Guide to RSC resources for the CCEA GCSE Chemistry Prescribed Practicals

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This resource supports the teaching of CCEA's prescribed practical activities for GCSE. It is not a replacement for the CCEA Practical Handbook. These resources cover the content thoroughly, but as they have not been designed with any particular specification in mind they may go beyond the limit of this specification. It is advisable to familiarise yourself with the material during your lesson planning.

These are suggested resources from the range available on the Royal Society of Chemistry's Learn Chemistry website; click on this link to access the full collection.

Booklet A is a practical skills assessment. It assesses students' ability to carry out **two** practical tasks based on but not identical to the nine **prescribed practicals** listed.

Booklet B is a written, externally assessed examination taken during the final year of study. It assesses students' knowledge and understanding of practical science. It consists of questions about planning and carrying out any of the **prescribed practical** tasks, together with more general questions about any practical situation that arises in Units 1 and 2 in this specification. This booklet then examines the **non-prescribed practicals** in the examination.

• Prescribed Practical **C1**: determine the mass of water present in hydrated crystals
• Prescribed Practical **C2**: investigate the reactions of acids, including temperature changes that occur
• Prescribed Practical **C3**: investigate the preparation of soluble salts
• Prescribed Practical **C4**: identify the ions in an ionic compound using chemical tests
• Prescribed Practical **C5**: investigate the reactivity of metals
• Prescribed Practical **C6**: investigate how changing a variable changes the rate of reaction
• Prescribed Practical **C7**: investigate the reactions of carboxylic acids
• Prescribed Practical **C8**: determine the reacting volumes of solutions of acid and alkali by titration **and determine the concentration of solutions of acid and alkali by titration (Higher Tier)**
• Prescribed Practical **C9**: investigate the preparation, properties, tests and reactions of the gases hydrogen, oxygen and carbon dioxide

Prescribed practicals

Prescribed practical for GCSE Chemistry (stand-alone)	Specification content (bold text indicates higher tier content)	Learn Chemistry resources
*Prescribed Practical **C1*** *determine the mass of water present in hydrated crystals*	1.7.12 calculate the percentage of water of crystallisation in a compound 1.7.13 **determine the empirical formulae of simple compounds and determine the moles of water of crystallisation present in a hydrated salt from percentage composition, mass composition or experimental data**	Finding the formula of hydrated copper(II) sulfate
*Prescribed Practical **C2*** *investigate the reactions of acids, including*	1.8 Reactions of acids	Exothermic metal-acid reactions Reactions of acids with metals and carbonates: Assessment for Learning (AfL) resource

temperature changes that occur		The reaction of metals with acids: microscale Acid–base titration online simulation Science Cartoons: exothermic and endothermic reactions
*Prescribed Practical **C3*** *investigate the preparation of soluble salts*	1.8.16 demonstrate knowledge and understanding that a salt is a compound formed when some or all of the hydrogen ions in an acid are replaced by metal ions or ammonium ions 1.8.17 demonstrate knowledge and understanding that most Group 1 (I), Group 2 (II), aluminium and zinc salts are white and if they dissolve in water they give colourless solutions, and that transition metal salts are generally coloured	Preparing a soluble salt by neutralisation – reacting ammonia and sulfuric acid Preparing salts by neutralisation of oxides and carbonates Reacting copper(II) oxide with sulfuric acid
*Prescribed Practical **C4*** *identify the ions in an ionic compound using chemical tests*	1.9.13 demonstrate knowledge of the flame colours of different metal ions: • lithium (crimson); • sodium (yellow/orange); • potassium (lilac); • calcium (brick red); and • copper(II) (blue–green/green–blue) 1.9.14 describe the test for Cu^{2+}, Fe^{2+}, Fe^{3+}, Al^{3+}, Zn^{2+} and Mg^{2+} ions in solution using sodium hydroxide solution and ammonia solution 1.9.15 describe the tests for the following: • chloride, bromide and iodide (using silver nitrate solution); • sulfate (using barium chloride solution); • carbonate (using dilute acid and identifying the carbon dioxide evolved) 1.9.16 **write ionic equations for the halide and sulfate ion tests and tests for metal ions using sodium hydroxide solution** 1.9.17 demonstrate knowledge and understanding that many tests for anions and cations are precipitation reactions 1.9.18 plan experiments to identify cations and anions present in an unknown or a given compound	Testing for negative ions Flame tests Flame Test Infographic Qualitative analysis (videos, handouts, tests)
*Prescribed Practical **C5*** *investigate the reactivity of metals*	2.1 Metals and reactivity series	Metals: Teacher and Student packs **This resource is designed for the gifted and talented and has a good depth of knowledge for students aged between 11 and 18. However, could be used for Higher Tier students.** The reactivity of Group 2 metals Periodic Table Group Infographics

