

Science - Chemistry

Year 11

Unit Checklist



Topic	Student Checklist	R	A	G
Bonding structure and properties	Describe the properties of metals, ionic compounds, simple molecular covalent substances and giant covalent substances			
	Explain the physical properties of metals using the 'sea' of electrons/lattice of positive ions structural model			
	Explain how ionic bonding takes place (and how this is represented using dot and cross diagrams)			
	Explain why giant ionic structures have similar properties			
	Explain how covalent bonds are formed (and how this is represented using dot and cross diagrams)			
	Explain why simple molecular substances have similar properties			
	Describe the properties of diamond, graphite, fullerenes, carbon nano-tubes and graphene			
	Explained why allotropes of carbon have these properties			
	Recall that individual atoms do not have the same properties as bulk materials e.g. carbon and silver			
	Describe the properties and uses of nano-scale particles of silver and titanium dioxide			
	HT only: Describe the possible risks associated and the future developments of nano-scale particles of silver and titanium dioxide			
	Recall the properties and uses of smart materials			
2.2 Acids, Bases and Salts	Describe substances as acidic, alkaline or neutral in terms of the pH scale, including acid/alkali strength			
	Describe solutions of acids containing hydrogen ions and alkalis containing hydroxide ions			
	Describe the reactions of dilute acids with metals and how these relate to the metals' position in the reactivity series			
	Explain how dilute acids are neutralised with bases (including alkalis) and carbonates			
	HT only: Describe neutralisation as the reaction of hydrogen ions with hydroxide ions to form water, including symbol equation			
	Recall the acid/carbonate reaction as a test for acidic substances and CO_3^{2-} ions			
	Describe how to prepare crystals of soluble salts, such as copper(II) sulfate, from insoluble bases and carbonates			
	Name salts formed by hydrochloric acid, nitric acid and sulfuric acid			
	Describe the test used to identify SO_4^{2-} ions			
	Recall the uses of titrations			
	HT + Chem only: Describe the concentration of a solution in mol dm^{-3}			

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	<i>HT + Chem only: Carry out calculations involving neutralisation reactions in solution, using a balanced chemical equation</i>			
	<i>Chem only: Describe the difference between a dilute or concentrated acid and a strong or weak acid</i>			
	Describe the similarities and differences in the reactions of strong and weak acids			
	Describe the preparation of insoluble salts by precipitation reactions			
	<i>Spec prac: Prepare crystals of a soluble salt from an insoluble base or carbonate</i>			
	<i>Spec prac: Titrate a strong acid against a strong base using an indicator</i>			
2.3 Metals and their extraction	Name different ores found in the Earth's crust			
	Explain how unreactive metals (e.g. gold) can be found in their native form			
	Explain the increased difficulty involved in extracting metals as their reactivity increases			
	Describe the relative reactivities of metals as demonstrated by displacement			
	Describe reduction and oxidation in terms of removal or gain of oxygen			
	Recall how iron is extracted from its ore in a blast furnace			
	Describe the electrolysis of molten ionic compounds to include electrode equations			
	Describe reduction and oxidation in terms of gain or loss of electrons			
	Explain how aluminium is extracted by electrolysis including the use of cryolite to dissolve alumina			
	Recall the properties and uses of iron (steel), aluminium, copper and titanium			
	Describe the general properties of transition metals, including their ability to form ions with different charges			
	Chem + HT only: Identify Cu^{2+}, Fe^{2+} and Fe^{3+} ions by their precipitation reactions with aqueous OH^-			
	Define the term alloy			
	<i>Chem only: Describe what happens during the electrolysis of water (including electrode equations)</i>			
	<i>Chem only: Describe what happens during the electrolysis of aqueous solutions (including electrode equations)</i>			
	Chem + HT only: Describe electrolysis of aqueous solutions involving competing ions such as sodium chloride			
	<i>Chem only: Describe how electrolysis is used in electroplating</i>			
	Chem + HT only: Describe how electrolysis is used in purification of copper and the manufacture of sodium hydroxide			
Describe the factors that affect the economic viability and sustainability of extraction processes				
<i>Spec prac: Determine the relative reactivities of metals through displacement reactions</i>				

