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| **Unit 2: Natures Chemistry**  **Key Area: Homologous series** |

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| **LEVEL**  **N4/N5** | After completing this topic: | How well I have understood (✓) | | |
| ☺ | 😐 | ☹ |
| **N4** | I can state fractional distillation is the process used for separating crude oil into fractions. |  |  |  |
| **N4** | I can state the properties and uses of the fractions. |  |  |  |
| **N4** | I can state that a fraction is a group of hydrocarbons with boiling points within a given range. |  |  |  |
| **N4** | I can state there are many different hydrocarbon molecules as carbon and hydrogen can form chain molecules of different lengths. |  |  |  |
| **N4** | I can define cracking and can state that the cracking process is used to meet the demand for shorter chain alkanes and alkenes. |  |  |  |
| **N4** | I can state that one of the products of cracking includes an unsaturated hydrocarbon |  |  |  |
| **N4/N5** | I can state that a hydrocarbon molecules contain carbon and hydrogen only. |  |  |  |
| **N4/N5** | I can state that a homologous series is a set of compounds with the same general formula and similar chemical properties. |  |  |  |
| **N4/N5** | I can identify alkanes from the ‘-ane’ ending. Alkanes are a subset of hydrocarbons with the general formula of Cn H2n+2 |  |  |  |
| **N4/N5** | I can name straight-chain alkanes and identify them from full structural formulae and molecular formulae up to C8. |  |  |  |
| **N4/N5** | I can state that the alkenes are also a subset of hydrocarbons with the general formula of Cn H2n |  |  |  |
| **N4/N5** | I can identify an alkene from the carbon-to-carbon double bond and ‘-ene’ ending. |  |  |  |
| **N4/N5** | I can name straight-chain alkenes and identify them from full structural formulae and molecular formulae up to C8. |  |  |  |
| **N5** | I can explain the trends in physical properties to include melting and boiling point for hydrocarbons in terms of their intermolecular forces. |  |  |  |
| **N5** | I can write balanced formula equations for the combustion of a named hydrocarbon and identify the products. |  |  |  |

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| **Unit 2: Natures Chemistry**  **Key Area: Homologous series** |

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| **LEVEL**  **N4 N5** | After completing this topic: | How well I have understood (✓) | | |
| ☺ | 😐 | ☹ |
| **N5** | I can explain why the production of carbon dioxide and water, in combustion, indicates the presence of carbon and hydrogen in the original hydrocarbon fuel |  |  |  |
| **N5** | I can state that the alkanes and the cycloalkanes are saturated hydrocarbons and saturated hydrocarbons contain only carbon to carbon single covalent bonds. |  |  |  |
| **N5** | I can state that the alkenes are described as unsaturated hydrocarbons and unsaturated hydrocarbons contain at least one carbon to carbon double covalent bond. |  |  |  |
| **N5** | I can describe the Bromine test which is the chemical test for unsaturation. |  |  |  |
| **N5** | I can state that the reactions of an alkene with halogens (such as bromine), hydrogen, hydrogen halides and water are addition reactions. |  |  |  |
| **N5** | I can write the balanced equations and draw the structures of reactants and products for all addition reactions of alkenes with halogens (such as bromine), hydrogen, hydrogen halides and water. |  |  |  |
| **N5** | I can state that the cycloalkane family is a homologous series of hydrocarbons and can identify them from the name and the general formula  Cn H2n. |  |  |  |
| **N5** | I can name cycloalkanes, with no more than eight carbon atoms in their longest chain, from their full structural formulae, shortened structural formulae and molecular formulae. |  |  |  |
| **N5** | I can draw structural formulae, in shortened or full formula, and write molecular formulae from systematic names for cycloalkanes, branched chain alkanes and branched chain alkenes containing up to eight carbons in their longest chain. |  |  |  |
| **N5** | I can write systematic names, including the position of any double bond, from the structural formulae, in shortened or full formula, for cycloalkanes, branched chain alkanes and branched chain alkenes containing up to eight carbons in their longest chain. |  |  |  |
| **N5** | I can state that an example for the use of a branched alkane is fuels and an example for the use of branched alkenes is making plastics |  |  |  |
| **N5** | I can state that isomers are molecules that have the same molecular formula but a different structural formula. |  |  |  |
| **N5** | I can identify isomers including alkanes, alkenes, cycloalkanes, branched alkanes and branched alkenes. |  |  |  |
| **N5** | I can state that isomers have different physical properties including melting point and boiling point. |  |  |  |

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| **Unit 2: Natures Chemistry**  **Key Area: Everyday consumer products** |

