

Edexcel Chemistry Checklist

Triple Award

VIDEO

EXAM
Q&A



Topic 1. Key concepts in chemistry

Video: **Developing the atomic model**

- Describe how and why the atomic model has changed over time.
- Describe the difference between the plum-pudding model of the atom and the nuclear model of the atom.
- Describe why the new evidence from the scattering experiment led to a change in the atomic model.



Video: **Atomic Structure**

- Recall the different charges of the particles that make up an atom.
- Describe why atoms have no overall charge.
- Use the periodic table to identify the number of protons in different elements.
- Calculate the numbers of protons, neutrons and electrons in an atom or ion, given its atomic number and mass number for the first 20 elements.



Video: **Isotopes and RAM**

- Describe isotopes as different atoms of the same element containing the same number of protons but different numbers of neutrons in their nuclei
- Calculate the numbers of protons, neutrons and electrons in atoms given the atomic number and mass number
- Explain how the existence of isotopes results in relative atomic masses of some elements not being whole numbers|
- HT) Calculate the relative atomic mass of an element from the relative masses and abundances of its isotopes



Video: **The Periodic Table**

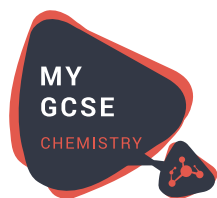
- Explain how the position of an element in the periodic table is related to the arrangement of electrons in its atoms and hence to its atomic number.
- Describe the key steps in the development of the periodic table.
- Explain the differences between metals and non-metals on the basis of their characteristic physical and chemical properties.
- Explain how the atomic structure of metals and non-metals relates to their position in the periodic table.



Video: **Electronic Arrangements**

- Represent the electronic structures of the first twenty elements of the periodic table in both forms.
- Describe how many electrons there can be in the first, second and third energy shells.
- Answer questions in terms of either energy levels or shells.





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Video: **Ionic Bonding**

- The definition of an ionic bond.
- Describe how ionic bonds form between metals and non-metals.
- Recognise a compound from its formula or from a 3D diagram.
- Describe key properties of ionic compounds.



Video: **Covalent bonding**

- Recognise common substances that consist of small molecules from their chemical formula
- Draw dot and cross diagrams for the molecules of hydrogen, chlorine, oxygen, nitrogen, hydrogen chloride, water, ammonia and methane
- Represent the covalent bonds in small molecules, in the repeating units of polymers and in part of giant covalent structures, using a line to represent a single bond
- Describe the limitations of using dot and cross, ball and stick, two and three dimensional diagrams to represent molecules or giant structures



Video: **Metallic bonding**

- Define a metallic bond
- Recognise substances as giant metallic structures from diagrams showing their bonding
- Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects



Video: **Properties of ionic, covalent and metallic structures**

- Describe the properties of ionic compounds and explain these in terms of strong electrostatic forces of attraction between oppositely charged ions.
- Describe the properties of simple covalent molecules and explain these using the idea that intermolecular forces are weak compared with covalent bonds.
- Recognise giant covalent structures from diagrams showing their bonding and structure and explain their properties in terms of the strong covalent bonds between atoms.
- Describe the properties of metals and alloys in terms of the layers of metal ions held together by a sea of delocalised electrons.



Video: **Giant covalent structures**

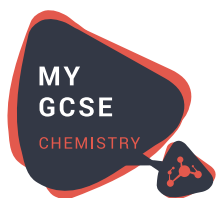
- Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects.
- Explain how the properties of diamond and graphite are linked to their bonding and structure.
- Describe the structure and bonding in graphene and fullerenes.



Video: **Relative Formula Mass**

- Calculate relative formula masses of species separately and in a balanced chemical equation





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Video: Conservation of mass

- Recall the meaning of the law of conservation.
- Write simple word equations.
- Write simple symbol equations.
- Balance symbol equations.



