| Chemistry 2 | Higher | | |
|---|---|---|---|
| Red | Amber | Green | |
| 8. Rates & Equilibrium | 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 | | |
| | Describe how different factors affect the rate of a chemical reaction, including the concentration, pressure, surface area, temperature and presence of catalysts | | |
| | ***Required practical:*** *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* | | |
| | **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** | | |
| | 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 | | |
| | 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** | | |
| 9. Crude Oil & Fuels | 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 | | |

| Chemistry 2 | Foundation & Higher | | |
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| Red | Amber | Green | |
| 12. Chemical Analysis | 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:*** *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 | | |
| 13. Atmosphere of Earth | 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 | | |
| | 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 | | |
| | 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 | | |

| Chemistry 2 | Higher | | |
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| Red | Amber | Green | |
| 14. Earth's Resources | 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:*** *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** | | |
| | 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) | | |