GCSE Chemistry Full Course Checklist

Points in bold are Paper 2C only

For Core Practicals, you need to be able to describe method, name equipment, analyse results and evaluate the experiment.

Criteria	**Spec Ref**	✓
Describe the arrangement, movement and energy of the particles in the three states of matter	1.1	
Name the conversations between the states and describe them	1.2	
Describe how results of experiments involving dilutions and diffusion of gases can be explained	1.3	
Define solvent, solute, solution, saturated solution	1.4	
Describe solubility in the units g per 100g of solvent	**1.5**	
Plot and describe solubility curves	**1.6**	
Describe experiments investigating the solubility of solid in water at a specific temperature	**1.7**	
Classify substances as elements, compounds or mixtures	1.8	
Compare pure and impure substances in terms of their boiling and melting points or ranges	1.9	
Define the terms atom and molecule	1.14	
Describe how to separate mixtures using simple distillation, fractional distillation, filtration, crystallization and paper chromatography	1.10	
Interpret chromatograms to find out about the composition of a mixture	1.11	
Calculate Rf values to identify the components of a mixture	1.12	
Describe how to investigate mixtures of inks using paper chromatography	1.13	
Describe the structure of an atom in terms of the positions, relative masses and relative charges of the sub-atomic particles	1.15	
Define the terms atomic mass, mass number, isotopes and relative atomic mass	1.16	
Calculate the relative atomic mass of an element (Ar) from isotope abundancies	1.17	
Deduce the electron configurations of the first 20 elements from their positions in the Periodic Table	1.19	
Describe how the Periodic table is arranged	1.18	
Classify metals and non-metals from their properties	1.20	
Classify metals and non-metals from their position in the Periodic Table	1.21	
Describe how the electronic configuration of an elements is related to its position in the Periodic Table	1.22	
Describe why elements in the same group have similar chemical properties	1.23	
Describe why the noble gases do not readily react	1.24	

Describe how ions form	1.37	
Use dot and cross diagrams to show how ionic compounds are formed	1.40	
Recall the charges on ions	1.38	
Deduce ionic formulae	1.39	
State the properties of ionic compounds	1.41	
Link the properties of ionic compounds to their structure	1.42, 1.43	
Describe how covalent bonds are formed	1.44, 1.45	
Draw dot and cross diagrams of covalent substances	1.46	
Define the term molecule	1.14	
State the properties of simple molecular substances	1.47, 1.51	
Explain the properties in terms of the structure	1.41	
Describe and explain the change in melting and boiling points of simple molecular structures and relative molecular mass	1.48	
State the properties of giant covalent structures	1.49	
Link the properties to the structure	1.50	
Describe the different structures and properties of carbon	1.51	
Describe the structure of metals	**1.52**	
Describe metallic bonding	**1.53**	
State and explain the physical properties of metals	**1.54**	
Describe the similarities between lithium, sodium & potassium	2.1	
Describe the reactions of lithium, sodium & potassium with air and water	2.2	
Predict the properties of other alkali metals	2.3	
Describe the reactions of the alkali metals with water	2.1	
Describe the reactivities of the alkali metals	2.2	
Explain the reactivities of the alkali metals	**2.4**	
Give details about chlorine, bromine & iodine	2.5	
Make predictions about other halogens	2.6	
Describe how Halogens react with metals	2.7	
Write word and chemical equations for the reactions of the Halogens	2.7	
Describe how displacement reactions can illustrate the trend in reactivity of the Halogens	2.7	
Explain the reactivity of the Halogens	**2.8**	

Give the percentages of gases in the atmosphere	2.9	
Describe how to measure the percentage of O_2 in the atmosphere	2.10, 2.14	
Describe the combustion of metals and non-metals	2.11	
Write word and chemical equations	1.25	
To recap the gas tests	2.44	
Describe thermal decomposition reactions	2.12 2.13	
Describe the process of rusting	2.18	
Describe how rusting can be prevented	2.19	
Investigate the reactions of metals with acid	2.21	
Write word and chemical equations	2.21	
Deduce a reactivity series from evidence	2.15	
Write word and chemical equations	2.17	
Define displacement reactions	2.16	
Deduce the reactivity of metals based on displacement reactions	2.16	
Write word and chemical equations	2.16	
Explain the need for extraction of metals	**2.22**	
Define key terms for extraction	2.20	
Link the method of extraction to the reactivity of the metal	**2.23, 2.24**	
Define key terms for extraction	2.20	
Recap the properties and structure of metals	1.54	
Link the uses of metals to their properties	**2.25**	
Define alloys	**2.26**	
Give examples of alloys	**2.26**	
Explain the properties of alloys	**2.27**	
Define acids in terms of proton donors, sources of hydrogen ions and hydrogen donors	2.31, 2.32	
Define bases as proton acceptors and hydrogen acceptors	2.35	
Define alkalis as soluble bases and sources of hydroxide ions	2.36	
Describe how to use indicators (litmus, universal indicator, methyl orange and phenolphthalein) to identify acids and alkalis	2.28, 2.29	
Describe the importance of the pH scale	2.30	

