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| **AQA Chemistry (8462) from 2016 Topics C4.1 Atomic structure and the periodic table** | | | | |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **4.1.1 A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes** | State that everything is made of atoms and recall what they are |  |  |  |
| Describe what elements and compounds are |  |  |  |
| State that elements and compounds are represented by symbols; and use chemical symbols and formulae to represent elements and compounds |  |  |  |
| Write word equations and balanced symbol equations for chemical reactions, including using appropriate state symbols |  |  |  |
| **HT ONLY: Write balanced half equations and ionic equations** |  |  |  |
| Describe what a mixture is |  |  |  |
| Name and describe the physical processes used to separate mixtures and suggest suitable separation techniques |  |  |  |
| Describe how the atomic model has changed over time due to new experimental evidence, inc discovery of the atom and scattering experiments (inc the work of James Chadwick) |  |  |  |
| Describe the difference between the plum pudding model of the atom and the nuclear model of the atom |  |  |  |
| State the relative charge of protons, neutrons and electrons and describe the overall charge of an atom |  |  |  |
| State the relative masses of protons, neutrons and electrons and describe the distribution of mass in an atom |  |  |  |
| Calculate the number of protons, neutrons and electrons in an atom when given its atomic number and mass number |  |  |  |
| Describe isotopes as atoms of the same element with different numbers of neutrons |  |  |  |
| Define the term relative atomic mass and why it takes into account the abundance of isotopes of the element |  |  |  |
| Calculate the relative atomic mass of an element given the percentage abundance of its isotopes |  |  |  |
| Describe how electrons fill energy levels in atoms, and represent the electron structure of elements using diagrams and numbers |  |  |  |
| **4.1.2 The periodic table** | Recall how the elements in the periodic table are arranged |  |  |  |
| Describe how elements with similar properties are placed in the periodic table |  |  |  |
| Explain why elements in the same group have similar properties and how to use the periodic table to predict the reactivity of elements |  |  |  |
| Describe the early attempts to classify elements |  |  |  |
| Explain the creation and attributes of Mendeleev's periodic table |  |  |  |
| Identify metals and non-metals on the periodic table, compare and contrast their properties |  |  |  |
| Explain how the atomic structure of metals and non-metals relates to their position in the periodic table |  |  |  |
| Describe noble gases (group 0) and explain their lack of reactivity |  |  |  |
| Describe the properties of noble gases, including boiling points, predict trends down the group and describe how their properties depend on the outer shell of electrons |  |  |  |
| Describe the reactivity and properties of group 1 alkali metals with reference to their electron arrangement and predict their reactions |  |  |  |
| Describe the properties of group 7 halogens and how their properties relate to their electron arrangement, including trends in molecular mass, melting and boiling points and reactivity |  |  |  |
| Describe the reactions of group 7 halogens with metals and non-metals |  |  |  |
| *Chem ONLY: Describe the properties of transition metals and compare them with group 1 elements, including melting points and densities, strength and hardness, and reactivity (for CR, Mn Fe, Co, Ni & Cu)* |  |  |  |

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| **AQA Chemistry (8462) from 2016 Topics C4.2 Bonding, structure, and the properties of matter** | | | | |
| **Topic** | **Student Checklist** | **R** | **A** | **G** |
| **4.2.1 Chemical bonds, ionic, covalent and metallic** | Describe the three main types of bonds: ionic bonds, covalent bonds and metallic bonds in terms of electrostatic forces and the transfer or sharing of electrons |  |  |  |
| Describe how the ions produced by elements in some groups have the electronic structure of a noble gas and explain how the charge of an ion relates to its group number |  |  |  |
| Describe the structure of ionic compounds, including the electrostatic forces of attraction, and represent ionic compounds using dot and cross diagrams |  |  |  |
| 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 |  |  |  |
| Describe covalent bonds and identify different types of covalently bonded substances, such as small molecules, large molecules and substances with giant covalent structures |  |  |  |
| Represent covalent bonds between small molecules, repeating units of polymers and parts of giant covalent structures using diagrams |  |  |  |
| Draw dot and cross diagrams for the molecules of hydrogen, chlorine, oxygen, nitrogen, hydrogen chloride, water, ammonia and methane |  |  |  |
| Deduce the molecular formula of a substance from a given model or diagram in these forms showing the atoms and bonds in the molecule |  |  |  |
| Describe the arrangement of atoms and electrons in metallic bonds and draw diagrams the bonding in metals |  |  |  |
| **4.2.2 How bonding and structure are related to the properties of substances** | Name the three States of matter, identify them from a simple model and state which changes of state happen at melting and boiling points |  |  |  |
| Explain changes of state using particle theory and describe factors that affect the melting and boiling point of a substance |  |  |  |
| **HT ONLY: Discuss the limitations of particle theory** |  |  |  |
| Recall what (s), (l), (g) and (aq) mean when used in chemical equations and be able to use them appropriately |  |  |  |
| Explain how the structure of ionic compounds affects their properties, including melting and boiling points and conduction of electricity (sodium chloride structure only) |  |  |  |
| Explain how the structure of small molecules affects their properties |  |  |  |
| Explain how the structure of polymers affects their properties |  |  |  |
| Explain how the structure of giant covalent structures affects their properties |  |  |  |
| Explain how the structure of metals and alloys affects their properties, including explaining why they are good conductors |  |  |  |
| Explain why alloys are harder than pure metals in terms of the layers of atoms |  |  |  |
| Explain the properties of graphite, diamond and graphene in terms of their structure and bonding |  |  |  |
| Describe the structure of fullerenes, and their uses, including Buckminsterfullerene and carbon nanotubes |  |  |  |
| *Chem ONLY: Compare the dimensions of nanoparticles to other particles and explain the effect of their surface area to volume ratio on their properties* |  |  |  |
| *Chem ONLY: Discuss the applications of nanoparticles and their advantages and disadvantages, including uses in medicine, cosmetics, fabrics and the development of catalysts* |  |  |  |