		Alkali Metals – 20 reactions of the alkali metals with water (video) Alkali metals – resources Displacement reactions of metals Phytoextraction and mining
*Prescribed Practical **C6*** *investigate how changing a variable changes the rate of reaction*	2.3.2 suggest appropriate practical methods to measure the rate of a reaction and collect reliable data (methods limited to measuring a change in mass, gas volume or formation of a precipitate against time) for the reaction of: • metals with dilute acid; • calcium carbonate/marble chips with dilute hydrochloric acid; • catalytic decomposition of hydrogen peroxide; and • sodium thiosulfate with acid (equation not required) 2.3.3 interpret experimental data quantitatively, for example drawing and interpreting appropriate graphs to determine the rate of reaction; and 2.3.4 describe and explain the effects on rates of reaction when there are changes in: • temperature; • concentration; • frequency and energy of collisions between particles; and • changes in particle size in terms of surface area to volume ratio	AfL: Rates of Reactions The rate of reaction of magnesium with hydrochloric acid The effect of temperature on reaction rate The effect of concentration on reaction rate Rate of reaction – the effects of concentration and temperature Iodine clock reaction Decomposing hydrogen peroxide demo: Article from Education in Chemistry (EiC) Hydrogen peroxide decomposition experiment and video
*Prescribed Practical **C7*** *investigate the reactions of carboxylic acids*	**2.5.24 recall the oxidation of alcohols when exposed to air and by the reaction with acidified potassium dichromate solution (equations are not required) and demonstrate understanding that methanol, ethanol and propan-1-ol are oxidised to the corresponding carboxylic acid (students should know that propan-2-ol can be oxidised but do not need to know the name or structure of the product)** 2.5.26 demonstrate knowledge that carboxylic acids are **weak acids as they are only partially ionised in solution** 2.5.27 investigate experimentally the reactions of carboxylic acids with carbonates, hydroxides and metals, test any gases produced **and write balanced symbol equations for these reactions**	The acidic reactions of ethanoic acid Making esters from alcohols and acids A microscale oxidation of alcohols Functional groups in organic chemistry: Infographic Acid–base solutions: online simulation for weak and strong solutions
*Prescribed Practical **C8*** *determine the reacting volumes of solutions of*	2.6.3 demonstrate knowledge and understanding that the volumes of acid and alkali solutions that react together	Titration Screen Experiment Titration Videos and Quiz

acid and alkali by titration ***and determine the concentration of solutions of acid and alkali by titration***	can be measured by titration using phenolphthalein or methyl orange; 2.6.4 carry out acid–base titrations using an indicator and record results to one decimal place, repeating for reliability and calculating the average titre from accurate titrations (details of the practical procedure and apparatus preparation are required); and **2.6.5 collect data from primary and secondary sources for acid–base titration and use these data to calculate the concentrations of solutions in mol/dm^3 and g/dm^3**	A microscale acid–base titration Starter for Ten: Experimental Skills Starter for Ten: Quantitative Chemistry **The Starter for Ten resources are designed for the transition from GCSE to A-Level chemistry. However, it has some very useful content for higher achieving pupils.**
Prescribed Practical ***C9*** *investigate the preparation, properties, tests and reactions of the gases hydrogen, oxygen and carbon dioxide*	2.9.9 investigate the chemical reactions of carbon dioxide with water producing carbonic acid and with calcium hydroxide (limewater) until carbon dioxide is in excess	Generating, collecting and testing gases It's a Gas: Oxygen (video) It's a Gas Part 2 (videos) Which gas test can be used to identify the following gases? Test the gas Determining relative molecular masses by weighing gases

Non-prescribed practicals

Non-prescribed practical for GCSE Chemistry (stand-alone) (bold text indicates higher tier content)	Learn Chemistry resources
2.2.3 investigate experimentally rusting as a reaction of iron with water and air producing hydrated iron(III) oxide	The causes of rusting
2.3.2 suggest appropriate practical methods to measure the rate of a reaction and collect reliable data (methods limited to measuring a change in mass, gas volume or formation of a precipitate against time) for the reaction	Rate of reaction graphs: Assessment for Learning
2.5.29 identify alkanes, alkenes, **alcohols** and carboxylic acids using chemical tests	Qualitative techniques for inorganic analysis: Practical skills quizzes and videos
2.6.4 carry out acid–base titrations using an indicator and record results to one decimal place, repeating for reliability and calculating the average titre from accurate titrations (details of the practical procedure and apparatus preparation are required)	Titration screen experiment and teacher notes

Other relevant material

The following resources are examples of other material for pupils and the classroom. They are useful for high achieving pupils.

Exothermic and endothermic reactions: experiments
Energy in or out – classifying reactions
Endothermic solid–solid reactions
Exothermic or endothermic?