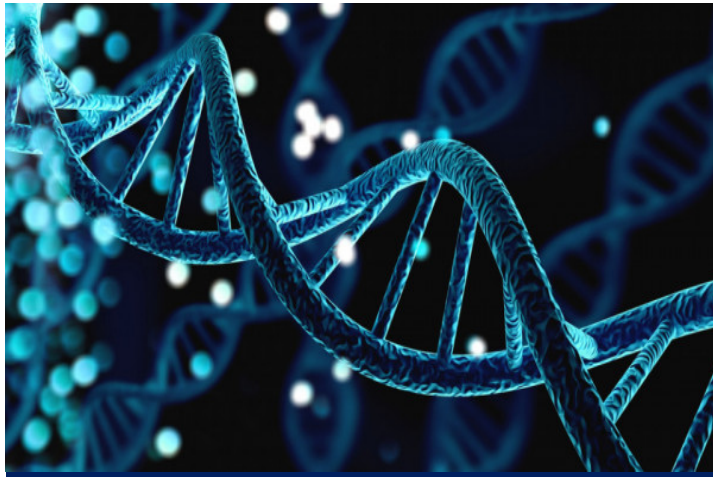
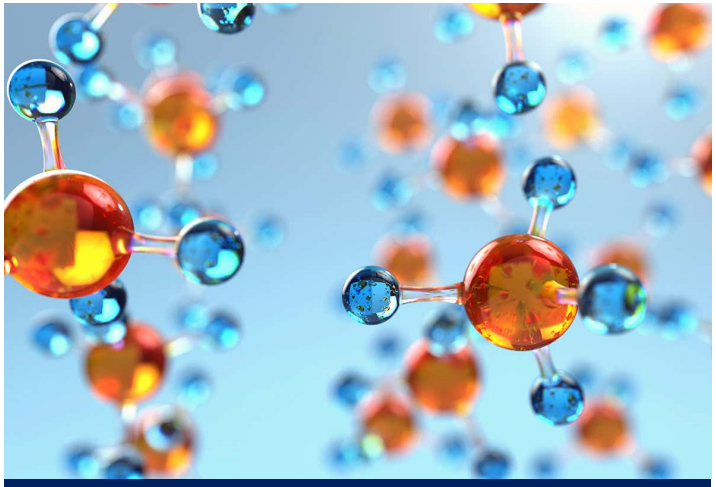
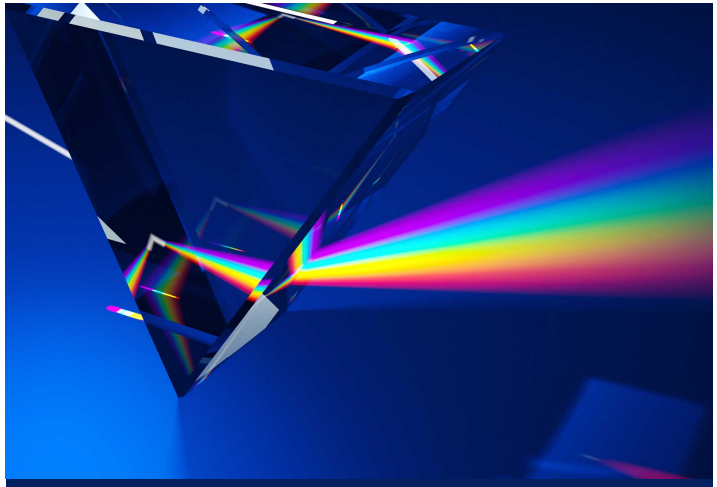
Hessle High School

Science Department







Chemistry Combined Foundation

This document will help you work with students to assess their understanding of the science curriculum for their exam. The students have their personal learning checklist from their mock exams. They need to revise these topics, then they can use these questions to test their understanding.