Video: Concentration in g/dm³

- Calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution.
- (HT) Explain how the mass of a solute and the volume of a solution is related to the concentration of the solution



Video: The mole

- (HT) Understand that the measurement of amounts in moles can apply to atoms, molecules, ions, electrons, formulae and equations.
- (HT) Calculate the number of moles in a substance using the relative formula mass.



Video: Reacting masses

- (HT) Calculate the masses of reactants and products from the balanced symbol equation and the mass of a given reactant or product.
- (HT) Balance an equation given the masses of reactants and products.
- (HT) Explain the effect of a limiting quantity of a reactant on the amount of products it is possible to obtain in terms of amounts in moles or masses in grams.
- (HT) Change the subject of a mathematical equation.



Topic 2. States of matter and mixtures

Video: States of matter

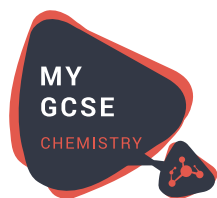
- Describe the main differences between solids, liquids and gases
- Predict the states of substances at different temperatures given appropriate data
- Explain why changes of state occur at different temperatures for different types of substance
- (HT) Describe the limitations of the simple particle model



Video: Purity

- Define a pure substance.
- Use melting point data to distinguish pure from impure substances.
- Identify formulations given appropriate information.





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Video: **Methods of separating substances**

- Describe, explain and give examples of filtration, crystallisation, distillation and fractional distillation.
- Suggest suitable separation and purification techniques for mixtures when given appropriate information.



Video: **Chromatography**

- Describe the similarities and differences between paper, thin layer and gas chromatography.
- Explain how paper chromatography separates mixtures.
- Suggest how chromatographic methods can be used for distinguishing pure substances from impure substances.
- Interpret chromatograms and determine R_f values from chromatograms.



Video: **Water for drinking**

- Distinguish between potable water and pure water.
- Describe how clean drinking water is produced from ground water and waste water
- Describe how salty water such as sea water is treated to make it safe to drink



Topic 3. Chemical changes

Video: **Acids, alkalis and neutralisation**

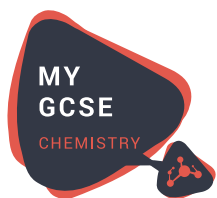
- Recall that acids produce hydrogen ions (H^+) in aqueous solutions and alkalis contain hydroxide ions (OH^-).
- Recall that a neutral solution has a pH of 7, acidic solutions have lower pH values and alkaline solutions have higher pH values
- Describe the use of universal indicator and the pH scale to measure the approximate pH of a solution.
- Describe the use of litmus, methyl orange and phenolphthalein to identify acidic or alkaline solutions.



Video: **Investigating neutralisation**

- Recall that acids produce hydrogen ions (H^+) in aqueous solutions and alkalis contain hydroxide ions (OH^-).
- Recall that a neutral solution has a pH of 7, acidic solutions have lower pH values and alkaline solutions have higher pH values
- Describe the use of universal indicator and the pH scale to measure the approximate pH of a solution.
- Use experimental results to predict the mass of calcium hydroxide or oxide needed to neutralise a fixed volume of dilute hydrochloric acid





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Video: **Strong and weak acids**

- (HT) Use and explain the terms dilute and concentrated (in terms of amount of substance), and weak and strong (in terms of the degree of ionisation) in relation to acids.
- (HT) Describe neutrality and relative acidity in terms of the effect on hydrogen ion concentration and the numerical value of pH (whole numbers only).



Video: **Reactions of acids**

- Recall that acids react with some metals to produce salts and hydrogen.
- Recall the products formed when acids react with metal oxides, hydroxides and carbonates.
- Predict and name the salts produced from given reactants.
- Use the formulae of common ions to deduce the formulae of salts.



Video: **Making Soluble Salts**

- Recall that soluble salts can be made from acids by reacting them with solid insoluble substances, such as metals, metal oxides, hydroxides or carbonates.
- Define the terms soluble and insoluble, and explain what is meant by a soluble salt.
- Explain why reactants are often used in excess.



