Topic 3 – Structure, Bonding and the Periodic Table (both Papers unless stated)

* I can describe ionic bonding involves electrostatic attraction between oppositely charged ions in a lattice
* I can recall the formulas of the compound ions sulfate, hydroxide, nitrate, carbonate and ammonium
* I can predict the charge on a simple ion using the position of the element in the Periodic Table
* I can construct formulas for ionic compounds
* I can describe the structure of sodium chloride as an example of an ionic structure
* I can describe metallic bonding as the attraction between delocalized electrons and positive ions arranged in a lattice
* I can describe the structure of sodium chloride as an example of an ionic structure
* I can describe the structure of magnesium as an example of a metallic structure
* I can relate the melting point and conductivity of materials to the type of structure and the bonding present
* I can explain the energy changes associated with changes of state
* I can draw diagrams to represent these structures involving specified numbers of particles
* I can describe a single covalent bond contains a shared pair of electrons, and multiple bonds as containing multiple pairs of electrons
* I can describe a co-ordinate (dative covalent) bond as a shared pair of electrons with both electrons supplied by one atom
* I can represent a covalent bond using a line and a co-ordinate bond using an arrow
* I can describe bonding pairs and lone (non-bonding) pairs of electrons as charge clouds that repel each other
* I can state that pairs of electrons in the outer shell of atoms arrange themselves as far apart as possible to minimise repulsion, that lone pair–lone pair repulsion is greater than lone pair–bond pair repulsion, which is greater than bond pair–bond pair repulsion
* I can state the effect of electron pair repulsion on bond angles
* I can explain the shapes of, and bond angles in, simple molecules and ions with up to six electron pairs (including lone pairs of electrons) surrounding the central atom
* I can describe electronegativity as the power of an atom to attract the pair of electrons in a covalent bond
* I can explain that the electron distribution in a covalent bond between elements with different electronegativities will be unsymmetrical, and that this produces a polar covalent bond, which may cause a molecule to have a permanent dipole
* I can use partial charges to show that a bond is polar
* I can explain why some molecules with polar bonds do not have a permanent dipole
* I can describe permanent dipole–dipole forces, induced dipole–dipole (van der Waals, dispersion, London) forces and hydrogen bonding as forces between molecules
* I can explain how the melting and boiling points of molecular substances are influenced by the strength of these intermolecular forces
* I can explain the importance of hydrogen bonding in the low density of ice and the anomalous boiling points of compounds
* I can explain the existence of these forces between familiar and unfamiliar molecules
* I can explain how melting and boiling points are influenced by these intermolecular forces
* I can describe macromolecular (giant covalent) structures using diamond and graphite as examples
* I can describe molecular structures using ice and iodine as examples
* I can relate the melting point and conductivity of materials to the type of structure and the bonding present
* I can describe the trends in melting point of the elements Na–Ar, and explain the melting point of the elements in terms of their structure and bonding (paper 1 only)