Cambridge Assessment International Education

Cambridge IGCSE

Grade Descriptions for Cambridge IGCSE Chemistry 0620

What are Grade Descriptions?

Grade descriptions describe the level of performance typically demonstrated by candidates achieving the different grades awarded for a qualification. For Cambridge IGCSEs, they describe performance at three levels – grades ‘F’, ‘C’ and ‘A’.

Grade descriptions sit alongside other key documents that illustrate examination standards, including:

- the syllabus, which presents what students should be taught over a course of study and explains how this is assessed
- the specimen assessment materials, which illustrate the structure of the assessment and the kinds of tasks that candidates complete
- grade thresholds, which show the total mark required to achieve a grade.

Grade descriptions are produced with a wide range of audiences in mind. For teachers, they support lesson planning and curriculum development, while students may gain useful insights into what is required to achieve a high grade and what candidate performance at lower grades typically looks like. For university admissions staff and employers, and those less familiar with Cambridge, they paint a picture of typical performance at different grades.

Cambridge publishes grade descriptions for a qualification once examinations have taken place for the first time and we review them when a qualification is substantially revised. They are developed by highly experienced examiners who understand performance standards in the subject area and have studied samples of candidate work.

How do I use this resource?

Grade descriptions are presented as a grid, with content areas at the start of each row and the different grades at the top of each column.

The content areas group together various aspects of the syllabus – they reflect topics, assessment objectives, key concepts, syllabus aims and/or components. The way they are organised is specific to each subject.

For each content area there is a descriptor for each grade. Reading across the row from left to right, the descriptors represent increasing levels of performance, with each grade descriptor building on, and including, the last.

Each column represents overall performance at a particular grade. Reading down the column from top to bottom, the descriptors capture the range of knowledge, understanding and skills that a candidate ‘comfortably inside the grade’ is likely to demonstrate.

Cambridge produces grade descriptions to support teaching and learning and the interpretation of candidate scores and grades. We do not use them to set grade thresholds. As such, they cannot be used to challenge the grade awarded to any individual candidate.

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Grade Descriptions

Area of knowledge, understanding and skills	Typical performance at grade F	Typical performance at grade C	Typical performance at grade A
Atomic structure, the Periodic Table and bonding	Students describe solids, liquids and gases. This could be through the use of diagrams, descriptions of physical properties and the names for changes of state. Students recall properties and the location of particles within an atom. This includes the relative mass and the relative charge for protons, neutrons and electrons. Students describe ionic and covalent bonding and draw dot-and-cross diagrams when provided with support. They identify and describe some physical properties of ionic and covalent substances. This could include the structures of diamond and graphite.	Students apply a particle model to describe and explain physical changes. These changes could include changes in state, dissolving, precipitation and diffusion. Students use nuclide notation. This could include the determination of the number of each particle within an atom or ion. They may be able to give the electronic configuration for an atom or ion. Students draw dot-and-cross diagrams without support. They may be able to predict the general physical properties for unfamiliar compounds, given information about their bonding. They may be able to identify and describe the properties of silicon (IV) oxide and its similarity to diamond.	Students interpret data to identify changes in state, which could include heating and cooling curves. They may be able to apply kinetic particle theory to describe and explain how temperature and pressure affect the volume of a gas. Students use nuclide notation, relative masses and the abundance of each isotope to determine relative atomic mass. This may include the reverse calculation to determine an abundance or mass of an isotope. Students predict the physical properties of more complex compounds, given additional information or support. They may be able to describe metallic bonding and explain typical physical properties of metals using a simple model.
Periodicity and metals	Students describe the layout of the Periodic Table. This could be in terms of groups and periods and the trend of decreasing metallic character across a period.	Students describe the relationship between the number of outer-shell electrons and the charge of ions formed from elements of each group.	Students make predictions about elements based on their position in the Periodic Table, given additional information.