Video: **Solubility and Making Insoluble Salts**

- Define the terms soluble and insoluble, and explain what is meant by an insoluble salt or precipitate.
- Recall the general rules which describe the solubility of common salts in water.
- Recall that insoluble salts can be made by reacting two soluble salts together in a precipitation reaction.
- (HT) Write an ionic equation, including state symbols, for a precipitation reaction.



Video: **Electrolysis of molten salts**

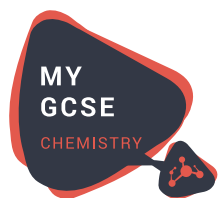
- Explain why an ionic compound must be melted or dissolved in water in order to conduct electricity.
- Recall that the metal (lead) is produced at the cathode and the non-metal (bromine) is produced at the anode.
- Predict the name of the products of the electrolysis of a given ionic compound.
- (HT) Write balanced half equations for the reactions occurring at the electrodes during electrolysis.



Video: **Electrolysis of aqueous salts**

- Predict the products of the electrolysis of aqueous solutions containing a single ionic compound.
- Explain what happens at the cathode and anode in terms of the gain or loss of electrons.
- (HT) Write balanced half equations for the reactions that occur at both electrodes.





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Video: **Electrolysis of copper sulfate**

- Explain the formation of the products in the electrolysis of copper sulfate solution using copper electrodes.
- Explain how this process can be used to purify copper.
- Explain what happens at the cathode and anode in terms of the gain or loss of electrons.
- (HT) Write balanced half equations for the reactions that occur at both electrodes.



Topic 4. Extracting metals and equilibria

Video: **The reactivity of metals**

- Explain reduction and oxidation in terms of loss or gain of oxygen.
- Recall and describe the reactions, if any, of potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper with water or dilute acids.
- Explain how the reactivity of metals with water or dilute acids is related to the tendency of the metal to form its positive ion.



Video: **Displacement reactions**

- Deduce an order of reactivity of metals based on experimental results.
- Write balanced chemical equations for displacement reactions.
- (HT) Identify in a given reaction or symbol equation, which species are oxidised and which are reduced.



Video: **Extraction of metals and redox**

- Recall that reduction involves the loss of oxygen.
- Describe how carbon is used to reduce metal oxides.
- (HT) Explain how this takes place in terms of movement of electrons



Video: **Extraction of Aluminium**

- Explain why and how electrolysis is used to extract some metals from their ores
- (HT) Write balanced half equations for the reactions that happen at the anode and the cathode.



Video: **Biological extraction of metals**

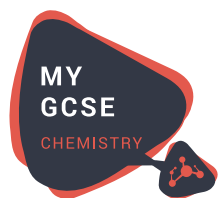
- (HT) Describe the processes of phytomining and bioleaching
- (HT) Evaluate alternative biological methods of metal extraction, given appropriate information.



Video: **Recycling materials and Life Cycle Assessment**

- Describe the basic principles in carrying out a life-cycle assessment of a material or product
- Interpret data from a life-cycle assessment of a material or product
- Describe a process where a material or product is recycled for a different use, and explain why this is viable
- Evaluate factors that affect decisions on recycling





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Video: Reversible reactions and equilibrium

- Explain what is meant by a reversible reaction.
- Recall that in every reversible reaction, the reaction in one direction will be exothermic, while the reaction in the opposite direction will be endothermic.
- Explain the term equilibrium.



Video: Factors affecting equilibrium

- (HT) Recall Le Chatelier's Principle in relation to closed systems at equilibrium.
- (HT) Make predictions about the effect of changes on systems at equilibrium, when given appropriate information.
- (HT) Interpret data to predict the effect of concentration, temperature and pressure changes on given reactions at equilibrium.



Topic 5. Separate chemistry 1

Video: Transition metals

- Describe the main differences in melting points, densities, strength, hardness and reactivity between transition metals and group 1 metals.
- Recall that transition elements have ions with different charges form coloured compounds and are useful as catalysts.



