**Little Heath Sixth Form**

**(Chemistry)** Personal Learning Checklist

**Student Name: ……………………….…………………………………..………**

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| **Unit Name:**  **Chemistry for Life** | **Unit Code:**  **F331** |
| *Minimum Target Grade:* | *Aspirational Target Grade:* |

*KEY:* ***Red =*** *with difficulty* ***Amber*** *= not sure* ***Green*** *= yes*

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| **GCSE Re-Cap** |  | **Red** | **Amber** | **Green** |
| ***C1 – Air Quality*** | * Combustion of fuels * Pollutants |  |  |  |
| ***C2 – Materials Properites*** | * Fractional Distillation of Crude Oil * Intermolecular forces |  |  |  |
| ***C4 – Chemical Patterns*** | * Structure of an atom * Formation of ions and ionic bonding * Balancing Equations * Periodicity (patterns in the periodic table) |  |  |  |
| ***C5 – Chemistry of the Natural Environment*** | * Calculate Mr * Covalent bonding (molecular and network) * Metallic bonding |  |  |  |
| ***C6 – Chemical Synthesis*** | * Energy in reactions (exothermic/endothermic) * Catalysts * Atom economy and percent yield |  |  |  |
| ***C7 – Chemistry for a Sustainable Future*** | * Organic Chemistry (alkanes, alcohols, carboxylic acids, esters) * Bond making/bond breaking calculations |  |  |  |

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| **Elements of Life** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| 1. Explain and use the terms: atomic number, mass number, isotope, Avogadro constant, relative isotopic mass, relative atomic mass, relative formula mass, relative molecular mass. |  |  |  |  |
| 1. Use the concept of amount of substance to perform calculations involving: masses of substances, empirical and molecular formulae, percentage composition. |  |  |  |  |
| 1. Write and interpret balanced chemical equations including state symbols. |  |  |  |  |
| 1. Describe protons, neutrons and electrons in terms of their mass and relative charge. |  |  |  |  |
| 1. Describe the structure of atoms in terms of protons, neutrons and electrons. |  |  |  |  |
| 1. Explain the occurrence of absorption and emission atomic spectra in terms of changes in electronic energy levels. |  |  |  |  |
| 1. Compare and contrast the similarities and differences of atomic spectra. |  |  |  |  |
| 1. Describe the electron structure of atoms in terms of the main energy levels (electron shells), up to Z = 36. |  |  |  |  |
| 1. Recall that the nuclei of some atoms are unstable, and that these atoms are radioactive. |  |  |  |  |
| 1. Recall the different properties of alpha, beta and gamma radiations. |  |  |  |  |
| 1. Recall that the term half-life refers to the time taken for half the radioactive nuclei in a sample to decay and that the half-life is fixed for any given isotope. |  |  |  |  |
| 1. Carry out half life calculations. |  |  |  |  |
| 1. Use nuclear symbols to write equations for nuclear processes, both fusion and radioactive decay. |  |  |  |  |
| 1. Recall that, in fusion reactions, lighter atoms join to give heavier atoms (at high temperature and pressure) and that this is how elements are formed. |  |  |  |  |
| 1. Understand how radioactive isotopes can be used as tracers and explain optimum half-life of the tracers. |  |  |  |  |
| 1. Understand the use of radioisotopes in the dating of archaeological and geological material. |  |  |  |  |
| 1. Understand that knowledge of the structure of an atom developed in terms of a succession of gradually more sophisticated models. |  |  |  |  |
| 1. Draw and interpret simple electron ‘dot-cross’ diagrams to show how atoms bond through ionic, covalent and dative covalent bonds (be aware of limitations). |  |  |  |  |
| 1. Describe a simple model of metallic bonding (be aware of limitations). |  |  |  |  |
| 1. Recall the typical physical properties (m.p.t., solubility in H2O & ability to conduct electricity) characteristic of giant lattice (metallic, ionic and covalent network) and simple molecular structure types. |  |  |  |  |
| 1. Use the electron pair repulsion principle to predict the shapes of simple molecules (such as CH4, NH3, H2O and SF6) and ions (such as NH4+) with up to six outer pairs of electrons (any combination of bonding pairs and lone pairs). |  |  |  |  |
| 1. Describe the elementary principles underlying the operation of a time of flight mass spectrometer. |  |  |  |  |
| 1. Use data from a mass spectrometer to determine relative atomic mass and the relative abundance of isotopes. |  |  |  |  |
| 1. Recall that the Periodic Table lists elements in order of atomic (proton) number and groups elements together according to their common properties. |  |  |  |  |
| 1. Understand the way that ideas behind the Periodic Table developed historically. |  |  |  |  |
| 1. Relate the position of an element in the Periodic Table to its electron structure (in terms of electron shells) and vice versa. |  |  |  |  |
| 1. Describe periodic trend in m.p.t and b.p.t. |  |  |  |  |
| 1. Use given data to describe trends in a group of the Periodic Table and to make predictions concerning the properties of an element in the group. |  |  |  |  |
| 1. Describe and compare the following properties of the elements Mg, Ca, Sr, Ba in Group 2:    1. Reactions of the elements with water,    2. Acid-base character of the oxides and hydroxides,    3. Thermal stability of the carbonates,    4. Solubilities of hydroxides and carbonates; |  |  |  |  |

