

GCSE Science – Chemistry SEPARATES: PERSONALISED LEARNING CHECKLIST

	Red	Amber	Green	Revised Tick ☒
Area of Study: Atomic Structure and the periodic table				
Atoms, elements and compounds				
Mixtures				
The development of the model of the atom				
Relative electrical charges of subatomic particles				
Size and mass of atoms				
Relative atomic mass				
Electron arrangement				
The periodic table and its development				
Metals and non-metals				
Group 0				
Group 1				
Group 7				
Comparison of transition metals with Group 1				
Typical properties of transition metals				
<i>I am most confident with the following topic/topics:</i>				
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Area of Study: Bonding, Structure and the Properties of Matter				
Ionic bonding				
Properties of ionic compounds				
Covalent bonding				

Properties of small molecules				
Polymers				
Properties of giant covalent structures				
Structure and bonding of carbon (Diamond, graphite, graphene and fullerenes)				
Metallic bonding				
Properties of metals and alloys				
Metals as conductors				
The three states of matter and state symbols				
HT – Limitations of particle theory				
Nanoparticles				
Uses of nanoparticles				
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Area of Study: Quantitative Chemistry				
The law of conservation of mass				
Mass changes when a reactant is a product or gas				
Balancing symbol equations				
Relative formula mass (M_r)				
Chemical measurements				
HT: Moles				
HT: Calculating masses from balanced equations				
HT: Using moles to balance equations				
HT: Limiting reactants				

Percentage yield				
Atom economy				
Concentrations of solutions in g/dm ³				
HT: the link between mass of solute and volume of solution				
HT: Using concentrations of solutions in mol/dm³				
HT: titrations				
HT: Calculating volumes of gases				
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Area of Study: Chemical Changes				
Metal oxides				
The reactivity series				
Extracting metals using reduction				
HT: Oxidation and reduction equations				
Naming salts				
Reactions of acids and metals to form salts				
HT: Redox reactions				
Neutralisation of acids to form salts				
The pH scale and neutralisation				
Methods of forming soluble salts				
HT: Strong and weak acids				
Electrolysis of molten ionic compounds				
Using electrolysis to extract aluminum				

Electrolysis of ionic compound solutions (eg. Sodium chloride solution)				
HT: Use half equations to represent what happens to electrons at the electrodes				
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Area of Study: Energy Changes				
Energy transfer during exothermic reactions to include combustion, oxidation and neutralisation reactions				
Everyday uses of such exothermic reactions				
Energy transfer during endothermic reactions to include thermal decompositions and reaction of a weak acid with sodium hydrogencarbonate				
Everyday uses of endothermic reactions				
Distinguish between exo and endo reactions using temperature measurements				
Reaction energy profiles to include showing how activation energy term is used for both exothermic and endothermic reactions				
The Energy changes of reactions using the energy required to break bonds compared to the energy formed to make bonds (HT)				
Actual calculations of the overall energy transfer from given bond energies values (HT)				
How a simple chemical cell works to produce electricity (therefore batteries)				
What the differences are between non-rechargeable and rechargeable cells/batteries				

How a simple fuel cell works and more specifically how the Hydrogen fuel cell works				
Be able to write the half equations for the electrode reactions in the Hydrogen Fuel cell (HT)				
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Area of Study: Rate and Extent of Chemical Change				
Calculating rates of reactions				
Activation energy and how reactions happen				
Factors affecting rates of reactions: • Temperature • Concentration/pressure • Surface area • Catalyst				
Collision theory for factors affecting rate: • Temperature • Concentration/pressure • Surface area • Catalyst				
Catalysts and reaction profiles				
Reversible reactions				
Energy changes and reversible reactions				
Equilibrium				
HT: The effect of changing concentration on equilibrium				
HT: The effect of changing temperature on equilibrium				
HT: The effect of changing pressure on equilibrium				

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Area of Study: Organic Chemistry				
The alkanes mixture that crude oil is made up of				
How to these alkanes generally and specifically				
The fractional distillation method details used to separate these Alkanes from crude oil				
An awareness of some of the uses of the many products processed from these fractions and the vast array of products they contribute to making in our everyday lives.				
What the physical properties of Hydrocarbons are, how this can vary (trends) and why				
Details about the process of oxidation (complete combustion) of hydrocarbon fuels				
Able to write balanced symbol equations for the above from given starting formula of alkane				
Able to describe in general terms both catalytic and steam 'cracking' processes to obtain new alkanes and alkenes				
Alkenes double bonds reaction with Bromine water as test for level of unsaturation				
Give examples of the usefulness of cracking in addressing the supply and demand issues of such necessary products as polymers and fuels				
Structure, formula as ways of representing and identifying alkenes with names of the first 4.				
Correct use of terms such as homologous series, unsaturated/saturated, general formula				

