Brockington College

Separate Science – Chemistry Paper 2

Personal Learning Checklist

AQA Chemistry (8462) from 2016 Topics C4.6 The rate and extent of chemical change				
Topic	**Student Checklist**	**R**	**A**	**G**
4.6.1 Rate of reaction	Calculate the rate of a chemical reaction over time, using either the quantity of reactant used or the quantity of product formed, measured in g/s, cm^3/s or mol/s			
	Draw and interpret graphs showing the quantity of product formed or reactant used up against time and use the tangent to the graph as a measure of the rate of reaction			
	HT ONLY: Calculate the gradient of a tangent to the curve on the graph of the quantity of product formed or reactant used against time and use this as a measure of the rate of reaction			
	Describe how different factors affect the rate of a chemical reaction, including the concentration, pressure, surface area, temperature and presence of catalysts			
	Required practical 5: *investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced, change in colour or turbidity*			
	Use collision theory to explain changes in the rate of reaction, including discussing activation energy			
	Describe the role of a catalyst in a chemical reaction and state that enzymes are catalysts in biological systems			
	Draw and interpret reaction profiles for catalysed reactions			
4.6.2 Reversible reactions and dynamic equilibrium	Explain what a reversible reaction is, including how the direction can be changed and represent it using symbols: A + B ⇌ C + D			
	Explain that, for reversible reactions, if a reaction is endothermic in one direction, it is exothermic in the other direction			
	Describe the State of dynamic equilibrium of a reaction as the point when the forward and reverse reactions occur at exactly the same rate			
	HT ONLY: Explain that the position of equilibrium depends on the conditions of the reaction and the equilibrium will change to counteract any changes to conditions			
	HT ONLY: Explain and predict the effect of a change in concentration of reactants or products, temperature, or pressure of gases on the equilibrium position of a reaction			

AQA Chemistry (8462) from 2016 Topics C4.7 Organic chemistry				
Topic	**Student Checklist**	**R**	**A**	**G**
4.7.1 Carbon compounds as fuels and feedstock	Describe what crude oil is and where it comes from, including the basic composition of crude oil and the general chemical formula for the alkanes			
	State the names of the first four members of the alkanes and recognise substances as alkanes from their formulae			
	Describe the process of fractional distillation, state the names and uses of fuels that are produced from crude oil by fractional distillation			
	Describe trends in the properties of hydrocarbons, including boiling point, viscosity and flammability and explain how their properties influence how they are used as fuels			
	Describe and write balanced chemical equations for the complete combustion of hydrocarbon fuels			
	Describe the process of cracking and state that the products of cracking include alkanes and alkenes and describe the test for alkenes			
	Balance chemical equations as examples of cracking when given the formulae of the reactants and products			
	Explain why cracking is useful and why modern life depends on the uses of hydrocarbons			
4.7.2 Reactions of alkenes and alcohols	*Chem ONLY: State the names and draw structural formulae of the first four members of the alkenes and recognise substances as alkenes from their formulae*			
	Chem ONLY: Describe the basic composition of alkenes, including the C=C functional group, the general chemical formula for the alkanes and describe what unsaturated means			
	Chem ONLY: Describe the combustion reactions of alkenes and the reactions of alkenes with hydrogen, water and the halogens			
	Chem ONLY: Draw fully displayed structural formulae of the first four members of the alkenes and the products of their addition reactions with hydrogen, water, chlorine, bromine and iodine			
	Chem ONLY: State the functional group of alcohols and the first four members of the homologous series of alcohols and represent alcohols using formulae			
	Chem ONLY: Describe some properties and reactions of the first four members of alcohols, including dissolving in water, reacting with sodium, burning in air, oxidation and uses			
	Chem ONLY: State the functional group of carboxylic acids and the first four members of the homologous series of carboxylic acids and represent them using diagrams and formulae			
	Chem ONLY: Describe some properties and reactions of carboxylic acids, including dissolving in water, reacting with carbonates and reacting with alcohols			
4.7.3 Synthetic and naturally occurring polymers	*Chem ONLY: Describe how alkenes can be used to make polymers by addition polymerisation*			
	Chem ONLY: Identify addition polymers and monomers from diagrams and from the presence of the functional group and draw diagrams to represent the formation of an addition polymers			
	Chem & HT ONLY: Describe the process of condensation polymerisation and explain the basic principles of condensation polymerisation			
	Chem & HT ONLY: State that amino acids have two different functional groups in a molecule and they react by condensation polymerisation to produce polypeptides			
	Chem & HT ONLY: Explain that different amino acids can be combined in a chain to produce proteins			
	Chem ONLY: Describe DNA as a large molecule of two polymer chains made from four different monomers called nucleotides in the form of a double helix			
	Chem ONLY: State and describe some other naturally occurring polymers such as proteins, starch and cellulose			