**Grade tracking:**

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| *Grade* | *Data* | *Grade* | *Date* | *Grade* | *Date* | *Grade* | *Date* | *Grade* | *Date* | *Grade* | *Date* |
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*Note: You should discuss this checklist regularly with your subject teacher/mentor*

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| **Developing Fuels** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| 1. Use the concept of amount of substance to perform calculations involving: Volumes of gases, Balanced chemical equations, Enthalpy changes. |  |  |  |  |
| 1. Explain and use the terms: exothermic, endothermic, standard state, enthalpy change of combustion, enthalpy change of reaction, enthalpy change of formation. |  |  |  |  |
| 1. Describe and design simple experiments to measure the energy transferred when reactions occur or flammable liquids burn. |  |  |  |  |
| 1. Explain the limitations of these practical procedures and the uncertainties of the measurements involved. |  |  |  |  |
| 1. Calculate enthalpy changes from experimental results (ΔH=cmT). |  |  |  |  |
| 1. Use Hess’s law and enthalpy cycles to calculate enthalpy changes. |  |  |  |  |
| 1. Recall that bond-breaking is an endothermic process and bond-making is exothermic. |  |  |  |  |
| 1. Explain and use the term bond enthalpy. |  |  |  |  |
| 1. Relate bond enthalpy to the length and strength of a bond. |  |  |  |  |
| 1. Use the term entropy in a qualitative manner, interpreting it as a measure of the number of ways that molecules can be arranged. |  |  |  |  |
| 1. Describe the differences in magnitude of the entropy of a solid, a liquid, a solution and a gas. |  |  |  |  |
| 1. Explain and use the terms catalysis, catalyst, catalyst poison, heterogeneous. |  |  |  |  |
| 1. Describe a simple model to explain the function of a heterogeneous catalyst. |  |  |  |  |
| 1. Describe the use of catalysts (including zeolites) in isomerism, reforming and cracking processes and in the control of exhaust emissions. |  |  |  |  |
| 1. Describe and explain the origin of atmospheric pollutants including those from car exhausts and other sources; particulates, unburned hydrocarbons, CO, CO2, NOx, SOx. |  |  |  |  |
| 1. Describe the environmental implications of these pollutants and discuss methods of reducing these pollutants and the decisions society has to make in using such methods. |  |  |  |  |
| 1. Recall that crude oil consists of a mixture of compounds, mainly hydrocarbons that can be separated by fractional distillation. |  |  |  |  |
| 1. Recognise members of the following homologous series: alkanes, cycloalkanes, alkenes, arenes, alcohols and ethers. |  |  |  |  |
| 1. Explain and use the terms: aliphatic, aromatic, saturated and unsaturated. |  |  |  |  |
| 1. Use systematic nomenclature to name alkanes and alcohols. |  |  |  |  |
| 1. Describe and write balanced equation for the combustion (oxidation) of alkanes and alcohols. |  |  |  |  |
| 1. Draw and interpret structural formulae (full, shortened & skeletal). |  |  |  |  |
| 1. Use the concept of areas of electron density to deduce bond angles in organic molecules. |  |  |  |  |
| 1. Relate molecular shape to structural formulae and use wedges and dotted lines to represent 3D shape. |  |  |  |  |
| 1. Explain and use the term isomerism. |  |  |  |  |
| 1. Recognise and draw structural isomers. |  |  |  |  |
| 1. Explain what is meant by the octane number of a petrol and describe how it may be increased. |  |  |  |  |
| 1. Describe the effect of chain length and chain branching on the tendency of petrol towards auto-ignition which causes ‘knocking’ in a car engine. |  |  |  |  |
| 1. Describe what happens in isomerism, reforming and cracking reactions of hydrocarbons; explain how these processes improve the performance of hydrocarbons as fuels. |  |  |  |  |
| 1. Understand the work of chemists in improving fuels and in searching for and developing fuels for the future: use of oxygenates and hydrogen economy. |  |  |  |  |
| 1. Understand the benefits and risks associated with using fossil fuels and alternative fuels (biofuels, hydrogen, nuclear) and discuss the choices involved in making decisions about ensuring a sustainable energy supply. |  |  |  |  |

**Grade tracking:**

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