Describe how acids react with metals and metal compounds	2.37	
Name salts	2.37	
Write word and chemical equations	2.38	
To predict the solubility of salts	2.34	
Describe how to prepare a pure, dry sample of a soluble salt from acids and insoluble bases	2.39	
CORE PRACTICAL: describe how to prepare a sample of pure, dry copper sulfate from copper oxide and sulfuric acid	2.42	
Describe how to carry out an acid-alkali titration	**2.33**	
Describe how to prepare a pure, dry sample of a soluble salt from acids and soluble bases (alkalis)	**2.40**	
Describe how to prepare a pure, dry sample of an insoluble salt from two soluble reactants	**2.41**	
CORE PRACTICAL: describe how to prepare a sample of pure, dry lead(II) sulfate	**2.43**	
Describe how to carry out flame tests and give the results	2.45, 2.46	
Describe how to test for cations	2.47	
Describe how to test for anions	2.48	
Describe how to test for gases	2.44	
Describe how to test for water	2.49, 2.50	
State collision theory	3.11	
Describe experiments to investigate the effect of changes in: • surface area of a solid • concentration of a solution • pressure of a gas • temperature on the rate of a reaction	3.9	
Describe the effects of changes in: • surface area of a solid • concentration of a solution • pressure of a gas • temperature on the rate of a reaction	3.10	
Explain the effects of changes in: • surface area of a solid • concentration of a solution • pressure of a gas • temperature on the rate of a reaction in terms of particle collision theory	3.11	
Define a catalyst	3.12	

Describe how a catalyst works	3.13	
Draw and energy level diagram with ΔH and activation energy	**3.14**	
CORE PRACTICAL: investigate the effect of changing the surface area of marble chips and the effect of changing the concentration of hydrochloric acid on the rate of reaction between calcium carbonate and hydrochloric acid	3.15	
CORE PRACTICAL: investigate the effects of different solids on the catalytic decomposition of hydrogen peroxide solution	3.16	
Calculate relative formula masses (including relative molecular masses) (Mr) from relative atomic masses (Ar)	1.26	
Describe the mole (mol) is the unit for the amount of a substance	1.27	
Carry out calculations involving amount of substance, relative atomic mass (Ar) and relative formula mass (Mr)	1.28	
Calculate reacting masses using experimental data and chemical equations	1.29	
Calculate percentage yield	1.30	
Use experimental data to work out the formulae of simple compounds including: • metal oxides • salts containing water of crystallization	1.31	
Define empirical and molecular formulae	1.32	
Use experimental data to calculate empirical and molecular formulae	1.33	
Carry out calculations involving moles, volume and concentration of solutions	**1.34**	
Carry out calculations involving moles, volume and molar volume of gas at rtp (1 mol of gas = 24dm^3 = 24,000cm^3 at rtp)	**1.35**	
CORE PRACTICAL: determine the formula of a metal oxide by combustion (eg magnesium oxide) or by reduction (eg copper(II) oxide)	1.36	
Define endothermic and exothermic reactions	3.1	
Describe simple calorimetry experiments for reactions such as: • combustion • displacement • dissolving • neutralization	3.2	
Use q = mcΔT to calculate energy change in reactions	3.3	
Calculate ΔH from moles and Q	3.4	
Drawn and explain energy level diagrams to represent exothermic and endothermic reactions	**3.5**	
Describe bond breaking as endothermic and bond forming as exothermic	**3.6**	
Use bond energies to calculate the enthalpy change during a reaction	**3.7**	
CORE PRACTICAL: investigate temperature changes with the following reactions • salts dissolving • neutralization • displacement • combustion	3.8	