Video: Corrosion and rusting

- Describe experiments and interpret results to show that both air and water are necessary for rusting.
- Explain sacrificial protection in terms of relative reactivity.



Video: Alloys and the properties of metals

- Recall a use of each of the alloys: bronze, brass, gold, aluminium, steel
- Compare quantitatively the physical properties of glass and clay ceramics, polymers, composites and metals.
- Explain how the properties of materials are related to their uses and select appropriate materials.



Video: Concentration in mol/dm³

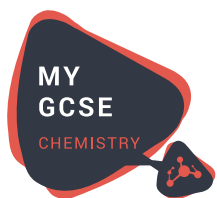
- (HT) Explain the meaning of concentration and the unit mol per dm³.
- (HT) Calculate the concentration of a solution in mol per dm³.
- Convert cm³ into dm³. (HT) Convert g per dm³ into mol per dm³.



Video: Titrations

- Describe how to carry out titrations using strong acids and strong alkalis only (sulfuric, hydrochloric and nitric acids only) to find the reacting volumes accurately.
- (HT) Calculate the chemical quantities in titrations involving concentrations in mol/dm³ and in g/dm³.





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Video: Yield and atom economy

- Calculate the percentage yield of a product from the actual yield of a reaction.
- (HT) Calculate the theoretical amount of a product from a given amount of reactant and the balanced equation for the reaction.
- Calculate the atom economy of a reaction to form a desired product from the balanced equation.
- (HT) Explain why a particular reaction pathway is chosen to produce a specified product given appropriate data such as atom economy, yield and usefulness of by-products.



Video: Gas volumes

- (HT) Calculate the volume of a gas at room temperature and pressure from its mass and relative formula mass
- (HT) Calculate volumes of gaseous reactants and products from a balanced equation and a given volume of a gaseous reactant or product.
- (HT) Change the subject of a mathematical equation.



Video: The Haber process

- Recall a source for the nitrogen and a source for the hydrogen used in the Haber process.
- Describe the process for manufacturing ammonia.
- (HT) Interpret graphs of reaction conditions versus rate.
- (HT) Explain how temperature, pressure and a catalyst affect the Haber process in terms of rate of production and position of equilibrium.
- (HT) Explain how the conditions for the Haber process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate.



Video: Making Fertilisers

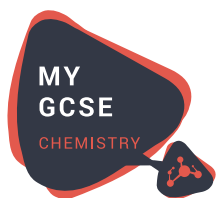
- Recall the importance of nitrogen, phosphorus and potassium compounds in agricultural production
- Describe the industrial production of fertilisers
- Compare the industrial production of fertilisers with laboratory syntheses of the same products



Video: Chemical cells and fuel cells

- Recall that a chemical cell produces a potential difference until the reactants are used up
- Evaluate the advantages and disadvantages of hydrogen/oxygen and other fuel cells for given uses
- (HT) Write the half equations for the electrode reactions in the hydrogen fuel cell.





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Topic 6. Groups in the periodic table

Video: **Group 1 - The Alkali Metals**

- Describe the reactions of the first three alkali metals with water.
- Explain how properties of the elements in Group 1 depend on the outer shell of electrons of the atoms.
- Predict properties from given trends down the group.



Video: **Group 7 - Halogens**

- Describe the main properties of group 7 halogens, such as chlorine, bromine, iodine.
- Explain how properties of the elements in Group 7 depend on the outer shell of electrons of the atoms.
- Predict properties from given trends down the group.



Video: **Group 0 - The Noble Gases**

- Explain how properties of the elements in Group 0 depend on their full outer shell of electrons
- Describe some uses of the noble gases, linked to their properties
- Predict properties such as boiling points from given trends down the group.



