

PIXL 6:
Subject: Chemistry
Examination Board: AQA
Specification Code: 7404
Section: 1 Physical chemistry

Date you have reviewed

Key:		Secure at Target
Grade		Insecure at Target Grade
No Knowledge at Target Grade		

Students' Target ALPS + 1 Fine Levelled Grades

Atomic structure
State the relative masses of protons, neutrons and electrons
State the relative charges of protons, neutrons and electrons
Explain how these particles are arranged in an atom
Define the terms mass number, atomic number and isotope
Explain why isotopes of the same element have identical chemical properties
Describe how electrons are arranged in an atom
Recognise that the electron can behave as a particle, a wave, or a cloud of charge
Describe how the structure of an atom developed from Dalton to Schrodinger
Explain how a mass spectrometer works and what it measures
Illustrate how the electron configuration of atoms and ions are written in terms of s, p and d electrons
State the definition of ionisation energy
Describe the trend in ionisation energies a) down a group and b) across a period in terms of electron configurations
Explain how trends in ionisation energies provide evidence for the existence of energy levels and sub-levels
Amount of substance
State the definition of relative atomic mass
State the definition of relative molecular mass
State the meaning of Avogadro constant
State what the same numbers of moles of different substances have in common
Calculate the number of moles present in a given mass of an element or compound
Calculate the number of moles of substance from the volume of a solution and its concentration
State the ideal gas equation
Describe how the ideal gas equation is used to calculate the number of moles of a gas at a given volume, temperature and pressure
State the definitions of empirical formula and molecular formula
Calculate the empirical formula from the masses or percentage masses of the elements present in a compound
Calculate the additional information needed to work out a molecular formula from an empirical formula
Demonstrate how an equation can be balanced in the reactants and products are known
Calculate the amount of a product using experimental data and a balanced equation
Describe the atom economy of a chemical reaction
State how an equation is used to calculate an atom economy
Describe the percentage yield of a chemical reaction
Calculate percentage yields
Bonding
State how ions form and why they attract each other
State the properties of ionically bonded compounds
Describe the structure of ionically bonded compounds
Describe a covalent bond
Describe a co-ordinate bond
Describe the properties of covalently bonded molecules
Describe the nature of bonding in metals
Describe the properties of metals
State what is meant by the term electronegativity
State what makes one atom more electronegative than another
State what the symbols δ^+ and δ^- mean when placed above atoms in a covalent bond
State the three types of intermolecular force
Describe how dipole-dipole and van der Waals forces arise
Describe how van der Waals forces affect boiling temperatures
State what is needed for hydrogen bonding to occur
Explain why NH_3 , H_2O and HF have higher boiling temperatures than might be expected
State the rules that govern the shapes of simple molecules
Describe how the number of electron pairs around an atom affects the shapes of simple molecules
Describe how the number of electron pairs around an atom affects the shapes of the molecule
Describe what happens to the shape of the molecule when a bonding pair of electrons is replaced by a non-bonding pair
State the energy changes that occur when solids melt and liquids vaporise
Explain the values of enthalpies of melting (fusion) and vapourisation are
Explain the physical properties of ionic solids, metals, macromolecular solids and molecular solids in terms of their detailed structures and bonding
List the three types of strong bonds
List the three types of intermolecular forces
Describe how melting temperatures and structure are related
Describe how electrical conductivity is related to bonding
Energetics
Define the terms endothermic and exothermic
Define what an enthalpy change is
Describe what an enthalpy level diagram is
Describe how enthalpy change is measured in a reaction
Describe how you measure enthalpy changes more accurately
Describe how you measure enthalpy changes in solution
Describe how to find enthalpy changes that cannot be measured directly
Apply Hess's law
Describe how the enthalpy change of combustion can be used to find the enthalpy change of a reaction
State what is used as the zero for enthalpy changes
State what the definition of a bond enthalpy is
Describe how mean bond enthalpies are worked out from given data
Demonstrate how bond enthalpies are used in calculations
Kinetics
Describe what must happen before a reaction will take place
Explain why all collisions do not result in a reaction
Define activation energy
Explain how temperature affects the number of molecules with energy equal to or more than the activation energy
Explain why a small increase in temperature has a large effect on the rate of a reaction
State the definition of a catalyst
Describe how a catalyst affects activation energy
Describe how a catalyst affects enthalpy change
Equilibria
State the definition of a reversible reaction
State what is meant by chemical equilibrium
Explain why all reactions do not go to completion
Explain what happens when equilibrium has been reached
State Le Chatelier's principle
Explain how an equilibrium is affected by concentration, temperature, pressure and a catalyst
Explain why compromises are made when deciding how to get the best yield in industry
State the definition of an equilibrium constant and describe how it is determined
Describe how K_c is used to work out the composition of an equilibrium mixture
Explain how Le Chatelier's principle can predict how changes in conditions affect the position of equilibrium
Describe how the equilibrium constant is affected by changing the conditions of a reaction
Oxidation, reduction and redox reactions
Define a redox reaction in terms of oxygen or hydrogen transfer
Define a redox reaction in terms of electron transfer
Define a half equation
Define an oxidation state
Describe how oxidation states are worked out
Explain how half life equations are used to balance an equation
Deduce half equations from a redox equation

PiXL 6:
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Section: 2 Inorganic chemistry

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Periodicity

State the location of the s, p and d blocks of elements in the Periodic Table

Describe the trends in melting and boiling temperatures of the elements in Period 3

Explain these trends in terms of bonding and structure

Describe the trends in atomic radius and first ionisation energy of the elements in Period 3

Explain the trends in atomic radius and first ionisation energy of the elements in Period 3

Explain why the increase in ionisation energies across a period is not regular

Describe how successive ionisation energies explain electron arrangements

Group 2: the alkaline earth metals

Explain the changes in the atomic radius of the Group 2 elements from Mg to Ba

Explain the changes in the first ionisation energies of the Group 2 elements from Mg to Ba

Explain the changes in the melting points of the Group 2 elements from Mg to Ba

State the trend in reactivity of the group

State the trend in solubilities of a) the hydroxides and b) the sulphates

Group 7(17): the halogens

Explain how and why the atomic radius changes in Group 7 of the periodic table

Explain how and why electronegativity changes in Group 7 of the periodic table

State the trend in oxidising ability of the halogens

Describe the experimental evidence that confirms this trend

State the trend in reducing ability of halide ions

Explain how this trend is linked to ionic radius

Describe how halide ions are identified using silver nitrate

Describe how chlorine reacts with water

Describe how chlorine reacts with alkali

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PiXL 6:
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Section: 5 Skills in A level chemistry

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Mathematical skills
I can use correct Units
I can use and convert to standard form
I can convert to base units
I can use and understand prefixes and suffixes of units
I can correct to the correct number of significant figures
I can change the subject of an equation
I can substitute into equations
I can interpret graphs
I can draw graphs correctly
I can find the rate of a reaction from a graph
I can use tangents in order to calculate the rate of a reaction from a graph
I can use and interpret logarithms
I can calculate and interpret angles
I understand how angles are represented in diagrams depending on their orientation within the molecule