Paper

Question	Answer	Topic
The reactants of a reaction have 20kJ of energy, how much energy will be present at the end of the reaction? Why?	20KJ as the energy is conserved.	C7.1 Exothermic and endothermic reactions
What is an exothermic reaction?	Transfers energy to the surroundings so the temperature increases.	C7.1 Exothermic and endothermic reactions
What is an endothermic reaction?	Requires energy from the surroundings so the temperature decreases.	C7.1 Exothermic and endothermic reactions
What are examples of exothermic reactions?	Combustion, oxidation reactions and neutralisation reactions.	C7.1 Exothermic and endothermic reactions
What are examples of endothermic reactions?	Thermal decomposition and citric acid and sodium hydrogen carbonate reacting.	C7.1 Exothermic and endothermic reactions
What are two applications of exothermic reactions?	Self-heating cans and hand warmers.	C7.1 Exothermic and endothermic reactions
What is one application of endothermic reactions?	Sports injury packs.	C7.1 Exothermic and endothermic reactions
A reaction changes temperature from 25'c to 43'c what type of reaction is this? How do you know?	The reaction is exothermic as the temperature has increased.	C7.2 Using energy transfers from reactions
A reaction changes temperature from 75'c to 43'c what type of reaction is this? How do you know?	The reaction is endothermic as the temperature has decreased.	C7.2 Using energy transfers from reactions
An acid and alkali are reacted leading to a temperature increase. More alkali is added but the temperature does not continue to increase- why?	The temperature plateaus as all the acid have reacted with the alkali (exothermic reaction) so the reaction is complete.	C7.2 Using energy transfers from reactions
What is activation energy?	The minimum amount of energy particles must collide with to be able to react.	C7.2 Using energy transfers from reactions
Draw the reaction profile for an exothermic reaction.	Must include the following- energy of reactants higher than products, a curve to show activation energy, an arrow labelled overall energy change (or ΔH).	C7.3 Reaction profiles

Draw the reaction profile for an endothermic reaction.	Must include the following- energy of reactants lower than products, a curve to show activation energy, an arrow labelled overall energy change (or ΔH).	C7.3 Reaction profiles
What can be measured to find out the rate of reaction?	reactant lost/time OR product made/time	C8.1 Rate of reaction
What is the rate of a chemical reaction in terms of reactants?	How quickly the reactants in a reaction are used up	C8.1 Rate of reaction
What is the rate of a chemical reaction in terms of products?	How quickly the products in a reaction are formed	C8.1 Rate of reaction
What are the units for the quantity of reactants or product?	grams or in cm^3	C8.1 Rate of reaction
What are the two possible units for rate of reaction?	g/s or cm^3/s (where s is seconds)	C8.1 Rate of reaction
How could you measure the rate of a reaction from a graph at specific time?	Draw a tangent to the curve and calculate the gradient.	C8.1 Rate of reaction
What is "collision theory"?	Chemical reactions can occur only when reacting particles collide with each other and with sufficient energy.	C8.2 Collision theory and surface area
What factors can affect the rate of a reaction?	Temperature, surface area of a solid, concentration or reactants in solution, pressure of gases	C8.2 Collision theory and surface area
State the effect of increasing the surface area to volume ratio on the rate of a reaction?	Rate increases	C8.2 Collision theory and surface area
Explain why increasing the surface area increases the rate of a reaction?	More particles are available to collide so more frequent collisions and so the rate of reaction increases	C8.2 Collision theory and surface area
What does Collison theory explain?	How various factors affect rates of reactions.	C8.2 Collision theory and surface area
What is the activation energy?	The minimum amount of energy that particles must have to react	C8.2 Collision theory and surface area
State the effect of increasing the temperature on the rate of reaction	Increases	C8.3 The effect of temperature
Explain why increasing the temperature increases the rate of reaction	Particles collide more frequently and with more energy	C8.3 The effect of temperature
State the effect of increasing the concentration on the rate of reaction	Increases	C8.4 The effect of concentration or pressure
Explain why increasing the concentration increases the rate of reaction	More particles of reactants in the same volume= increase in frequency of collisions = increase in rate of reaction.	C8.4 The effect of concentration or pressure
State the effect on increasing the pressure of a gas on the rate of reaction	Increases	C8.4 The effect of concentration or pressure
Explain why increasing the pressure of a gas increases the rate of a reaction	Less space = same number of particles in smaller volume = increase in frequency of collisions = increase in rate of reaction.	C8.4 The effect of concentration or pressure