Topic 7. Rates of reaction and energy changes

Video: **Measuring rates of reaction**

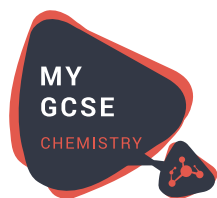
- Calculate the mean rate of a reaction from given information about the quantity of a reactant used or the quantity of a product formed and the time taken.
- Draw graphs showing the quantity of product formed or quantity of reactant used up against time.
- Use graphical data to explain each part of the graph ie: initially rate is fast; slows down; reaction completes.



Video: **Factors affecting rates of reaction**

- Recall the main factors which affect the rates of chemical reactions including: the concentrations of reactants in solution, the pressure of reacting gases, the surface area of solid reactants, the temperature and the presence of catalysts.
- Recall how changing these factors affects the rate of chemical reactions.
- Investigate how changes in concentration affect the rates of reactions by an appropriate method.





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Video: **Collision theory and catalysts**

- Predict and explain using collision theory the effects of changing conditions of concentration, pressure and temperature on the rate of a reaction.
- Predict and explain the effects of changes in the size of pieces of a reacting solid in terms of surface area to volume ratio.
- Identify catalysts in reactions from their effect on the rate of reaction and because they are not included in the chemical equation for the reaction.
- Explain catalytic action in terms of activation energy.



Video: **Interpreting rate graphs**

- Interpret graphs showing the quantity of product formed or quantity of reactant used up against time.
- Draw tangents to the curves on these graphs and use the slope of the tangent as a measure of the rate of reaction.
- (HT) Calculate the gradient of a tangent to the curve on these graphs as a measure of rate of reaction at a specific time.



Video: **Exothermic and endothermic reactions**

- Distinguish between exothermic and endothermic reactions on the basis of the temperature change of the surroundings.
- Evaluate uses and applications of exothermic and endothermic reactions given appropriate information.
- Investigate the variables that affect temperature changes in reacting solutions such as acid plus metals, acid plus carbonates, neutralisations, displacement of metals.



Video: **Reaction profile diagrams**

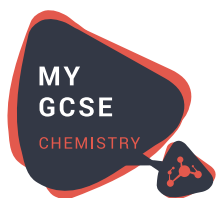
- Draw simple reaction profiles (energy level diagrams) for exothermic and endothermic reactions.
- Use reaction profiles to identify reactions as exothermic or endothermic.
- Explain that the activation energy is the energy needed for a reaction to occur.



Video: **Calculating Energy Changes**

- Recall that breaking bonds is endothermic and making bonds is exothermic
- Recall that a reaction is exothermic if more heat energy is released in forming the bonds in the products than is required in breaking the bonds in the reactants.
- Recall that a reaction is endothermic if less heat energy is released in forming the bonds in the products than is required in breaking the bonds in the reactants.
- (HT) Calculate the energy change in a reaction given the energies of bonds (in kJ/mol)





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Topic 8. Fuels and Earth science

Video: Crude oil and alkanes

- Recognise substances as alkanes given their chemical formulae or displayed formulae.
- Name and draw the displayed formula for methane, ethane, propane and butane.
- Explain how fractional distillation works in terms of evaporation and condensation.
- Recall how boiling point, viscosity and flammability change with increasing molecular size.



Video: Combustion of hydrocarbons

- Recall that combustion of hydrocarbons release energy.
- Describe combustion as an oxidation reaction.
- Name the products of combustion of hydrocarbons.
- Write balanced equations for the complete combustion of hydrocarbons with a given formula.



Video: Pollution from combustion

- Describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen are produced by burning fuels
- Predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used.
- Describe and explain the problems caused by increased amounts of these pollutants in the air.



Video: Cracking

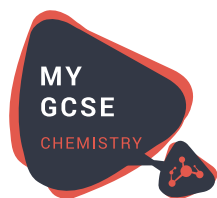
- Describe the process of cracking, including the conditions used.
- Write balanced symbol equations for the cracking of alkanes.
- Describe how bromine water is used to test the products of cracking.
- Explain, giving examples if necessary, why cracking is a useful process.



