Sale High School

Year 9 Autumn Term 1

Department: Science Unit of Work: Chemistry – The Atom and the periodic table. (Key Concepts)

Projection Grades (end of year 11) 1-3	Projection Grades (end of year 11) 4-6	Projection Grades (end of year 11) 7-9
❑ Describe the structure of an atom as a nucleus containing protons and neutrons, surrounded by electrons in shells ❑ Recall the relative charge and relative mass of: a a proton b a neutron c an electron ❑ Recall that most of the mass of an atom is concentrated in the nucleus ❑ Recall the meaning of the term mass number of an atom ❑ Calculate the numbers of protons, neutrons and electrons in atoms given the atomic number and mass number ❑ Describe that in the periodic table elements are arranged in order of increasing atomic number, in rows called periods and elements with similar properties are placed in the same vertical columns called groups ❑ Recall that metals are found on the left hand side of the periodic table. ❑ Identify elements as metals or non-metals according to their position in the periodic table. ❑ Recall that isotopes are atoms of the same element containing the same number of protons but different umbers of neutrons in their nuclei	❑ Describe how the Dalton model of an atom has changed over time because of the discovery of subatomic particles ❑ Describe the nucleus of an atom as very small compared to the overall size of the atom ❑ Describe isotopes as different atoms of the same element ❑ containing the same number of protons but different umbers of neutrons in their nuclei ❑ Calculate the relative atomic mass of an element from the relative masses and abundances of its isotopes ❑ Describe how Mendeleev arranged the elements, known at that time, in a periodic table by using properties of these elements and their compounds and used his table to predict the existence and properties of some elements not then discovered ❑ Predict the electronic configurations of the first 20 elements in the periodic table as diagrams and in the form, for example 2.8. 1. ❑	❑ Explain why atoms contain equal numbers of protons and electrons ❑ Explain how the existence of isotopes results in relative atomic masses of some elements not being whole numbers ❑ Explain that Mendeleev thought he had arranged elements in order of increasing relative atomic mass but this was not always true because of the relative abundance of isotopes of some pairs of elements in the periodic table ❑ Explain the meaning of atomic number of an element in terms of position in the periodic table and number of protons in the nucleus ❑ Explain how the electronic configuration of an element is related to its position in the periodic table

Year 9 Autumn Term 1

Department: Science Unit of Work: Chemistry – States of matter and mixtures

Projection Grades (end of year 11) 1-3	Projection Grades (end of year 11) 4-6	Projection Grades (end of year 11) 7-9
❑ Describe the arrangement, movement and the relative energy of particles in each of th three states of matter: solid, liquid and gas ❑ Recall the names used for the interconversions between the three states of matter (recognising these are physical changes) ❑ Recall the names and be able to label the equipment of the following separating techniques: a simple distillation, b fractiona distillation, c filtration, d crystallisation, e paper chromatography ❑ Recall that paper chromatography is the separation of mixtures of soluble substanc by running a solvent through the mixture on the paper. ❑ State a line is drawn in pencil because per is insoluble. ❑ Recall the formulae for calculating an Rf value. ❑ Recall what the word potable means ❑ Recall that waste and ground water can be made potable by the process of sedimentation, filtration and chlorination. ❑ Recall that sea water can be made potable by using distillation	❑ Explain the changes in arrangement, movement and energy of particles during these interconversions ❑ Predict the physical state of a substance under specified conditions, given suitable data ❑ Interpret melting point data to distinguish between pure substances which have a sharp melting point and mixtu which melt over a range of temperatures Describe the experimental techniques for separation of mixtures by: a simple distillation b fractional distillation c filtration d crystallisation e paper chromatography ❑ Describe paper chromatography as the separation of mixtures of soluble substances by running a solvent (mobile phase) through the mixture on the paper (the paper contains the stationary phase), which causes the substances to move at different rates over the paper ❑ Interpret a paper chromatogram a to distinguish between pure and impure substances b to identify substances by comparison with known substances c to identify substances by calculation and use of Rf val ❑ Describe how waste and ground water can be made potable, including describing the processes of sedimentation, filtration and chlorination ❑ Describe how sea water can be made potable by using distillation	❑ Explain the difference between the use of 'pure' in chemistry compared with its everyday use and the differences in chemistry between a pure substance and a mixture ❑ Explain the experimental techniques for separatio of mixtures by: a simple distillation b fractional distillation c filtration d crystallisation e paper chromatography ❑ Describe an appropriate experimental technique t separate a mixture, knowing the properties of the components of the mixture ❑ Explain why water used in analysis must not contai any dissolved salts

Sale High School

Year 9 Autumn Term 1

Department: Science Unit of Work: Chemistry – Bonding (Key Concepts)

Projection Grades (end of year 11) 1-3	Projection Grades (end of year 11) 4-6	Projection Grades (end of year 11) 7-9
❑ Recall that ionic bonds are formed through the transfer of electrons. ❑ Recall that an ion is an atom or group of atoms with a positive or negative charge ❑ Recall how a covalent bond is formed when a pair of electrons is shared between two atoms ❑ Recall that covalent bonding results in the formation of molecules ❑ Recall the typical size (order of magnitude) of atoms and small Molecules ❑ Describe the properties of ionic compounds limited to: a high melting points and boiling points, in terms of forces between ions b whether or not they conduct electricity as solids, when molten and in aqueous solution ❑ Explain the properties of typical covalent, simple molecular compounds limited to: a low melting points and boiling points, in terms of forces between molecules (intermolecular forces) b poor conduction of electricity ❑ Recall that graphite and diamond are different forms of carbon and that they are examples of giant covalent substances ❑ Recall what an allotrope is.	❑ Explain how ionic bonds are formed by the transfer of electrons between atoms to produce cations and anions, including the use of dot and cross diagrams ❑ Calculate the numbers of protons, neutrons and electrons in simple ions given the atomic number and mass number ❑ Explain the use of the endings –ide and –ate in the names of Compounds ❑ Deduce the formulae of ionic compounds (including oxides, hydroxides, halides, nitrates, carbonates and sulfates) given the formulae of the constituent ions ❑ Explain the structure of an ionic compound as a lattice structure a consisting of a regular arrangement of ions b held together by strong electrostatic forces (ionic bonds)between oppositely-charged ions ❑ Explain the formation of simple molecular, covalent substances, using dot and cross diagrams, including: a hydrogen b hydrogen chloride c water d methane e oxygen f carbon dioxide ❑ Describe the structures of graphite and diamond ❑ Describe the properties of metals, including malleability and the ability to conduct electricity	❑ Explain the formation of ions in ionic compounds from their atoms, limited to compounds of elements in groups 1, 2, 6 and 7 ❑ Explain why elements and compounds can be classified as: a ionic b simple molecular (covalent) c giant covalent d metallic and how the structure and bonding of these types of substances results in different physical properties, including relative melting point and boiling point, relative solubility in water and ability to conduct electricity (as solids and in solution) ❑ Explain, in terms of structure and bonding, why graphite is used to make electrodes and as a lubricant, whereas diamond is used in cutting tools ❑ Explain the properties of fullerenes including C60 and graphene in terms of their structures and bonding