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Weatherhead High School

Year 11 Revision List

AQA GCSE Triple Chemistry

Paper 1: Atomic structure and the periodic table

4.1.1 A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes	
use the names and symbols of the first 20 elements in the periodic table, the elements in Groups 1 and 7, and other elements in this specification	
name compounds of these elements from given formulae or symbol equations	
write word equations for the reactions in this specification	
write formulae and balanced chemical equations for the reactions in this specification	
describe, explain and give examples of the specified processes of separation	
suggest suitable separation and purification techniques for mixtures when given appropriate information	
why the new evidence from the scattering experiment led to a change in the atomic model	
the difference between the plum pudding model of the atom and the nuclear model of the atom	
use the nuclear model to describe atoms	
calculate the numbers of protons, neutrons and electrons in an atom or ion, given its atomic number and mass number	
relate size and scale of atoms to objects in the physical world	
calculate the relative atomic mass of an element given the percentage abundance of its isotopes	
represent the electronic structures of the first twenty elements of the periodic table in numbers or diagrams	
4.1.2 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	
predict possible reactions and probable reactivity of elements from their positions in the periodic table	
describe the 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	
explain how the reactions of elements are related to the arrangement of electrons in their atoms and hence to their atomic number	
explain how properties of the elements in Group 0 depend on the outer shell of electrons of the atoms	
predict properties from given trends down the group	
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	
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	
4.1.3 Properties of transition metals (chemistry only)	
describe the difference compared with Group 1 in melting points, densities, strength, hardness and reactivity with oxygen, water and halogens	
exemplify these general properties by reference to Cr, Mn, Fe, Co, Ni, Cu	
transition elements have ions with different charges, form coloured compounds and are useful as catalysts	
exemplify these general properties by reference to compounds of Cr, Mn, Fe, Co, Ni, Cu	

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Paper 1: Bonding, structure, and the properties of matter

4.2.1 Chemical bonds, ionic, covalent and metallic	
explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons	
draw dot and cross diagrams for ionic compounds formed by metals in Groups 1 and 2 with non-metals in Groups 6 and 7	
work out the charge on the ions of metals and non-metals from the group number of the element, limited to the metals in Groups 1 and 2, and non-metals in Groups 6 and 7	
deduce that a compound is ionic from a diagram of its structure in one of the specified forms	
describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent a giant ionic structure	
work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure	
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	
deduce the molecular formula of a substance from a given model or diagram in these forms showing the atoms and bonds in the molecule	
Recognise substances as metallic giant structures from diagrams showing their bonding	
4.2.2 How bonding and structure are related to the properties of substances	
predict the states of substances at different temperatures given appropriate data	
explain the different temperatures at which changes of state occur in terms of energy transfers and types of bonding	
recognise that atoms themselves do not have the bulk properties of materials	
(HT only) explain the limitations of the particle theory in relation to changes of state when particles are represented by solid inelastic spheres which have no forces between them	
include appropriate state symbols in chemical equations for the reactions in this specification	
describe the bonding in ionic structures and link this bonding to melting and boiling points and conductivity	
describe the bonding in simple covalent structures and link this bonding to melting and boiling points and conductivity	
use the idea that intermolecular forces are weak compared with covalent bonds to explain the bulk properties of molecular substances	
recognise polymers from diagrams showing their bonding and structure	

4.2.3 Structure and bonding of carbon		
Recognise giant covalent structures from diagrams showing their bonding and structure		
describe the bonding in giant covalent structures (diamond, graphite, graphene, fullerenes) and link this bonding to melting and boiling points and conductivity		
recognise graphene and fullerenes from diagrams and descriptions of their bonding and structure		
give examples of the uses of fullerenes, including carbon nanotubes		
explain why alloys are harder than pure metals in terms of distortion of the layers of atoms in the structure of a pure metal		
describe the bonding in metallic structures and link this bonding to melting and boiling points and conductivity		

4.2.4 Bulk and surface properties of matter including nanoparticles (chemistry only)		
compare 'nano' dimensions to typical dimensions of atoms and molecules		
given appropriate information, evaluate the use of nanoparticles for a specified purpose		
explain that there are possible risks associated with the use of nanoparticles		

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Paper 1: Quantitative Chemistry