Describe how alkenes can react with oxygen, hydrogen, water and group 7 Halogens to give rise to many varied products. (+ conditions)				
Be able to draw fully displayed structural formulae of first 4 Alkenes				
How to represent the first 4 alcohols in formula and structure. Recall uses of them				
Describe how alcohols react with sodium, in air, added to water and with an oxidising agent				
Conditions for the fermentation process to make alcohols from sugar solution				
How to represent the first 4 Carboxylic acids in formula and structure. Recall uses of them				
Describe what happens when Carboxylic acids react with carbonates, dissolve in water, react with alcohols				
Explain why carboxylic acids are referred to as weak acids (HT)				
Able to name first 4 Carboxylic acids				
Know and recognise the ester ethyl ethanoate				
Recognise and draw diagrams to represent the process called addition polymerisation to form polymers from any given alkene monomer				
Explain the basic principles of condensation polymerisation (HT)				
Able to identify a given amino-acid and use it to show how they can be combined to form polyamines such as proteins (HT)				
Name the types of monomers from which naturally occurring polymers such as DNA are made via condensation polymerisation (HT)				
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Area of Study: Chemical Analysis				
Using melting and boiling point data, identify pure substances and mixtures				
Define the meaning of the term formulation.				
Identify formulations given the appropriate information.				
Explain how paper chromatography separates mixtures				
Suggest how chromatographic methods can be used for distinguishing pure substances from impure substances.				
Interpret chromatograms and determine R _f values from chromatograms.				
Describe how to test for hydrogen gas.				
Describe how to test for oxygen gas.				
Describe how to test for carbon dioxide gas.				
Describe how to test for chlorine.				
Describe how to test for positive ions using flame tests.				
Describe how to test for positive ions using sodium hydroxide.				
Describe how to test for carbonate ions in a compound.				
Describe how to test for halide ions in a compound.				
Describe how to test for sulfate ions in a compound.				
State advantages of flame emission spectroscopy compared with the chemical tests above.				
Interpret an instrumental result of flame emission spectroscopy when given appropriate data.				
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Area of Study: Chemistry of the Atmosphere					
State the proportions of the gases in the Earth's atmosphere.					
Describe theories of the Earth's early atmosphere.					
Describe theories of how the Earth's early atmosphere became what it is today.					
Interpret evidence and evaluate theories about the Earth's early atmosphere.					
Describe how oxygen in the current atmosphere was produced.					
State the photosynthesis equation.					
Describe the main changes in the atmosphere over time and some of the likely causes of these changes.					
Describe and explain the formation of deposits of limestone, coal, crude oil and natural gas.					
Describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter.					
Recall human activities that increase the amounts of carbon dioxide and methane.					
Describe four potential effects of global climate change.					
Discuss the scale, risk and environmental implications of global climate change.					
Describe actions to reduce emissions of carbon dioxide and methane and give reasons why these may be limited.					
Describe how carbon monoxide, carbon particles (soot), sulphur dioxide and oxides of nitrogen are produced by burning fuels.					
Describe and explain the problems caused by increased amounts of the pollutants above.					
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Area of Study: Using Resources				
State reasons for using the Earth's resources.				
Give examples of natural products that are supplemented or replaced by agricultural and synthetic products.				
Distinguish between finite and renewable resources given appropriate information.				
Distinguish between potable water and pure water.				
Describe the differences in treatment of ground water and salty water.				
Give reasons for the steps used to produce potable water.				
Describe the process of sewage treatment and comment on the relative ease of obtaining potable water.				
HT: give reasons for alternative methods of extracting copper.				
HT: describe and evaluate the process of phytomining.				
HT: describe and evaluate the process of bioleaching.				
Compare life cycle assessments of shopping bags made from plastic and paper.				
Evaluate ways of reducing the use of limited resources.				
Describe experiments to show that both air and water are necessary for rusting.				
Explain sacrificial protection in terms of relative reactivity.				
Give uses of alloys of bronze, and steel and those made from aluminium and gold.				
Explain how LDPE and HDPE are both produced from ethane.				
Explain the difference between thermosoftening and thermosetting polymers.				

Define the meaning of the term composite.				
Recall some examples of composites.				
Compare the physical properties of glass and clay, ceramics, polymers, composites and metals.				
Explain how the properties of materials are related to their uses.				
Describe what happens in the Haber process.				
Apply the principles of dynamic equilibrium to the Haber process.				
Explain the trade-off between rate of production and position of equilibrium.				
Explain how the commercially used conditions for the Haber process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate.				
Recall the names of the salts produced when phosphate rock is treated with nitric acid, sulphuric acid and phosphoric acid.				
Compare the industrial production of fertilisers with laboratory preparations of the same compounds.				
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