IGCSE Chemistry Mock Exams Checklist

Any "missing" spec points (eg. 1.5, 1.6, 1.7) are **not** included in the mock exams!

For Core Practicals, you need to be able to describe method, name equipment, analyse results and evaluate the experiment. You may also be asked to draw and/or interpret a graph.

Section 1: Principles of Chemistry

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	
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	
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	
Define the terms atom and molecule	1.14	
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	
Describe how the Periodic table is arranged	1.18	
Deduce the electron configurations of the first 20 elements from their positions in the Periodic Table	1.19	
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	
Write word and chemical equations	1.25	
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	
CORE PRACTICAL: determine the formula of a metal oxide by combustion (eg magnesium oxide) or by reduction (eg copper(II) oxide)	1.36	
Describe how ions form	1.37	
Recall the charges on ions	1.38	
Deduce ionic formulae	1.39	
Use dot and cross diagrams to show how ionic compounds are formed	1.40	
Describe ionic bonding and state the properties of ionic compounds	1.41	
Explain why ionic compounds have high melting and boiling points	1.42	
Explain why ionic compounds cannot conduct electricity when solid, but can when molten or dissolved	1.43	
Describe a covalent bond as electron sharing	1.44	
Describe a covalent bond in terms of electrostatic forces of attraction	1.45	
Draw dot and cross diagrams of covalent substances	1.46	
Explain why molecular covalent substances have low melting and boiling points	1.47	
Explain why melting and boiling points increase with molecular mass	1.48	
Explain why substances with giant covalent structures have high melting and boiling points	1.49	
Explain how the structures of diamond, graphite and C_{60} fullerene affect their electrical conductivity and hardness	1.50	
Explain why covalent substances do not usually conduct electricity	1.51	

Topic 2: Inorganic Chemistry

Criteria	Spec Ref	✓
Describe the similarities between lithium, sodium & potassium	2.1	
Describe the reactions of lithium, sodium & potassium with air and water, and state the reactivity down the group	2.2	
Predict the properties of other alkali metals	2.3	
Give details about chlorine, bromine & iodine including colour, state at room temperature and trends in physical properties	2.5	
Make predictions about other halogens	2.6	
Describe and explain how displacement reactions between halogen and halide solutions can show the reactivity of the Halogens	2.7	
Give the percentages of gases in the atmosphere	2.9	
Describe how to measure the percentage of O_2 in the atmosphere using reactions of metals (eg. Iron) and non-metals (eg. Phosphorus) with air	2.10	
Describe the combustion of metals and non-metals	2.11	
Describe how thermal decomposition of a metal carbonate can be used to make carbon dioxide	2.12	
Describe the effects of carbon dioxide on the environment	2.13	
CORE PRACTICAL: determine the approximate percentage of oxygen in air	2.14	
Deduce a reactivity series from evidence through reactions with water, steam or acid	2.15	
Define displacement reactions and use to deduce reactivity of metals	2.16	
Know the order of reactivity of these metals: potassium, sodium, lithium, calcium, magnesium, aluminium, zinc, iron, copper, silver, gold	2.17	
Describe the process of rusting	2.18	
Describe how rusting can be prevented	2.19	
Define key terms for extraction: oxidation, reduction, oxidizing agent and reducing agent	2.20	
CORE PRACTICAL: Investigate the reactions of metals with acid (including writing word and chemical equations)	2.21	
Describe how to use indicators (litmus, universal indicator, methyl orange and phenolphthalein) to identify acids and alkalis	2.28	
Describe how to use the pH scale to identify the strength of an acid or alkali	2.29	
Link the pH scale with universal indicator	2.30	
Define acids as a source of H^+ ions and alkalis as a source of OH^- ions	2.31	
Describe how bases neutralize acids	2.32	
Know the solubility rules for salts	2.34	
Define bases as proton acceptors and hydrogen acceptors	2.35	
Define alkalis as soluble bases and sources of hydroxide ions	2.36	
Describe how acids react with metals and metal compounds and name salts including writing word and chemical equations	2.37	

Know that metal oxides, metal hydroxides and ammonia are all bases and that alkalis are soluble bases	2.38	
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 test for gases: H_2, O_2, CO_2, NH_3 and Cl_2	2.44	
Describe how to carry out a flame test	2.45	
Give the results of flame tests: Na^+ is yellow, Li^+ is red, Cu^{2+} is blue-green, Ca^{2+} is orange-red and K^+ is lilac/purple	2.46	
Describe how to test for cations: NH_4^+, Cu^{2+}, Fe^{2+} and Fe^{3+}	2.47	
Describe how to test for anions: Cl^-, Br^-, I^-, SO_4^{2-} and CO_3^{2-}	2.48	
Describe the chemical test for water (anhydrous $CuSO_4$)	2.49	
Describe the physical test for purity of water (boiling point)	2.50	

Section 3: Physical Chemistry

Criteria	**Spec Ref**	✓
Define endothermic and exothermic reactions	3.1	
Describe simple calorimetry experiments for reactions such as: • combustion • displacement • dissolving neutralization	3.2	
Use $q = mc\Delta T$ to calculate energy change in reactions	3.3	
Calculate ΔH from moles and Q	3.4	
CORE PRACTICAL: investigate temperature changes with the following reactions • salts dissolving • neutralization • displacement • combustion	3.8	
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 with reference to the **frequency of successful collisions**	3.11	
Define a catalyst	3.12	
Describe how a catalyst works	3.13	
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	
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	

Section 4: Organic Chemistry

Criteria	**Spec Ref**	✓
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°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	
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	