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| **Unit 3: Chemistry in Society**  **Key Area: Nuclear Chemistry (N4/N5)** |

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| **LEVEL**  **N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) | | |
| ☺ | 😐 | ☹ |
| **N4** | I can describe how heavier elements are formed from lighter elements in stars |  |  |  |
| **N4** | I can describe how background radiation is a natural phenomenon and is caused by various factors. |  |  |  |
| **N5** | I can classify sources of background radiation can be natural or artificial. |  |  |  |
| **N5** | I can describe radioactivity as a random event caused by unstable nucleus emitting radiation to become more stable |  |  |  |
| **N5** | I can state how radioactive elements can become more stable by giving out alpha, beta or gamma radiation. |  |  |  |
| **N5** | I can write nuclear equations to describe nuclear reactions and I can identify the type of radiation emitted, starting isotope or product of a nuclear reaction given relevant information. |  |  |  |
| **N5** | I can identify the type of radiation emitted, starting isotope or product of a nuclear reaction given relevant information. |  |  |  |
| **N5** | I can describe the properties of alpha, beta or gamma radiation in terms of their mass, charge and ability to penetrate different materials. |  |  |  |
| **N5** | I can state that half-life is the time taken for half of the nuclei of a particular isotope to decay and I can use the half-life data to carry out simple half-life calculations to:   * determine half-life from a graph, * finding the number of half-lives that have passed or the time that has passed, * finding the proportion of a radioactive sample that has decayed or remains. |  |  |  |
| **N5** | I can state how the half-life for a particular isotope is a constant so radioactive isotopes can be used to date materials. |  |  |  |
| **N5** | I can describe how radioactive isotopes are used in medicine and industry. |  |  |  |

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| **Unit 3: Chemistry in Society**  **Key Area: Materials (N4)**  **Properties of Plastics (N5)** |

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| **LEVEL**  **N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) | | |
| ☺ | 😐 | ☹ |
| **N4/5** | I can state that plastics are a group of important synthetic materials made from long-chain molecules called polymers and that polymers are made in polymerisation reactions. |  |  |  |
| **N4** | I can state Polymers can be engineered to be used in a variety of environments. |  |  |  |
| **N4** | I can state that plastics can be grouped in different ways: thermosoftening (thermoplastics) and thermosetting plastics. |  |  |  |
| **N4** | I can state thermosoftening plastics (thermoplastics) can be reshaped once heated |  |  |  |
| **N4** | I can state that thermosetting polymers cannot be reshaped once heated |  |  |  |
| **N4** | I can state plastics burn to release harmful gases. |  |  |  |
| **N4** | I can state that plastics have been developed which are biodegradable: can be broken down by action of living organism. |  |  |  |
| **N4** | Chemists are constantly developing new or novel materials with properties that make them suitable for a range of uses(application) |  |  |  |
| **N4/5** | I can state plastics are made from small units called monomers. |  |  |  |
| **N4/5** | I can deduce the name of the polymer from the name of the monomer. |  |  |  |
| **N5** | I can describe how the processes of addition and condensation polymerisation can make different plastics. |  |  |  |
| **N5** | I can identify the type of polymer from its structure as addition or condensation polymer |  |  |  |
| **N5** | I can identify monomer or repeating unit from a given section of polymer chains and I can draw a section of a polymer chain from a monomer or repeating unit. |  |  |  |
| **N5** | I can draw the structure of a polymer from the structure of its monomers and vice versa. |  |  |  |
| **N5** | I can define addition polymerisation as a chemical reaction in which a number of small unsaturated molecules join together to form a long chain molecule and that no other product is formed. |  |  |  |
| **N5** | I know that polythene is an addition polymer made from the monomer ethene. |  |  |  |

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| **Unit 3: Chemistry in Society**  **Key Area: Metals and alloys (N4)**  **Metals (N5)** |

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| **LEVEL**  **N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) | | |
| ☺ | 😐 | ☹ |
| **N4** | I can give examples of different materials include metals, ceramics and plastics as well as natural and novel substances. |  |  |  |
| **N4** | I can give examples of the chemical and physical properties of metals and link properties to their uses and how it arises. |  |  |  |
| **N4** | I can use the observations from the reaction of metals with oxygen, water and dilute acid and write word equations to show reactants and products. |  |  |  |
| **N4/N5** | I can produce a reactivity series using reactions of metals with oxygen, water and dilute acid |  |  |  |
| **N4** | I can state the different methods used to extract metals from their ores are dependent on the position of the metal in the reactivity series. |  |  |  |
| **N4** | I can state that metals corrode by their reaction with oxygen and water. |  |  |  |
| **N4** | I can state that different metals corrode at different rates. |  |  |  |
| **N4** | I can state that the use of certain metals to protect iron from rusting is related to their relative position to iron in the electrochemical series. |  |  |  |
| **N4** | I can state that Ferroxyl indicator can be used to show rusting occurring and know the colour change involved. |  |  |  |
| **N4** | I can state that when different metals are connected by an electrolyte, an electric current flows from one metal to the other through connecting wires. |  |  |  |
| **N4** | I can state that by comparing pairs of metals in a cell the electrochemical series can be constructed. |  |  |  |

