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| **Unit 1: Chemical Changes and Structure****Key Area: Rate of Reaction** |

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| **LEVEL****N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) |
| ☺ | 😐 | ☹ |
| **N4** | I can explain the effect of changing particle size, temperature, concentration and use of a catalyst on the rate of a chemical reaction  |  |  |  |
| **N4** | I can participate in rates of reaction experiments by measuring changes to mass (or volume) and collect relevant data  |  |  |  |
| **N4** | I can identify factors that must be kept the same to make these experiments fair  |  |  |  |
| **N4** | I can convert experimental data into a line graph showing how the speed of a reaction changes with time  |  |  |  |
| **N4** | I can interpret rates of reaction graphs and identify fast or slow reactions  |  |  |  |
| **N4** | I can state that exothermic reactions give out heat energy resulting in a temperature rise  |  |  |  |
| **N4** | I can state that endothermic reactions result in a temperature decrease  |  |  |  |
| **N4** | I can investigate different chemical reactions and gather data to find out if the reaction is exothermic or endothermic  |  |  |  |
| **N5** | I can calculate the average rate of a reaction using information from a graph |  |  |  |

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| **Unit 1: Chemical Changes and Structure****Key Area: Atomic structure** |

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| **LEVEL****N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) |
| ☺ | 😐 | ☹ |
| **N4** | State that every element is made up of very small particles called atoms. |  |  |  |
| **N4** | Describe the structure of the atom as having a nucleus, which contains protons and neutrons, with electrons moving around outside the nucleus.  |  |  |  |
| **N4** | State that protons have a charge of one-positive, neutrons are neutral and electrons have a charge of one-negative.  |  |  |  |
| **N4** | State that, atoms of different elements have a different number of protons, called the atomic number, and be able to identify the element in the periodic table from its Atomic Number.  |  |  |  |
| **N4** | State that electrons in an atom are arranged in energy levels and can draw atomic structure diagrams for any of the first 20 elements from the periodic table to show the correct number of electrons in each energy level by using the : 2,8,8,8 electron rule.  |  |  |  |
| **N4** | State that the elements of the Periodic Table are arranged in terms of increasing atomic number and chemical properties. (The atomic number increases by one as you move left to right across a period of the periodic table). |  |  |  |
| **N4** | State those elements with the same number of outer electrons are found in the same group and have similar chemical properties.  |  |  |  |
| **N4** | State that protons and neutrons have an approximate mass of one atomic mass unit (a.m.u.) and electrons, in comparison, have virtually zero mass.  |  |  |  |
| **N4** | State an atom has an atomic number which equals the number of protons (also equal to number of electrons) mass number which equals the number of protons plus neutrons.  |  |  |  |
| **N5** | Write nuclide notation for an atom or an ion, and calculate the number of protons, neutrons and electrons from the mass number and the atomic number for both atoms and ions.  |  |  |  |
| **N5** | State isotopes are atoms with the same atomic number but different mass numbers due to different numbers of neutrons.  |  |  |  |
| **N5** | State elements exist as a mixture of isotopes and the average mass of an atom is called the relative atomic mass and is rarely a whole number.  |  |  |  |
| **N5** | Estimate the relative atomic mass of an element given the mass number and abundance of each isotope. |  |  |  |

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| **Unit 1: Chemical Changes and Structure****Key Area: Bonding, structure and properties** |

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| **LEVEL****N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) |
| ☺ | 😐 | ☹ |
| **N4/5** | State atoms can be held together by bonds and there are three types of bonding called metallic, ionic and covalent. |  |  |  |
| **N4** | Ionic compounds are usually formed when metals combine with non-metals.  |  |  |  |
| **N4** | State covalent bonding usually occurs when non-metal atoms bond.  |  |  |  |
| **N4** | State in a covalent bond, atoms share pairs of electrons.  |  |  |  |
| **N4** | State a molecule is a group of atoms held together by covalent bonds.  |  |  |  |
| **N4** | A diatomic molecule is made up of two atoms, and I can list the six gaseous elements which exist as diatomic molecules: (H2, N2, O2, Cl2, I2, Br2)  |  |  |  |
| **N4** | Positive ions are formed by metal atoms losing electrons, and negative ions are formed by non-metal atoms gaining electrons. |  |  |  |
| **N4** | Covalent substances (solids, liquids, solutions) do not conduct electricity. |  |  |  |
| **N4** | Many covalent substances have low melting and boiling points and are insoluble in water but are soluble in other covalent liquids.  |  |  |  |
| **N4** | Many covalent substances are insoluble in water but are soluble in other covalent liquids.  |  |  |  |
| **N4/5** | Ionic compounds do not conduct electricity in the solid, but these compounds do conduct electricity when dissolved in water or when molten (melted) |  |  |  |
| **N5** | I can state in forming bonds, atoms can achieve a stable electron arrangement.  |  |  |  |
| **N5** | I can state the covalent bond is a result of two positive nuclei being held together by their common attraction for the shared pair of electrons.  |  |  |  |
| **N5** | I can draw diagrams show how the outer electrons are shared to form the covalent bond(s) in a molecule.  |  |  |  |

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| **Unit 1: Chemical Changes and Structure****Key Area: Bonding, structure and properties** |