What is a catalyst?	Something which changes the rate of a reaction but is not used up in that reaction	C8.5 The effect of catalysts
How do catalysts speed up reactions?	They provide another route for the reaction to take place which has a lower activation energy.	C8.5 The effect of catalysts
Are catalysts used up in a reaction?	No	C8.5 The effect of catalysts
What is a biological catalyst?	Enzyme	C8.5 The effect of catalysts
Sketch a reaction profile with and without a catalyst	Reactants Products and Activation energy labelled. Catalyst has a lower activation energy	C8.5 The effect of catalysts
Why is using catalysts better for the environment?	Reactions take place and lower pressure, and temperatures so fewer fossil fuels are needed	C8.5 The effect of catalysts
What is a reversible reaction?	The products of the reaction can react to produce the original reactants.	C8.6 Reversible reactions
What is the symbol for a reversible reaction?	⇌	C8.6 Reversible reactions
A reaction is endothermic in one direction, what will the reverse reaction be?	Exothermic- it will release the same amount of energy as the endothermic reaction absorbed.	C8.6 Reversible reactions
What colour is hydrated copper sulfate?	Blue	C8.7 Energy and reversible reactions
What colour is anhydrous copper sulfate?	White	C8.7 Energy and reversible reactions
Write a word equation for the reversible reaction between hydrated and anhydrous copper sulfate.	Hydrated copper sulfate ⇌ Anhydrous copper sulfate + Water	C8.7 Energy and reversible reactions
What is equilibrium?	In a closed system the rate of the forward and backward reactions is equal	C8.7 Energy and reversible reactions
What is the test for alkanes?	Adding bromine water. If the chemical is an alkane, the bromine water will not react so it will stay orange/brown. If the chemical is an alkene, the bromine water will react and change from an orange/brown colour to colourless.	C9.1 Hydrocarbons
How are the hydrocarbons separated?	By fractional distillation- each fraction contains hydrocarbons of similar number of carbon atoms which have a similar boiling point.	C9.2 Fractional distillation of oil
How does fractional distillation separate hydrocarbons?	The crude oil is heated until it evaporates. The vapours rise through the fractioning column, as they rise, they cool. When they become cool enough, they condense. Small hydrocarbons have low boiling points, so they leave out the top of the column as gases. Large hydrocarbons have high boiling points, so they condense quickly and leave the column at the bottom as a liquid.	C9.2 Fractional distillation of oil
Why is it useful to separate crude oil into fractions?	To make more useful products such as fuels, solvents, lubricants, polymers and detergents.	C9.2 Fractional distillation of oil