4.3.1 Chemical measurements, conservation of mass and the quantitative interpretation of chemical equations		
understand the use of the multipliers in equations in normal script before a formula and in subscript within a formula		
calculate relative formula mass		
explain any observed changes in mass in non-enclosed systems during a chemical reaction given the balanced symbol equation for the reaction and explain these changes in terms of the particle mode		
represent the distribution of results and make estimations of uncertainty		
use the range of a set of measurements about the mean as a measure of uncertainty		
4.3.2 Use of amount of substance in relation to masses of pure substances		
(HT) understand that the measurement of amounts in moles can apply to atoms, molecules, ions, electrons, formulae and equations, for example that in one mole of carbon (C) the number of atoms is the same as the number of molecules in one mole of carbon dioxide (CO_2).		
(HT) use the relative formula mass of a substance to calculate the number of moles in a given mass of that substance and vice versa		
(HT) calculate the masses of substances shown in a balanced symbol equation		
(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) change the subject of a mathematical equation.		
(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		
calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution		
(HT only) explain how the mass of a solute and the volume of a solution is related to the concentration of the solution		
4.3.3 Yield and atom economy of chemical reactions (chemistry only)		
calculate the percentage yield of a product from the actual yield of a reaction		
(HT only) calculate the theoretical mass of a product from a given mass 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 only) explain why a particular reaction pathway is chosen to produce a specified product given appropriate data such as atom economy (if not calculated), yield, rate, equilibrium position and usefulness of by-products		
4.3.4 Using concentrations of solutions in mol/dm3 (chemistry only) (HT only)		
explain how the concentration of a solution in mol/dm3 is related to the mass of the solute and the volume of the solution		
4.3.5 Use of amount of substance in relation to volumes of gases (chemistry only) (HT only)		
calculate the volume of a gas at room temperature and pressure from its mass and relative formula mass		
calculate volumes of gaseous reactants and products from a balanced equation and a given volume of a gaseous reactant or product		
change the subject of a mathematical equation		

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Paper 1: Chemical Change

4.4.1 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 and where appropriate, to place these metals in order of reactivity	
explain how the reactivity of metals with water or dilute acids is related to the tendency of the metal to form its positive ion	
deduce an order of reactivity of metals based on experimental results	
interpret or evaluate specific metal extraction processes when given appropriate information	
Identify the substances which are oxidised or reduced in terms of gain or loss of oxygen	
(HT) write ionic equations for displacement reactions	
(HT) identify in a given reaction, symbol equation or half equation which species are oxidised and which are reduced	
4.4.2 Reactions of acids	
(HT) explain in terms of gain or loss of electrons, that these are redox reactions	
(HT) identify which species are oxidised and which are reduced in given chemical equations	
predict products from given reactants for salt production	
use the formulae of common ions to deduce the formulae of salts	
describe how to make pure, dry samples of named soluble salts from information provided	
Required practical 1: *preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution.*	
describe the use of universal indicator or a wide range indicator to measure the approximate pH of a solution	
use the pH scale to identify acidic or alkaline solutions	
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 Only) calculate the chemical quantities in titrations involving concentrations in mol/dm3 and in g/dm3	
Required practical 2: *(chemistry only) determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration.* ***(HT only) determination of the concentration of one of the solutions in mol/dm3 and g/dm3 from the reacting volumes and the known concentration of the other solution.***	
(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)	
4.4.3 Electrolysis	
describe what happens during the process of electrolysis	
(HT) write half equations for the reactions occurring at the electrodes during electrolysis, and may be required to complete and balance supplied half equations	
predict the products of the electrolysis of binary ionic compounds in the molten state	
explain why a mixture is used as the electrolyte in the extraction of aluminium	
explain why the positive electrode must be continually replaced in the extraction of aluminium	
predict the products of the electrolysis of aqueous solutions containing a single ionic compound	
Required practical 3: *investigate what happens when aqueous solutions are electrolysed using inert electrodes. This should be an investigation involving developing a hypothesis*	

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Paper 1: Energy Changes

4.5.1 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		
Required practical 4: *investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals*		
draw simple reaction profiles (energy level diagrams) for exothermic and endothermic reactions showing the relative energies of reactants and products, the activation energy and the overall energy change, with a curved line to show the energy as the reaction proceeds		
use reaction profiles to identify reactions as exothermic or endothermic		
explain that the activation energy is the energy needed for a reaction to occur		
(HT) calculate the energy transferred in chemical reactions using bond energies supplied		
4.5.2 Chemical cells and fuel cells (chemistry only)		
interpret data for relative reactivity of different metals and evaluate the use of cells		
evaluate the use of hydrogen fuel cells in comparison with rechargeable cells and batteries		
(HT only) write the half equations for the electrode reactions in the hydrogen fuel cell.		

Paper 2:

The rate and extent of chemical change

- Draw and interpret graphs showing the quantity of product formed against time
- Draw tangents to the curves of these graphs and use the slope of the tangent as a measure of the rate of reaction at a specific time
- Recall how changing concentration, pressure, surface area temperature and catalysts affects the rate of reaction
- Explain catalytic activity in terms of activation energy

Organic chemistry

- Explain how fractional distillation works in terms of evaporation and condensation
- Write balanced equations for the complete combustion of hydrocarbons with a given formula
- Recall the colour change when bromine water reacts with an alkene
- Recognise substances as alkenes given their written or drawn formula, for the first four alkenes
- Recognise the structure of esters and the name of ethyl ethanoate
- Recognise addition polymers and monomers from diagrams and from the functional group C=C in monomers
- Draw diagrams to represent the formation of a polymer from a given alkene monomer
- Relate the repeating unit to the monomer