alkaline batteries are non-rechargeable, state why some cells are rechargeable and evaluate the use of cells
	Chem ONLY: Describe fuel cells and compare fuel cells to rechargeable cells and batteries
	Chem ONLY: Describe the overall reaction in a hydrogen fuel cell
	Chem & HT ONLY: Write half equations for the electrode reactions in a hydrogen fuel cell

Videos to use – general revision:



https://www.youtube.com/c/Freesciencelessons/playlists?view=50&sort=dd&shelf_id=1

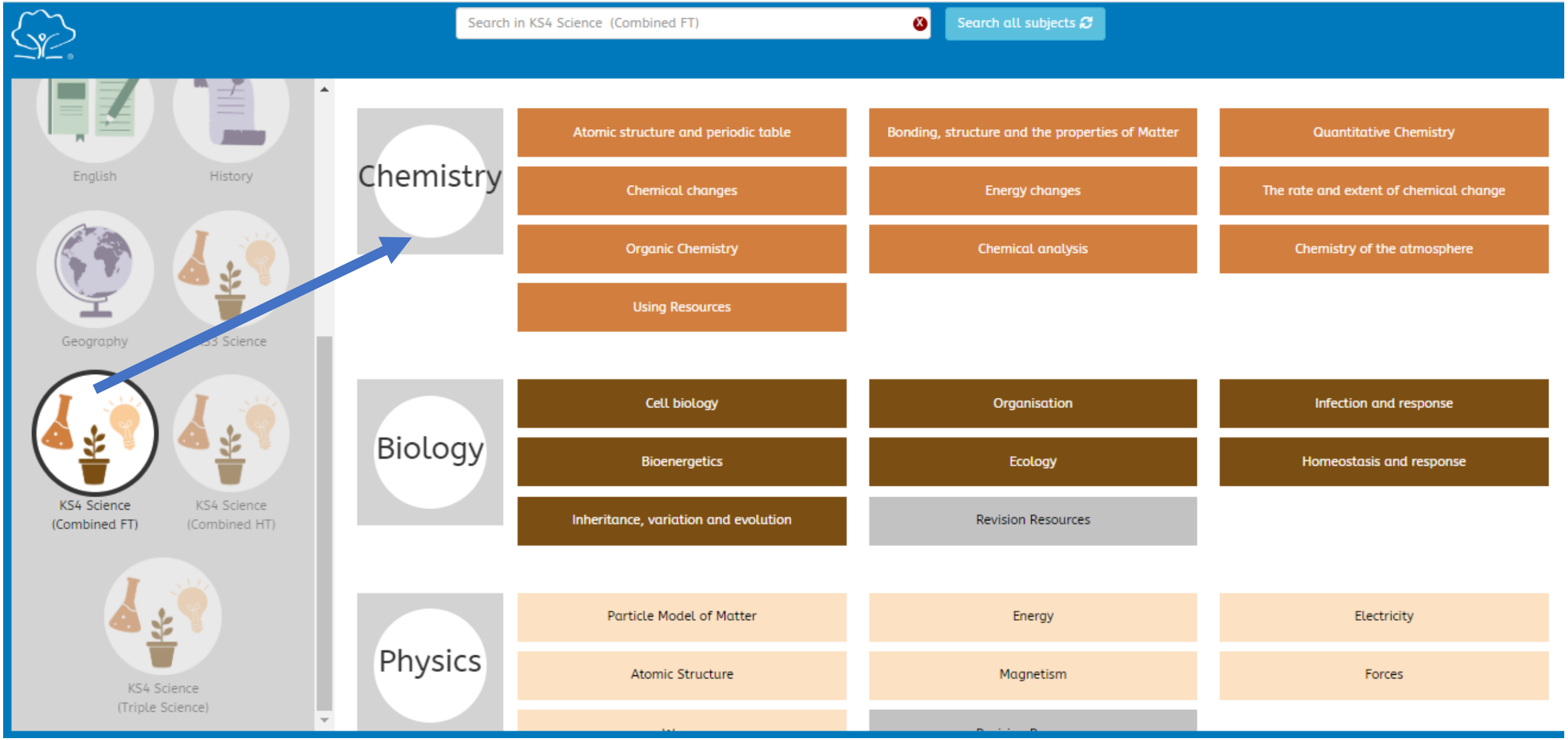
Videos to use – general revision:



https://www.youtube.com/playlist?list=PLidqqIGKox7WeOKVGHxcd69kKqtwrKl8W

If you struggle on a topic, use Oak Learning:

https://continuityoak.org.uk/Lessons



Practising questions:

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AQA Chemistry Paper 1 | Revision Playlist for Combined and Separate Science GCSE