As the length of the hydrocarbon increases, what happens to the boiling point?	It decreases so condenses easily.	C9.2 Fractional distillation of oil
What is viscosity?	How thick a liquid is.	C9.2 Fractional distillation of oil
As the length of the hydrocarbon increases, what happens to the viscosity?	The viscosity increases- it gets thicker.	C9.2 Fractional distillation of oil
As the length of the hydrocarbon increases, what happens to the flammability?	The flammability decreases, as the compounds are less volatile.	C9.3 Burning hydrocarbon fuels
What is the word equation for combustion?	A fuel (hydrocarbon) + oxygen --> carbon dioxide + water	C9.3 Burning hydrocarbon fuels
What is cracking?	Breaking long hydrocarbons into smaller more useful hydrocarbons.	C9.4 Cracking hydrocarbons
What are the two methods of cracking?	Using a catalyst or steam.	C9.4 Cracking hydrocarbons
What are the products of cracking?	Alkanes and alkenes	C9.4 Cracking hydrocarbons
What is a pure substance?	A single element or compound that is not mixed with any other substance.	C12.1 Pure substances and mixtures
How can a pure substance be detected?	It will melt/boil at a specific temperature.	C12.1 Pure substances and mixtures
What is a formulation?	A mixture that has been designed as a useful product- where each component has a particular purpose and an optimal quantity.	C12.1 Pure substances and mixtures
Name 7 examples of formulations.	Fuels, cleaning products, paints, medicines, alloys, fertilisers and foods.	C12.1 Pure substances and mixtures
What phases are involved in chromatography?	A stationary phase (normally paper) and a mobile phase (a solvent that is often water).	C12.2 Analysing chromatograms
What is an Rf value?	The ration of the distance moved by the compound to the distance moved by the mobile phase.	C12.2 Analysing chromatograms
How is an Rf value calculated?	Distance moved by the substance / Distance moved by mobile phase	C12.2 Analysing chromatograms
A chromatogram of a pure substance will contain how many spots?	1	C12.2 Analysing chromatograms
Explain how to test for hydrogen gas.	Hold a burning splint at the end of the test tube containing the gas- if the gas is hydrogen, it will burn rapidly with a pop sound.	C12.3 Testing for gases
Explain how to test for oxygen gas.	Insert a glowing splint into a test tube of the gas- if the gas is oxygen, the split will relight.	C12.3 Testing for gases
Explain how to test for carbon dioxide gas.	Option 1- bubble the gas through limewater which will go from clear to cloudy OR Option 2- shake the gas through limewater and it will go from clear to cloudy.	C12.3 Testing for gases
Explain how to test for chlorine gas.	Place damp litmus paper into the gas- if it is chlorine then the lithium paper will be bleached to a white colour.	C12.3 Testing for gases

In the early atmosphere there was intense volcanic activity- what gases were released by the volcanos?	Water vapour, carbon dioxide, methane and ammonia	C13.1 History of our atmosphere
Why did the amount of water vapour in the atmosphere decrease?	It condensed to form the oceans.	C13.1 History of our atmosphere
Why did the amount of carbon dioxide in the early atmosphere decrease?	1. Photosynthesis from algae and plants 2. Dissolved in the oceans, 3. Locked up in rocks and fossil fuels.	C13.1 History of our atmosphere
Why did the amount of oxygen increase?	Photosynthesis occurring in plants and algae.	C13.1 History of our atmosphere
How was methane and ammonia removed from the early atmosphere?	Methane and ammonia reacted with oxygen producing nitrogen, carbon dioxide and water.	C13.1 History of our atmosphere
Give the names of the gases in the modern atmosphere and their approximate percentage.	Nitrogen (approx. 80%), oxygen (approx. 20%), small amounts of carbon dioxide, water vapour and noble gases.	C13.2 Our evolving atmosphere
Why are greenhouse gases needed?	To maintain temperatures on Earth to support life.	C13.3 Greenhouse gases
Name the three greenhouse gases?	Water vapour, carbon dioxide and methane	C13.3 Greenhouse gases
What type of radiation reaches Earth from the Sun?	Short wave- ultraviolet	C13.3 Greenhouse gases
What type of radiation leaves Earth?	Long wave- infrared	C13.3 Greenhouse gases
Name two human activities that increase the amount of carbon dioxide?	Use of fossil fuels, deforestation, transport, industry and factories	C13.3 Greenhouse gases
Name two human activities that increase the amount of methane?	Agriculture and landfill.	C13.3 Greenhouse gases
What is climate change?	The increase of the temperature of Earth.	C13.4 Global climate change
What is peer review?	Experts looking over a scientist's findings to check that the results are reliable.	C13.4 Global climate change
Name 4 effects of climate change?	Increase in tropical storms, desertification, rising sea levels and drought.	C13.4 Global climate change
What is a carbon footprint?	The amount of greenhouse gases emitted by a product over its life cycle.	C13.4 Global climate change
How can a person reduce their carbon footprint?	Fit solar panels on the roof of your house, cycle instead of driving to work, install double glazing.	C13.4 Global climate change
What is the main source of pollutants in the atmosphere?	Combustion of fuels	C13.5 Atmospheric pollutants
What elements may be in fuels?	Carbon, hydrogen, sulfur.	C13.5 Atmospheric pollutants
What gases can be released when burning a fuel?	Carbon dioxide, water vapour, carbon monoxide, sulfur dioxide, oxides of nitrogen and carbon particulates.	C13.5 Atmospheric pollutants

