

| AQA TRILOGY Chemistry (8464) from 2016 Topics T5.6 The rate and extent of chemical change |   |   |   |   |
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| Topic   | Student Checklist   | R | A | G |
| 5.6.1 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 <sup>3</sup> /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                                 |   |   |   |
|   | <b>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</b>         |   |   |   |
|   | Describe how different factors affect the rate of a chemical reaction, including the concentration, pressure, surface area, temperature and presence of catalysts                                       |   |   |   |
|   | <i><b>Required practical 11:</b> 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</i> |   |   |   |
|   | 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  |   |   |   |
| 5.6.2 Reversible reactions and dynamic equilibrium  | Explain what a reversible reaction is, including how the direction can be changed and represent it using symbols: $A + B \rightleftharpoons C + D$  |   |   |   |
|   | 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  |   |   |   |
|   | <b>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</b>                              |   |   |   |
|   | <b>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</b>                       |   |   |   |

| AQA TRILOGY Chemistry (8464) from 2016 Topics T5.7 Organic chemistry |  |   |   |   |
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| Topic  | Student Checklist  | R | A | G |
| 5.7.1 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   |   |   |   |

| AQA TRILOGY Chemistry (8464) from 2016 Topics T5.8 Chemical analysis |   |   |   |   |
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| Topic  | Student Checklist   | R | A | G |
| 5.8.1 Purity, formulations and chromatograph & 5.8.2 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 R <sub>f</sub> value of a compound represents, how the R <sub>f</sub> value differs in different solvents and interpret and determine R <sub>f</sub> values from chromatograms |   |   |   |
|  | <b>Required practical 12:</b> investigate how paper chromatography can be used to separate and tell the difference between coloured substances (inc calculation of R <sub>f</sub> values)       |   |   |   |
|  | Explain how to test for the presence of hydrogen, oxygen, carbon dioxide and chlorine   |   |   |   |

| AQA Chemistry (8462) from 2016 Topics C4.9 Chemistry of the atmosphere |   |   |   |   |
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| 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        |  |   |   |   |
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| 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                           |   |   |   |
|  | <b>Required practical 13:</b> 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                       |   |   |   |
|  | <b>HT ONLY: Name and describe alternative biological methods for extracting metals, including phytomining and bioleaching</b>                                      |   |   |   |
| <b>HT ONLY: Evaluate alternative methods for extracting metals</b> |  |   |   |   |
| 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)                        |   |   |   |