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| **LEVEL**  **N4 /N5** | After completing this topic: | How well I have understood (✓) | | |
| ☺ | 😐 | ☹ |
| **N4** | I can state that plants are a source of carbohydrates and oils which can be used for food or fuel. |  |  |  |
| **N4** | I can state that carbohydrates are compounds which contain carbon, hydrogen and oxygen with the hydrogen and oxygen in the ratio of **2:1.** |  |  |  |
| **N4** | I can state that glucose is a simple carbohydrate with the molecular formula C6H12O6. |  |  |  |
| **N4** | I can describe how starch is a complex carbohydrate formed by joining many glucose molecules. |  |  |  |
| **N4** | I can carry out and describe the chemical tests to distinguish between glucose and starch using Benedict’s solution and iodine respectively. |  |  |  |
| **N4** | I can state that starch is broken down into glucose in the body, during digestion. |  |  |  |
| **N4** | I can explain that glucose, due to its small molecular size, can pass through the gut wall into the bloodstream to be used in cells, throughout the body, during respiration. |  |  |  |
| **N4** | I can state that enzymes present in yeast can convert glucose into ethanol. This process is called fermentation. |  |  |  |
| **N4** | I can state that different plants are used to produce different alcoholic beverages. |  |  |  |
| **N4** | I can explain that enzymes operate under optimum conditions of temperature and pH and that as the fermentation process continues the increasing concentration of ethanol produced causes the enzyme to stop working. This limits the ethanol concentration achievable by fermentation. |  |  |  |
| **N4** | I can state that to achieve higher concentrations of ethanol for production of spirits, distillation must be carried out. |  |  |  |
| **N4** | I can state that many plants are used by chemist in the design and manufacture of many everyday products such as pharmaceuticals soaps, cosmetics, dyes, medicines, foods or food colourings. |  |  |  |
| **N5** | I can identify alcohols from the Hydroxyl functional group, (–OH functional group) and the ‘-ol’ ending. |  |  |  |
| **N5** | I can name straight chain alcohols from the structure formulae. |  |  |  |

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| **Unit 2: Natures Chemistry**  **Key Area: Everyday consumer products** |

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| **LEVEL**  **N4/ N5** | After completing this topic, you should be able to: | How well I have understood (✓) | | |
| ☺ | 😐 | ☹ |
| **N5** | Given the names of straight-chain alcohols I can write structural, molecular and general formula. |  |  |  |
| **N5** | I can state that alcohols are effective solvents, highly flammable, and burn with very clean flames resulting in their use as a fuel. |  |  |  |
| **N5** | I can state the physical properties of alcohols including melting point, boiling point and solubility in water. |  |  |  |
| **N5** | I can explain these physical properties in terms of the intermolecular forces of attraction. |  |  |  |
| **N5** | I can identify carboxylic acids by the carboxyl functional group -COOH and the ‘-oic’ name ending. |  |  |  |
| **N5** | I can identify straight-chained carboxylic acids and name them from the structural formulae. |  |  |  |
| **N5** | Given the names of straight-chain carboxylic acids I can write structural, molecular and general formula. |  |  |  |
| **N5** | I can state that vinegar is a dilute solution of ethanoic acid |  |  |  |
| **N5** | I can state that vinegar is used in household cleaning products designed to remove limescale (a build-up of insoluble carbonates on plumbing fixtures) and as a preservative in the food industry. |  |  |  |
| **N5** | I can state the physical properties of carboxylic acids including melting point, boiling point and solubility in water. |  |  |  |
| **N5** | I can state the chemical properties of carboxylic acids to include:  pH, reactions with metals, metal oxides, metal hydroxides and metal carbonates. |  |  |  |
| **N5** | For straight chain alcohols and carboxylic acids (C1–C8) give the general formulae, systematic name and draw structural formulae (shortened or full). |  |  |  |

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| **Unit 2: Natures Chemistry**  **Key Area: Energy from fuels** |
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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 a fuel is any compound that has stored chemical energy. |  |  |  |
| **N4/N5** | I can state that combustion is the reaction of burning a fuel in oxygen to release energy.  I can state that combustion is a common example of oxidation. |  |  |  |
| **N4** | I can state that fossil fuels are a finite resource. |  |  |  |
| **N4** | I can state that crude oil is a mixture of hydrocarbons. |  |  |  |
| **N4/N5** | I can state that when a hydrocarbon burns in a plentiful supply of oxygen it will produce carbon dioxide and water. |  |  |  |
| **N4** | I can state that carbon monoxide which is a poisonous gas and carbon (soot) are produced when hydrocarbons burn in a limited supply of oxygen. |  |  |  |
| **N4/N5** | I can understand the concept of conservation of mass through equations relating to combustion of hydrocarbons. |  |  |  |
| **N4/N5** | I can state that exothermic chemical reactions produce energy |  |  |  |
| **N4/N5** | I can state that endothermic chemical reactions take in energy. |  |  |  |
| **N5** | I can state that alkanes and alcohols can be used as fuels. |  |  |  |
| **N4/N5** | I can state that combustion reactions are exothermic reactions. |  |  |  |
| **N5** | I can represent the combustion of a substance as a balanced formulae equation. |  |  |  |
| **N5** | I can calculate the quantities of reactants and products in combustion reactions. |  |  |  |
| **N5** | I can measure and calculate the different quantities of energy provided by different fuels using Eh = cmΔT. (There is no requirement to calculate enthalpy per mole.) |  |  |  |
| **N5** | I need to be aware of the appropriate units for the individual parts of the Eh = cmΔT equation. |  |  |  |
| **N5** | I can use Eh = cmΔT to determine the specific heat capacity of substances other than water. |  |  |  |