AQA Chemistry (8462) from 2016 Topics C4.8 Chemical analysis				
Topic	**Student Checklist**	**R**	**A**	**G**
4.8.1 Purity, formulations and chromatograph & 4.8.2 ID of gases	Define a pure substance and identify pure substances and mixtures from data about melting and boiling points			
	Describe a formulation and identify formulations given appropriate information			
	Describe chromatography, including the terms stationary phase and mobile phase and identify pure substances using paper chromatography			
	Explain what the Rf value of a compound represents, how the Rf value differs in different solvents and interpret and determine Rf values from chromatograms			
	Required practical 6: *investigate how paper chromatography can be used to separate and tell the difference between coloured substances (inc calculation of Rf values)*			
	Explain how to test for the presence of hydrogen, oxygen, carbon dioxide and chlorine			
4.8.3 Identification of ions by chemical and spectroscopic means	*Chem ONLY: Identify some metal ions from the results of flame tests and describe how to conduct a flame test*			
	Chem ONLY: Describe how sodium hydroxide solution can be used to identify some metal ions and identify metal ions from the results of their reactions with sodium hydroxide solution			
	Chem ONLY: Write balanced equations for the reactions between sodium hydroxide solution and some metal ions to produce insoluble hydroxides			
	Chem ONLY: Describe how to identify carbonates using limewater			
	Chem ONLY: Describe how to identify negative ions, including halide ions using silver nitrate and sulfate ions using barium chloride			
	Required practical 7: *use of chemical tests to identify the ions in unknown single ionic compounds*			
	Chem ONLY: State the advantages of using instrumental methods to identify elements and compounds compared to chemical tests			
	Chem ONLY: Describe the process of and how to use flame emission spectroscopy to identify metal ions; interpret the results of a flame emission spectroscopy tests			

AQA Chemistry (8462) from 2016 Topics C4.9 Chemistry of the atmosphere				
Topic	**Student Checklist**	**R**	**A**	**G**
4.9.1 The composition and evolution of the Earth's atmosphere	Describe the composition of gases in the Earth's atmosphere using percentages, fractions or ratios			
	Describe how early intense volcanic activity may have helped form the early atmosphere and how the oceans formed			
	Explain why the levels of carbon dioxide in the atmosphere changes as the oceans were formed			
	State the approximate time in Earth's history when algae started producing oxygen and describe the effects of a gradually increasing oxygen level			
	Explain the ways that atmospheric carbon dioxide levels decreased			
4.9.2 Carbon dioxide and methane as greenhouse gases	Name some greenhouse gases and describe how they cause an increase in Earth's temperature			
	List some human activities that produce greenhouse gases			
	Evaluate arguments for and against the idea that human activities cause a rise in temperature that results in global climate change			
	State some potential side effects of global climate change, including discussing scale, risk and environmental implications			
	Define the term carbon footprint and list some actions that could reduce the carbon footprint			
4.9.3 Common atmospheric pollutants and their sources	Describe the combustion of fuels as a major source of atmospheric pollutants and name the different gases that are released when a fuel is burned			
	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			
	Describe the properties and effects of carbon monoxide, sulfur dioxide and particulates in the atmosphere			
	Describe and explain the problems caused by increased amounts of these pollutants in the air			

AQA Chemistry (8462) from 2016 Topics C4.10 Using resources				
Topic	**Student Checklist**	**R**	**A**	**G**
4.10.1 Using the Earth's resources and obtaining potable water	State what humans use Earth's resources for, give some examples of natural resources that they use			
	Define the term finite and distinguish between finite and renewable resources			
	Explain what sustainable development is and discuss the role chemistry plays in sustainable development, including improving agricultural and industrial processes			
	State examples of natural products that are supplemented or replaced by agricultural and synthetic products			
	Discuss the importance of water quality for human life, including defining potable water			
	Describe methods to produce potable water, including desalination of salty water or sea water and the potential problems of desalination			
	Required practical 8: *analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.*			
	Describe waste water as a product of urban lifestyles and industrial processes that includes organic matter, harmful microbes and harmful chemicals			
	Describe the process of sewage treatment and compare the ease of obtaining potable water from waste water as opposed to ground or salt water			
	HT ONLY: Name and describe alternative biological methods for extracting metals, including phytomining and bioleaching			
	HT ONLY: Evaluate alternative methods for extracting metals			
4.10.2 Life cycle assessment and recycling	Describe, carry out and interpret a simple comparative life cycle assessment (LCA) of materials or products			
	Discuss the advantages and disadvantages of LCAs			
	Carry out simple comparative LCAs for shopping bags made from plastic and paper			
	Discuss how to reduce the consumption of raw resources and explain how reusing and recycling reduces energy use (inc environmental impacts)			
4.10.3 Using materials	*Chem ONLY: Define corrosion and describe rusting as an example of corrosion*			
	Chem ONLY: Describe ways to prevent corrosion, including providing coatings, sacrificial protection and explain how sacrificial protection works			
	Chem ONLY: Describe the following alloys bronze, gold, steels and aluminium, their uses and describe the benefits of using alloys instead of pure metals			
	Chem ONLY: Compare the properties of materials, including glass and clay ceramics, polymers and composites and explain how their properties are related to their uses			
	Chem ONLY: Discuss the different types of polymers and how their composition affects their properties, including thermosoftening and thermosetting polymers			
	Chem ONLY: Explain what composites are and provide examples of composites and their benefits over other types of materials			
4.10.4 The Haber process and the use of NPK fertilisers	*Chem ONLY: Describe the Haber process, including the reactants and products, recycling of remaining hydrogen and nitrogen and the chemical equation*			
	Chem & HT ONLY: For the Haber process interpret graphs of reaction conditions versus rate			
	Chem ONLY: Apply the principles of dynamic equilibrium to the Haber process and discuss the trade-off between the rate of production and the position of equilibrium			
	Chem ONLY: Explain how the commercially used conditions for the Haber process are related to the availability and cost of raw materials and energy supplies			
	Chem ONL: Recall the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid			
	Chem ONLY: Describe NPK fertilisers and the compounds they are composed of and compare the industrial production of fertilisers with the laboratory preparations			