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	Students describe the extraction of iron from its ore. This may include identifying the common ore of iron or giving an outline of the extraction process.	Students describe the extraction of iron from its ore in the blast furnace. This could include using word equations and describing the roles of carbon and limestone in the extraction.	Students recall symbol equations for the reactions involved in the extraction of iron from its ore. They may be able to describe the extraction of aluminium from bauxite, including ionic half equations for each electrode.
	Students list typical physical properties of metals and uses for some metals or alloys. They may be able to identify the reactivity of metals from experimental results.	Students describe the reactions of metals with acids, water or oxygen. This may include the conditions required for the rusting of iron and barrier methods to prevent rusting.	Students use the reactivity series of metals to make predictions about chemical reactions. This may include describing and explaining how sacrificial corrosion is used to prevent rusting and the displacement/redox reactions of metals and the aqueous ions of other metals.
	Students describe properties of Group I and Group VII elements. This could include their physical appearance or observations of the reactions between Group I elements and water.	Students describe the trend in chemical and physical properties of Group I elements. This may include predicting and writing word equations for the reactions between halogens and aqueous halide ions.	Students make predictions about other elements from Groups I and VII and elements from other groups, given suitable information. This may include predictions about the structure and bonding of their compounds, or the chemical reactivity or physical properties of the element.
	Students identify the location of Group VIII elements and the transition elements in the Periodic Table. They may be able to describe the general physical and chemical properties of these elements.	Students recall the typical properties of transition elements, including their variable oxidation numbers. They may also explain why Group VIII elements are unreactive.	Students link the variable oxidation states of transition elements with the redox topic. This may include electron transfer to form different ions and use of the terms described in redox chemistry.
Physical chemistry and stoichiometry	Students write the chemical formulae of elements and simple compounds. They may be able to complete word and symbol	Students give the formulae for unfamiliar compounds when given information. They may be able to write and complete word and	Students complete both word and symbol equations for the reactions in the syllabus, including the reactions of organic compounds. They may be able to construct equations for

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	equations which are partially complete and can recognise and use state symbols.	symbol equations for the reactions described in the syllabus.	unfamiliar reactions, given additional information.
	Students determine the relative mass for simple compounds and may be able to use this to calculate the mass of product by simple proportion methods.	Students answer questions using the mole concept when some support is provided. This may include use of mass, molar mass, molar gas volumes and the volume and concentration of aqueous solutions.	Students define empirical formulae and complete calculations to determine empirical and molecular formulae. They may be able to answer open-ended quantitative questions using the mole concept.
	Students identify reversible reactions. They may be able to describe the use of anhydrous salts to identify the presence of water.	Students understand that some reactions can form equilibria. They may be able to make some predictions about how the position of equilibrium changes when conditions are changed. They may be able to describe typical operating conditions for some industrial processes.	Students apply Le Chatelier's principle reliably to unfamiliar reactions. They may be able to describe the relationship between yield, rate, safety and economics in determining optimum reaction conditions for industrial processes.
	Students define and use the terms associated with electrolysis. They may be able to predict an observation at the anode or cathode for the electrolysis of simple molten binary compounds.	Students predict the electrode products at both electrodes for the electrolysis of molten binary compounds and for aqueous solutions stated in the syllabus.	Students write ionic half-equations for the processes at one or both of the electrodes in the electrolysis of a molten binary compound or of an aqueous solution of a salt.
	Students describe endothermic and exothermic reactions in terms of the transfer of thermal energy and the change in temperature of the surroundings.	Students draw and interpret reaction pathway diagrams which show reactants and products.	Students draw and interpret a reaction pathway diagram showing overall enthalpy change and the activation energy for the reaction. They may be able to calculate enthalpy changes using bond energy data.
	Students predict the effect of changing reaction conditions on the rate of reaction.	Students interpret data, including graphs, from rate-of-reaction experiments.	Students explain changes to reaction rate in terms of the frequency of particle collisions and the energy of the colliding particles.