Coal only contains carbon and hydrogen- what gases will not be released when it is burnt?	Sulfur dioxide.	C13.5 Atmospheric pollutants
A fuel contains no carbon- what gases may be released when it is combusted?	Water vapour, sulfur dioxide and oxides of nitrogen.	C13.5 Atmospheric pollutants
What are the issues of carbon monoxide being produced?	It is a toxic gas which is colourless and odourless and so not easily detected.	C13.5 Atmospheric pollutants
What are the issues of sulfur dioxide and oxides of nitrogen being produced?	Respiratory problems in humans and acid rain.	C13.5 Atmospheric pollutants
What are the issues of carbon particulates being produced?	Global dimming and health problems in humans.	C13.5 Atmospheric pollutants
What do humans need resources for?	Warmth, shelter, food and transport.	C14.1 Finite and renewable resources
Define a finite resource.	A resource that is not renewable- it will run out.	C14.1 Finite and renewable resources
How can we slow the use of finite resources?	Reuse, recycle and reduce the number of resources currently used.	C14.1 Finite and renewable resources
What is an example of a resource that is recycled?	Metals such as scrap steel.	C14.1 Finite and renewable resources
What is an example of a resource that is reused?	Glass bottles	C14.1 Finite and renewable resources
What is potable water?	Water that is safe to drink as it has low levels of soluble salts and microorganisms.	C14.2 Water safe to drink
What are sources of fresh water?	Ground water, lakes and rivers.	C14.2 Water safe to drink
Why are fresh water sources chosen over desalination of sea water?	Desalination requires a large amount of energy compared to filtering and sterilising of fresh water.	C14.2 Water safe to drink
Give three sources of wastewater.	Urban lifestyle (e.g. houses), industrial processes (e.g. factories) and agricultural waste (e.g. from farms).	C14.2 Water safe to drink
How is wastewater treated?	Removal of grit, sedimentation to produce sewage sludge and effluent, anaerobic digestion of sewage, aerobic digestion of effluent.	C14.2 Water safe to drink
How is potable water produced from fresh water?	It is filtered and sterilised.	C14.3 Treating wastewater
How can water be sterilised?	With chlorine, ozone or ultraviolet light.	C14.3 Treating wastewater
How can salt water/sea water be desalinated?	Distillation or reverse osmosis.	C14.3 Treating wastewater
Explain which it is easier to obtain potable water from- waste water or fresh water?	Fresh water as there are two stages (filtering and sterilisation) compared to four for wastewater.	C14.3 Treating wastewater
Explain which it is easier to obtain potable water from- waste water or salt water?	Either wastewater as it requires less energy than distillation/reverse osmosis of salt water OR salt water as it does not undergo as many stages as the treatment of wastewater.	C14.3 Treating wastewater
What is a life cycle assessment?	An assessment that assesses the impact a product has on the environment.	C14.5 Life cycle assessments

What stages are looked at during an LCA?	Extracting and processing raw materials, manufacturing and packaging, use during its lifetime, disposal at the end of its useful life, transport at each stage.	C14.5 Life cycle assessments
What is an issue with using a shortened version of an LCA?	It can be misleading and be done to reach pre-determined conclusions.	C14.5 Life cycle assessments