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Spec prac: Investigate the electrolysis of aqueous solutions and electroplating

2.4 Chemical	Define the terms exothermic and endothermic reaction in terms of temperature change and energy transfer to or from the surroundings			
	Describe the energy profiles for exothermic and endothermic reactions			
	Define the term activation energy			
	Use bond energy data to calculate overall energy change for a reaction and to identify whether it is exothermic or endothermic			
2.5 Crude oil, fuels and organic chemistry	Describe the composition and origin of crude oil			
	Describe how fractional distillation is used to separate crude oil			
	Describe how fractions similar			
	Describe the trends in properties of fractions with increasing chain length and the effect on their usefulness as fuels			
	Explain why the oil industry has global economic and political importance			
	Describe the social and environmental impact of the oil industry			
	the combustion reactions of hydrocarbons and other fuels			
	Recall how to determine experimentally the energy per gram released by a burning fuel			
	Evaluate hydrogen as an energy source			
	Explain the importance of the fire triangle in fire-fighting and fire prevention			
	Describe the process cracking of some fractions			
	Explain the importance of cracking			
	Use the general formula C_nH_{2n+2} for alkanes and C_nH_{2n} for alkenes			
	Recall the names and molecular and structural formulae for simple alkanes and alkenes			
	HT only: Describe isomerism in more complex alkanes and alkenes			
	Chem + HT only: Names more complex alkanes and alkenes			
	Describe the test used to identify alkenes			
Describe how addition polymerisation is used to produce polymers, to include named polymers				
Recall the general properties of plastics and the uses of named polymers				
Evaluate the environmental issues relating to the disposal of plastics				

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	<i>Chem only: Describe how ethanol (an alcohol) is made from sugars by fermentation using yeast</i>			
	<i>Chem only: Describe how to use potassium dichromate(VI) to test for alcohols</i>			
	<i>Chem only: Evaluate the social and economic impact of alcoholic drinks</i>			
	<i>Chem only: Describe the use of ethanol as a solvent and as a fuel</i>			
	<i>Chem only: Describe the social, economic and environmental factors that affect the development of bioethanol fuel</i>			
	<i>Chem only: Name and recall molecular and structural formulae for alcohols, including positional isomers</i>			
	<i>Chem only: Describe the microbial oxidation of ethanol to ethanoic acid (a carboxylic acid)</i>			
	<i>Chem only: Describe how infrared spectroscopy can be used to identify the presence of certain bonds in organic molecules</i>			
	<i>Spec prac: Determine the amount of energy released by a fuel</i>			
2.6 Reversible reactions, industrial processes and	<i>Chem only: Describe what is meant by a reversible reaction</i>			
	<i>Chem only: Describe the production of ammonia by the reversible reaction of nitrogen and ammonia in the Haber process</i>			
	HT + Chem only: Describe the factors involved in choosing conditions to ensure the most economical production of ammonia			
	<i>Chem only: Recall the test used to identify ammonia gas</i>			
	<i>Chem only: Describe the three stage process for the production of sulfuric acid by the contact process</i>			
	<i>Chem only: List the range of uses of sulfuric acid</i>			
	<i>Chem only: Describe concentrated sulfuric acid as a dehydrating agent in its reaction with sugar and hydrated copper(II) sulfate</i>			
	<i>Chem only: Describe how to produce nitrogenous fertilisers such by neutralisation of ammonia solution</i>			
	<i>Chem only: the identification of NH_4^+ ions by addition of aqueous OH^-</i>			
	<i>Chem only: List the benefits of nitrogenous fertilisers for crop growth and the problems that arise when they are washed into waterways</i>			

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