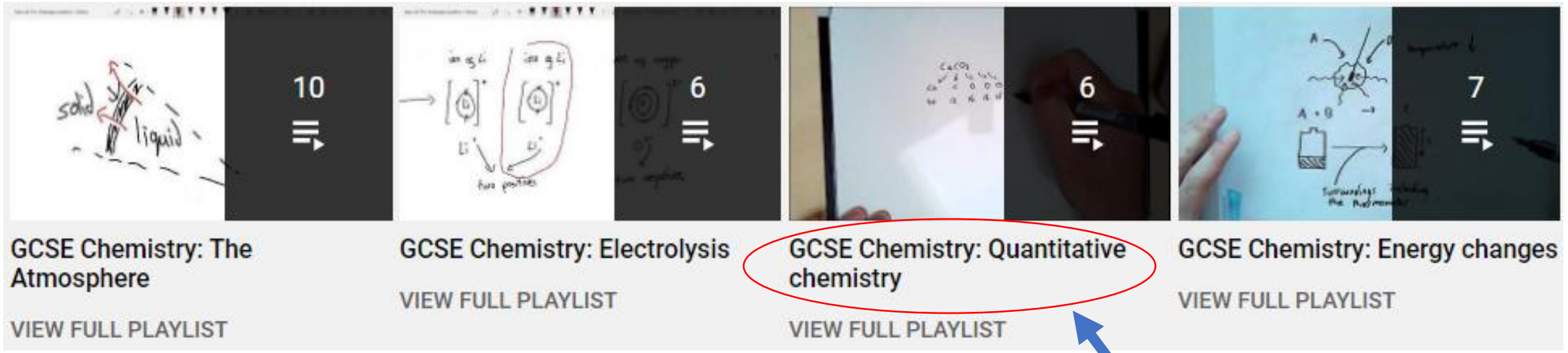
Chemistry Paper 1 practice questions:

https://www.youtube.com/playlist?list=PL7O6CcKg0HaGhn5E_LwNPH69bagsYQaJs

Chemistry required practicals:

https://www.youtube.com/watch?v=aXJI8YzB-ko&list=PL7O6CcKg0HaGP3xojKg1d4wA6WY1Hr-49&index=7

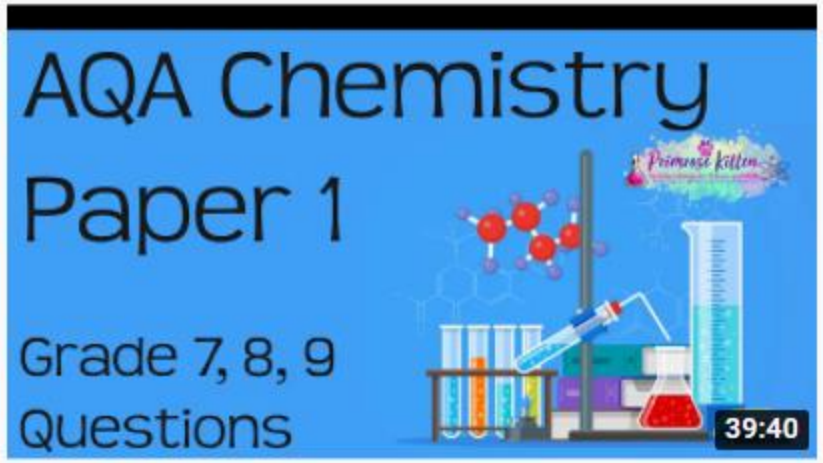
Practising questions:



https://www.youtube.com/channel/UCBHqVPDozD6Dg3tRN1-JSgg/playlists

These videos are really good for step by step calculation questions in the Quantitative Chemistry unit!

For higher/triple:



10 Hardest Questions in AQA Chemistry Paper 1 - Grade 7, 8, 9 Booster Revision

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Slop booklets:

Information and practise

All teams

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General

Lessons Autumn 1

Paper 1 revision resources

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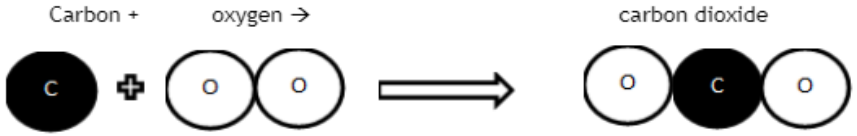
Paper 1 revision resources > **Unit 1 Atomic structure and periodic table**

Name

- Exam practice
- Knowledge organisers and revision mats
- Pixl PowerPoint
- SLOP booklet
- Unit checklist

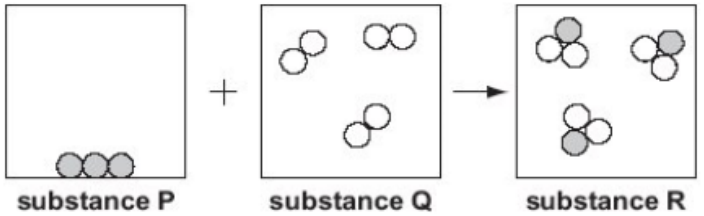
Conservation of mass

In any chemical reaction, the atoms are neither created nor destroyed. It does not matter whether the reaction is hot or cold, the atoms cannot be created or destroyed. But they are rearranged. For example, in a reaction between a carbon atom and an oxygen molecule, the atoms rearrange to form carbon dioxide.



You can see that the atoms on the left have all rearranged themselves to produce a new substance. This is called the **conservation of mass**; that atoms cannot be created or destroyed as a result of a chemical reaction.