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Acids, bases and salts, and redox	Students recall general descriptions of acids and bases. This includes the names and formulae of some acids and bases and the use of indicators. They may be able to use the pH scale to measure the relative acidity or alkalinity of an aqueous solution. Students describe redox reactions in terms of oxygen gain or loss. They may be able to apply this idea to the use of a hydrogen–oxygen fuel cell to produce electricity and water.	Students recall the ions present in alkaline and acidic solutions and the general equation for a neutralisation reaction. They may be able to use universal indicator and the pH scale to compare the hydrogen ion concentrations of aqueous solutions. Students identify redox reactions in terms of oxygen gain or loss in unfamiliar reactions. They may be able to describe the advantages and disadvantages of using a hydrogen–oxygen fuel cell compared to an internal combustion engine.	Students describe acids and bases in terms of proton transfer and can identify unfamiliar acids and bases from equations. They may be able to describe the differences between strong and weak acids in terms of dissociation, pH and reactivity. Students identify redox reactions in terms of electron movement. They may be able to assign oxidation numbers to elements in compounds and in their uncombined state. More able students will be able to apply and use the terms ‘oxidising agent’ and ‘reducing agent’.
Organic chemistry	Students name and draw compounds up to two carbons for the homologous series listed in the syllabus. Students describe the reactions of alkanes and alkenes, including complete and incomplete combustion and the addition of (aqueous) bromine. Students describe how ethanol is formed by the addition of steam to ethene or by fermentation. They may be able to describe the general properties of ethanoic acid.	Students recall the general formulae for the homologous series listed in the syllabus. Students write equations for the substitution reactions of alkanes, the addition reactions of alkenes and the combustion reactions of both alkanes and alkenes. Students recall the reaction conditions for the formation of ethanol by addition or by fermentation. They may be able to write equations for the reactions of carboxylic acids and to name the carboxylate product.	Students name and draw compounds up to four carbons for the homologous series listed in the syllabus. This may include structural isomers. Students describe the photochemical reaction of alkanes and recall the conditions and products of the addition reactions of alkenes. Students describe the advantages and disadvantages of forming ethanol by addition or by fermentation. They may be able to write equations for the reactions of carboxylic acids, including esterification.

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	Students know that many monomers combine to make a polymer and that it is difficult to dispose of some polymers. They may be able to describe pollution problems caused by waste plastics. Students name some fractions of petroleum and their uses.	Students identify the monomer and repeat unit for a given addition polymer and may be able to recall the structures of polymers listed in the syllabus. Students understand how fractions of petroleum are separated and can name and describe a use for each fraction.	Students identify the monomer(s) and repeat units for both addition and condensation polymers. They may be able to describe the difference between man-made polyamides and proteins. Students link physical properties of petroleum fractions to the structure and bonding topics to explain why different fractions are separated at each level in the fractionating column.
Environmental chemistry	Students describe how water is treated to make it suitable for drinking. They may be able to describe how impurities affect the melting point and the boiling point of water. Students describe the composition of the air and the source and effects of some air pollutants.	Students recall some beneficial or polluting substances found in water from natural sources and how they affect the environment. Students describe strategies to reduce environmental pollution.	Students have good recall and understanding of the source and nature of some water pollutants. They can describe how water is purified for drinking. Students describe how methane and carbon dioxide cause global warming. They may be able to explain, with equations, how a catalytic converter removes polluting gases.
Experimental skills and analysis	Students understand key terms such as solvent, solute, residue and filtrate and can identify suitable methods to separate mixtures. They may be able to interpret simple chromatograms. Students follow a provided practical method and make qualitative observations. They may be able to read analogue and digital scales to	Students make or predict observations for some gas tests or simple test-tube reactions on aqueous ions, using suitable terminology. Students make quantitative conclusions from rate experiment or titration data.	Students use the results of qualitative analysis to identify an ‘unknown’ substance. They may be able to use and interpret R_f values and understand the role of locating agents. Students make conclusions from experimental data, identify errors or uncertainties and suggest improvements to the methods. They

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	make quantitative measurements and to plot appropriate graphs of their data. Students identify suitable apparatus for an experimental investigation. They may be able to recall some solubility rules and, with support, suggest methods of preparing soluble salts.	Students identify suitable apparatus for an experimental investigation and can outline a workable method. They may be able to recall all the solubility rules and describe how to extract soluble salts from an aqueous solution to produce crystals.	may be able to evaluate practical methods for investigating the rate of reaction. Students construct a detailed practical plan for an experimental investigation which includes quantities and control of variables. They may be able to apply the solubility rules to form precipitates and describe how salts can be extracted from the reaction mixture.