Describe reversible reactions and use the symbol ⇌	3.17	
Give examples of reversible reactions such as the dehydration of copper(II) sulfate and the effect of heat on ammonium chloride	3.18	
Describe the features of dynamic equilibrium	**3.19, 3.20**	
Describe the effect of a catalyst on the position of an equilibrium	**3.21**	
Describe the effects of changing temperature and pressure on the position of equilibrium	**3.22**	
Define a hydrocarbon	4.1	
Represent organic molecules using empirical, molecular, general, structural and displayed formulae	4.2	
Define homologous series, functional group and isomers	4.3	
Name compounds containing up to 6 carbons	4.4	
Write displayed and structural formulae for molecules given their molecular formulae	4.5	
Classify reactions of organic compounds as substitution, addition and combustion	4.6	
Describe crude oil as a mixture of hydrocarbons	4.7	
Describe fractional distillation	4.8	
Give the names and uses of the main fractions of crude oil (refinery gases, gasoline, kerosene, diesel, fuel oil and bitumen)	4.9	
Describe the trend in colour, boiling point and viscosity of the main fractions	4.10	
Define fuels	4.11	
Give the products of complete and incomplete combustion of hydrocarbons	4.12	
Describe why carbon monoxide is poisonous	4.13	
Describe how nitrous oxides can form in car engines	4.14	
Describe how combustion can produce sulfur dioxide	4.15	
Describe the effects of nitrous oxides and sulfur dioxide forming acid rain on the atmosphere	4.16	
Describe the process of cracking including the conditions required (silica or alumina catalyst, 600-700^{o}C)	4.17	
Explain why cracking is necessary in terms of supply and demand of the different lengths of hydrocarbon chains	4.18	
Give the general formula for alkenes	4.19	
Define saturated hydrocarbons	4.20	
Draw structural and displayed formulae for alkanes with up to 5 carbon atoms and name them	4.21	
Describe how alkanes react with halogens in the presence of UV light, and name and draw the products	4.22	

Give the functional group for alkenes	4.23	
Give the general formula for alkenes	4.24	
Define unsaturated hydrocarbons	4.25	
Draw structural and displayed formulae for alkenes with up to 5 carbon atoms and name them including isomers (eg butan-1-ene and butan-2-ene)	4.26	
Describe how alkenes react with halogens and name and draw the products	4.27	
Describe how bromine water can be used to distinguish between alkanes and alkenes	4.28	
Describe why covalent substances don't conduct electricity	**1.55**	
Describe why ionic compounds only conduct electricity when molten or dissolved	**1.56**	
Define anions and cations	**1.57**	
Describe how to investigate electrolysis of molten compounds (including lead(II) bromide) and aqueous solutions (including NaCl, H_2SO_4 and $CuSO_4$) and predict the products	**1.58**	
Write ionic half-equations for the reactions at the electrodes	**1.59**	
CORE PRACTICAL: investigate the electrolysis of aqueous solutions	**1.60**	
Give the functional group for alcohols	4.29	
Draw the structural and displayed formulae for alcohols with up to 4 carbons and name them	4.30	
Describe the oxidation of ethanol through: • **burning in air or oxygen** • **reacting with oxygen (microbial oxidation)** • **heating with potassium dichromate(VI) in dilute sulfuric acid**	**4.31**	
Describe the production of ethanol through: • **fermentation in the absence of air with enzymes in the yeast at 30°C** • **reacting ethene with steam with a phosphoric acid catalyst at 300°C and 60-70atm**	**4.32**	
Explain why 30°C is chosen for fermentation	**4.33**	
Give the functional group of carboxylic acids	**4.34**	
Draw the structural and displayed formulae for carboxylic acids with up to 4 carbons and name them	**4.35**	
Describe the reactions of carboxylic acids with metals and metal carbonates including naming the products	**4.36**	
Describe vinegar as a solution of ethanoic acid	**4.37**	
Give the functional group for esters	**4.38**	
Describe how to produce ethyl ethanoate from ethanol and ethanoic acid with an acid catalyst	**4.39**	
Give the structural and displayed formulae for ethyl ethanoate	**4.40**	
Write the structural and displayed formulae of an ester when given the name or formula of the alcohol and carboxylic acid	**4.41**	

Name the alcohol and carboxylic acid used to form an ester when given the name or the structure	**4.41**	
Give the properties and uses of esters	**4.42**	
CORE PRACTICAL: prepare a sample of ethyl ethanoate	**4.43**	
Define an addition polymer and monomer	4.44	
Draw the repeated unit of an addition polymer including poly(ethene), poly(propene), poly(chloroethene) and poly(tetrafluoroethene)	4.45	
Deduce the structure of a monomer from an addition polymer and the structure of a polymer from a monomer	4.46	
Explain the problems in disposing of addition polymers	4.47	
Describe condensation polymerization when a dicarboxylic acid reacts with a diol producing polyester and water	**4.48**	
Give the structural and displayed formula of a polyester, showing the repeat unit, when given the formulae of the monomers	**4.49**	
Define bio polyesters as biodegradable polyesters	**4.50**	