Below is a particle diagram for a reaction:



80. Which substances are elements?
81. Which substance is a compound?
82. Identify the reactants and the products
83. In terms of atoms and rearrangement, how can you tell that a chemical reaction has taken place?
84. How many atoms of P are on the left?
85. How many atoms of Q are on the left?

Revision PowerPoints:

Also has questions and answers

All teams

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General

Lessons Autumn 1

Paper 1 revision resources

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Paper 1 revision resources > **Unit 1 Atomic structure and periodic table**

Name Modified

- Exam practice
- Knowledge organisers and revision mats
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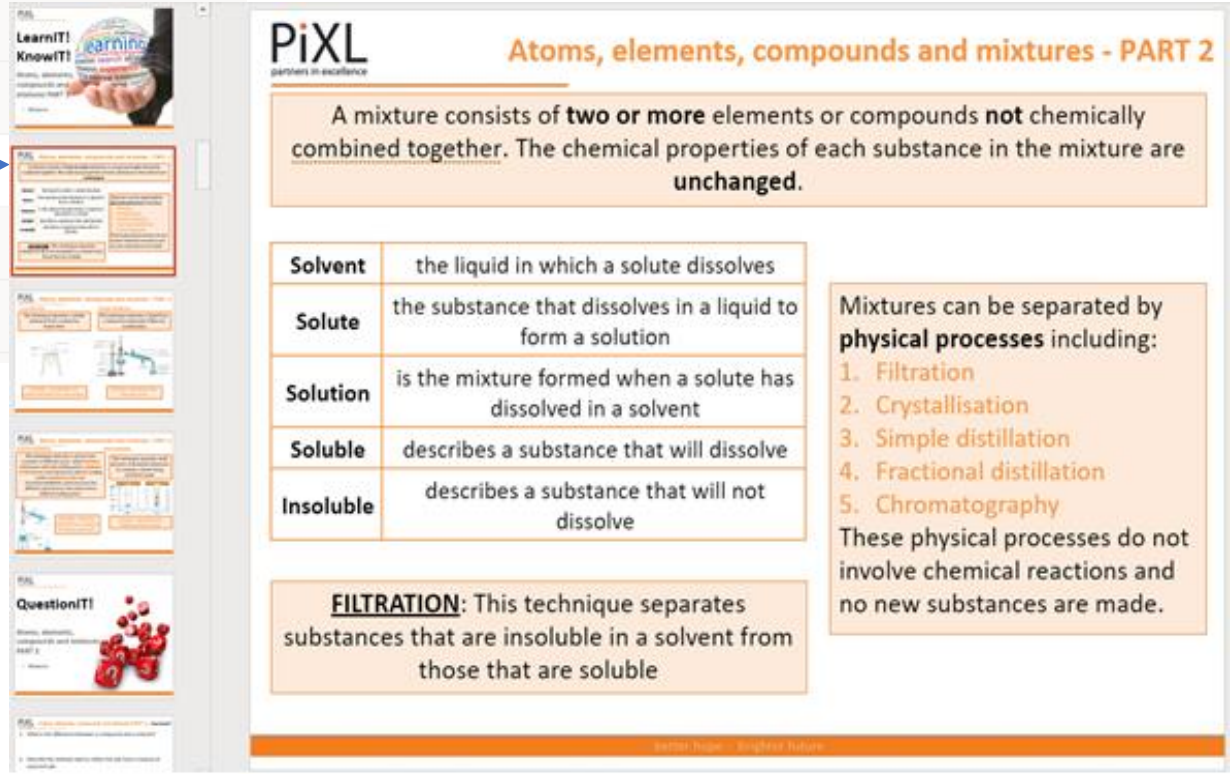
- Unit checklist



Exam practice:

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General

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Paper 1 revision resources

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Paper 1 revision resources > Unit 1 Atomic structure and periodic table

Name

- Exam practice
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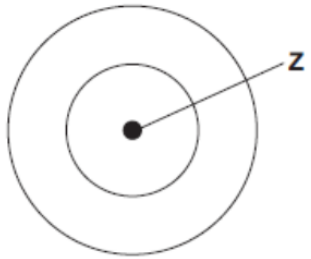
- Unit checklist

Atomic structure questions.pdf

Q31. There are eight elements in the second row (lithium to neon) of the periodic table.

(a) **Figure 1** shows an atom with two energy levels (shells).

Figure 1



(i) Complete **Figure 1** to show the electronic structure of a boron atom.

(1)

(ii) What does the central part labelled **Z** represent in **Figure 1**?

.....

(1)

Unit review videos:

The whole of AQA Chemistry Paper 1 in only 72 minutes!! GCSE 9-1 Science Revision

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https://www.youtube.com/watch?v=MpQ-3YAwNhI&t=600s

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These are longer but have practice questions…

https://classroom.thenational.academy/units/atomic-structure-and-periodic-table-c831

Key Stage 4, Chemistry
Atomic structure and periodic table

Lessons in this unit

Lesson 19
Review (Part 1)
35m video

Lesson 20
Review (Part 2)
41m video


Good Luck