

# Edexcel Chemistry Checklist

## Double 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**

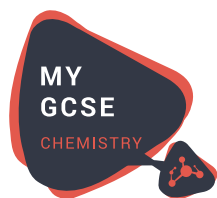
- Explain how the position of an element in the periodic table is related to the arrangement of electrons in its atoms and hence to its atomic number.
- Describe the key steps in the development of the periodic table.
- Explain the differences between metals and non-metals on the basis of their characteristic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

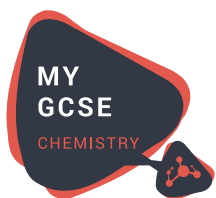
- Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects.
- Explain how the properties of diamond and graphite are linked to their bonding and structure.
- Describe the structure and bonding in graphene and fullerenes.



### 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/dm<sup>3</sup>

- 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

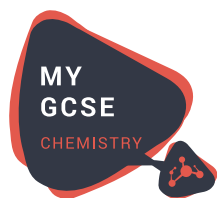
- Describe the main differences between solids, liquids and gases
- Predict the states of substances at different temperatures given appropriate data
- Explain why changes of state occur at different temperatures for different types of substance
- (HT) Describe the limitations of the simple particle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

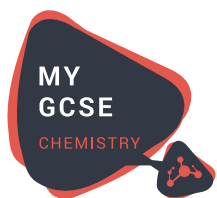
- Recall that acids produce hydrogen ions ( $H^+$ ) in aqueous solutions and alkalis contain hydroxide ions ( $OH^-$ ).
- Recall that a neutral solution has a pH of 7, acidic solutions have lower pH values and alkaline solutions have higher pH values
- Describe the use of universal indicator and the 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



### 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).





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### 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

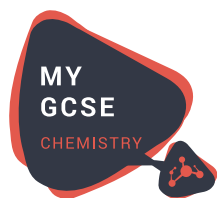
- Explain why an ionic compound must be melted or dissolved in water in order to conduct electricity.
- Recall that the metal (lead) is produced at the cathode and the non-metal (bromine) is produced at the anode.
- Predict the name of the products of the electrolysis of a given ionic compound.
- (HT)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

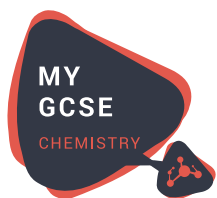
- (HT) Describe the processes of phytomining and bioleaching
- (HT) Evaluate alternative biological methods of metal extraction, given appropriate information.



### 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 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

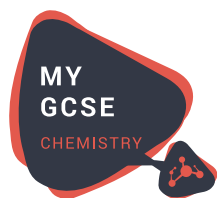
- Describe the main properties of group 7 halogens, such as chlorine, bromine, iodine.
- Explain how properties of the elements in Group 7 depend on the outer shell of electrons of the atoms.
- Predict properties from given trends down the group.



### 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.





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## 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.



### 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.

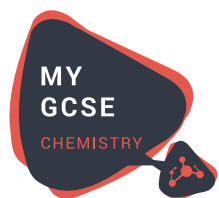


### Video: Exothermic and endothermic reactions

- 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.







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### 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)



## 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

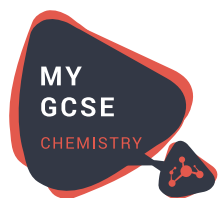
- Recall that combustion of hydrocarbons release energy.
- Describe combustion as an oxidation reaction.
- Name the products of combustion of hydrocarbons.
- Write balanced equations for the complete combustion of hydrocarbons with a given formula.



### 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.





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### 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.



### 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