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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 the electrochemical series is used to predict the size of voltage and direction of current in chemical cells. This forms the basis for batteries. |  |  |  |
| **N4** | I can state that an alloy is a mixture of two or more elements, at least one of which is a metal. |  |  |  |
| **N4** | I can state alloys have different physical properties in comparison to the pure elements. |  |  |  |
| **N5** | I can define metallic bonding and use the definition to explain metals electrical conductivity |  |  |  |
| **N5** | I can write balanced ionic formulae equations to show the reaction of metals with water, oxygen and acids |  |  |  |
| **N5** | I can calculate the percentage of a particular metal in an ore. |  |  |  |
| **N5** | I can state changing metal ions to metal atoms is a reduction reaction that occurs during the extraction of metals. |  |  |  |
| **N5** | I can write ion-electron equations for electrochemical cells including those involving non-metals. |  |  |  |
| **N5** | I can write ion electron equations for oxidation and reduction reactions and that combinations of these reactions form redox equations |  |  |  |
| **N5** | I can state the reducing agent from the balanced equations for the extraction of metals. |  |  |  |
| **N5** | I can define and identify the following types of reaction; oxidation, reduction and redox, given a balanced chemical equation or an ion-electron equation. |  |  |  |
| **N5** | I can state the direction of electron flow in electrochemical cells includes those involving non-metal electrodes. |  |  |  |
| **N5** | I can describe how fuel cells and rechargeable batteries are two examples of technologies which utilise redox reactions. |  |  |  |

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| **Unit 3: Chemistry in Society**  **Key Area: Fertilisers (N4/N5)** |

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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 the three key elements which provide the nutrients required for plant growth: nitrogen (N), phosphorus (P) and potassium (K). |  |  |  |
| **N4** | I know that plants are grown as crops for food production. |  |  |  |
| **N4** | I can use the information on fertiliser packaging to state the percentage composition of a NPK fertiliser. |  |  |  |
| **N4** | I can give examples of natural fertilisers. |  |  |  |
| **N4** | I can describe how man made (synthetic) fertilisers can be produced in laboratories by chemists using neutralisation reactions. |  |  |  |
| **N4** | I can state how the use of fertilisers may have an environmental impact. |  |  |  |
| **N4** | I know that chemists play a key role in the process by producing synthetic (man-made) fertiliser to increase or improve plant growth. |  |  |  |
| **N4** | I can calculate the percentage composition of an element in the fertiliser |  |  |  |
| **N4/5** | I can state how the Haber process is used to produce ammonia. |  |  |  |
| **N5** | I can write a balanced equation for the Haber process. |  |  |  |
| **N5** | I can describe how the Haber process is one of the most important reactions in the production of fertilisers and is an example of a reversible reaction. |  |  |  |
| **N5** | I know that there are ideal conditions which maximise the yield of ammonia produced in the Haber process. |  |  |  |
| **N5** | I can state how ammonia is used as the starting material for the commercial production of nitric acid. |  |  |  |
| **N5** | I know that that the Ostwald process is used industrially to produce Nitric acid. |  |  |  |
| **N5** | I can describe how Ammonia and nitric acid are used to produce ammonium nitrate, a salt used as a fertiliser. |  |  |  |

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| **Unit 3: Chemistry in Society**  **Key Area: Chemical Analysis** |

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| **LEVEL**  **N4 N5** | After completing this topic, you should be able to: | How well I have understood (✓) | | |
| ☺ | 😐 | ☹ |
| **N4** | I can understand why it is important and the significance of analysis and carry out simple analytical techniques. |  |  |  |
| **N5** | I can understand that Chemists play an important role in society by monitoring our environment to ensure that it remains healthy and safe and that pollution is tackled as it arises. |  |  |  |
| **N4/N5** | I can describe and carry out :   * chromatography * flame tests * pH measurement using indicators / pH meters * separation techniques * acid/base titration, * precipitation, |  |  |  |
| **N5** | I can state that acidity in water or soil can be tackled by addition of a suitable alkali or base such as lime (calcium oxide) and that titration is used to identify the extent of acidic pollution and titration calculations to determine the quantity of neutraliser required |  |  |  |
| **N5** | I can state that precipitation can be used to identify substances present in water or soil, e.g. silver nitrate can be used to monitor pollution by halogens, and barium chloride can be used to monitor sulphate pollution. |  |  |  |
| **N5** | I can state that flame testing can be used to identify metals present in compounds that have polluted the environment. Use of the data booklet to identify the metal present or flame colour. |  |  |  |