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| **LEVEL****N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) |
| ☺ | 😐 | ☹ |
| **N5** | State ionic bonding is the electrostatic force of attraction between oppositely charged ions.  |  |  |  |
| **N5** | Explain the conduction of ionic compounds in terms of movement of ions and the non-conduction of covalent substances in terms of molecules which are uncharged. |  |  |  |
| **N5** | Explain why discrete covalent substances have low melting and boiling points due to the weak forces of attraction that need to be overcome.  |  |  |  |
| **N5** |  I can explain that ionic compounds and covalent network substances have high melting and boiling points due to the strong forces of attraction which need to be overcome.  |  |  |  |
| **N5** | I can state the formula for a discrete covalent substance gives the actual number of atoms in each molecule but in a covalent network substance gives the simplest ratio of atoms of each element.  |  |  |  |
| **N5** |  I can use the valency rules to produce the chemical formulae of a covalent substance. |  |  |  |
| **N5** | The formula for an ionic compound gives the simplest ratio of positive ions to negative ions, and I can use this ration to produce the chemical and ionic formulae of the ionic compound. |  |  |  |
| **N5** | I can explain the conduction of ionic compounds in terms of movement of ions and the non-conduction of covalent substances in terms of molecules which are uncharged.  |  |  |  |
| **N5** | I can draw diagrams show how the shape of a covalent molecule. (methane, ethane, water, hydrogen, ammonia, hydrogen chloride) |  |  |  |

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| **Unit 1: Chemical Changes and Structure****Key Area: Formulae and reaction quantities** |

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| **LEVEL****N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) |
| ☺ | 😐 | ☹ |
| **N5** | I can change word equations into formula equations and balance them  |  |  |  |
| **N5** | I can calculate the formula mass of a substance  |  |  |  |
| **N5** | I can state that the gram formula mass of a substance is called one mole  |  |  |  |
| **N5** |  I can convert moles into mass and mass into moles  |  |  |  |
| **N5** | I can calculate the concentration of a solution from the number of moles and the volume  |  |  |  |
| **N5** |  I can state that the units of concentration are moles / litre or Molar |  |  |  |
| **N4/5** | I can calculate the mass of a solute needed to prepare a given concentration of solution. |  |  |  |



n = number of moles

c = concentration (moles/litre)

v= volume in ***litres***

n

c

V

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| **Unit 1: Chemical Changes and Structure****Key Area: Acids and Bases** |

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| **LEVEL****N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) |
| ☺ | 😐 | ☹ |
| **N4** | I can state that soluble metal oxides form alkaline solutions. |  |  |  |
| **N4** | I can state that soluble non-metal oxides form acidic solutions. |  |  |  |
| **N4** | I can state that insoluble oxides do not dissolve in water and therefore cannot affect pH. |  |  |  |
| **N4** | I can state that carbon dioxide gas is produced from burning fossil fuels or from industrial processes such as cement manufacture  |  |  |  |
| **N4** |  I can research and present information about non-metal oxides and their impact on the environment such as acid rain, global warming and ocean acidification  |  |  |  |
| **N4** | I can find and present information about some uses of acids in the food and drink industry and their impact on health  |  |  |  |
| **N4/5** | I can state that a base is a substance that neutralises an acid (metal oxides, metal hydroxides and metal carbonates) |  |  |  |
| **N4/5** | I can state that an alkali is a soluble base. |  |  |  |
| **N4/5** | I can state that water is always produced in a neutralisation reaction. |  |  |  |
| **N4** | I can name salts formed during neutralisation reactions .  |  |  |  |
| **N4/5** | I can construct word equations to describe neutralisation reactions  |  |  |  |
| **N5** |  I can state that water dissociates into equal numbers of hydrogen and hydroxide ions. |  |  |  |
| **N5** | I can state that pH is a measure of the hydrogen ion concentration  |  |  |  |
| **N5** | I can state that in a neutral solution there are an equal number of hydrogen and hydroxide ions  |  |  |  |

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| **Unit 1: Chemical Changes and Structure****Key Area: Acids and Bases** |

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| **LEVEL****N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) |
| ☺ | 😐 | ☹ |
| **N5** | I can state that a solution is acidic if it contains a higher concentration of H+ ions compared to OH- ions. |  |  |  |
| **N5** | I can state that a solution is alkaline if it contains a higher concentration of OH- ions compared to H+ ions. |  |  |  |
| **N5** | I can show by experiment how soluble metal oxides or non-metal oxides affect the pH of water. |  |  |  |
| **N5** | I can state that diluting an acid or an alkali results in changes to its H+ / OH- ion concentrations and its pH  |  |  |  |
| **N5** | I can show by experiment how soluble metal oxides or non-metal oxides affect the pH of water . |  |  |  |
| **N5** |  I can construct balanced formula equations and write balanced ionic equations for neutralisation reactions. |  |  |  |
| **N5** | I can identify the spectator ions in neutralisation reactions and, by omitting them (removing them), identify the reacting species and write the net ionic equation. |  |  |  |
| **N5** | I can show by experiment(titration)how to make accurate measurements of volumes during a neutralisation reaction  |  |  |  |
| **N5** | I can use experimental data to accurately calculate the end-point of a Titration. |  |  |  |
| **N5** | I can use experimental data from a titration to calculate the volume or concentration of a reacting solution. |  |  |  |