Video: The Earth's atmosphere

- Interpret evidence and evaluate different theories about the Earth's early atmosphere, when given appropriate information.
- Describe the main changes in the atmosphere over time and some of the likely causes of these changes.
- Describe and explain the formation of deposits of limestone, coal, crude oil and natural gas.





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Video: **The greenhouse effect and global warming**

- Describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter.
- Recall two human activities that increase the amounts of each of the greenhouse gases carbon dioxide and methane.
- Describe briefly four potential effects of global climate change
- Evaluate the quality of evidence about global climate change given appropriate information.
- Describe actions to reduce emissions of carbon dioxide and methane.



Video: **Gas tests**

- Describe the test for hydrogen
- Describe the test for oxygen
- Describe the test for carbon dioxide
- Describe the test for chlorine



Topic 9. Separate chemistry 2

Video: **Tests for positive ions**

- Identify lithium, sodium, potassium, calcium and copper ions from the results of flame tests.
- Identify aluminium, calcium, copper(II), iron(II), iron(III) and ammonium ions from the results of test tube tests with sodium hydroxide solution.
- Write balanced equations for the reactions to produce the insoluble hydroxides.



Video: **Tests for negative ions**

- Identify carbonate ions from their reaction with dilute acids.
- Identify halide ions from their reactions with acidified silver nitrate solution.
- Identify sulfate ions from their reaction with acidified barium chloride solution.
- Use chemical tests to identify the ions in unknown ionic compounds.



Video: **Instrumental analysis**

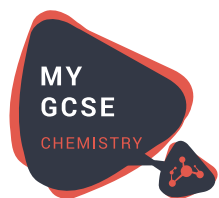
- State advantages of instrumental methods compared with the chemical tests in this specification.
- Interpret an instrumental result from flame emission spectroscopy, given appropriate data in chart or tabular form, when accompanied by a reference set in the same form.



Video: **Alkenes**

- Recognise substances as alkenes given their chemical and displayed formulae.
- Name and draw the displayed formula for ethene, propene, and butene.
- Explain the term unsaturated.
- Describe and write equations for the addition reactions between alkenes and hydrogen, chlorine and bromine.





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Video: **Addition Polymerisation**

- Recognise addition polymers and monomers from diagrams and from the presence of the functional group $-C=C-$ in the monomers.
- Draw diagrams to represent the formation of a polymer from a given alkene monomer.
- Deduce the structure of an addition polymer from a simple alkene monomer and vice versa



Video: **Condensation Polymerisation**

- (HT) Describe what takes place during condensation polymerisation.
- (HT) Identify monomers, polymers and repeating units.
- (HT) Recall that a small molecule is always formed alongside the polymer.



Video: **Biological Polymers**

- Name the types of monomers from which naturally occurring polymers such as sugars and amino acids are made.
- Recall that DNA is a polymer made from four different monomers called nucleotides



Video: **Alcohols**

- Describe what happens when any of the first four alcohols react with sodium, burn in air, are added to water, react with an oxidising agent.
- Recall the main uses of these alcohols.
- Know the conditions used for fermentation of sugar using yeast.
- Be able to recognise alcohols from their names or from given formulae.



Video: **Carboxylic acids**

- Describe what happens when any of the first four carboxylic acids react with carbonates, dissolve in water, react with alcohols.
- (HT) Explain why carboxylic acids are weak acids in terms of ionisation and pH.
- Recognise carboxylic acids from their names or from given formulae.



Video: **Nanoparticles**

- Compare "nano" dimensions to typical dimensions of atoms and molecules.
- Describe how the properties of nanoparticulate materials are related to their uses including surface area to volume ratio of the particles they contain, including sunscreens
- Explain the possible risks associated with some nanoparticulate materials



Video: **Using materials**

- Compare quantitatively the physical properties of glass and clay ceramics, polymers, composites and metals.
- Explain how the properties of materials are related to their uses and select appropriate materials.

