GCSE

Rewarding Learning

CCEA GCSE

Double Award Science Chemistry

Glossary of Terms

For first teaching from September 2017

GLOSSARY OF TERMS

DOUBLE AWARD SCIENCE: CHEMISTRY

This glossary is not exhaustive. Where a definition which is given here differs from that given in the specification, either definition will be accepted.

Unit C1

- The **atomic number** is the number of protons in (the nucleus of) an atom.
- The **mass number** is the total number of protons and neutrons in (the nucleus of) an atom.
- **Isotopes** are atoms of an element with the same atomic number but a different mass number, indicating a different number of neutrons. OR
  Isotopes are atoms of an element which have the same number of protons but have a different number of neutrons. *Either definition can be used.*
- A **cation** is a positive ion.
- An **anion** is a negative ion.
- An **element** is a substance that consists of only one type of atom and it cannot be broken down into simpler substances by chemical means.
- An **atom** is the simplest particle of an element that can exist on its own in a stable environment.
- A **molecule** is (a particle that consists of) two or more atoms chemically bonded (together).
- **Diatomic** means that there are two atoms covalently bonded in a molecule.
- A **compound** is (a substance formed when) two or more elements (are) chemically combined.
- **Ionic bonding** is the attraction between oppositely charged ions.
- A **single covalent bond** is (formed by) a shared pair of electrons.
- **Metallic bonding** results from the attraction between the positive ions in a regular lattice and the delocalised electrons.
- **Malleable** means can be hammered into shape.
- **Ductile** means can be drawn out into wires.
- In **molecular covalent structures** the intermolecular forces between covalent molecules are weak forces (of attraction) known as **van der Waals forces**.
- An **alloy** is a mixture of two or more elements, at least one of which is a metal, and the resulting mixture has metallic properties.
- **Allotropes** are different forms of the same element in the same physical state.
- **Graphene** is an allotrope of carbon whose structure is a single atom thick layer of graphite.
- A **nanometre** is 10^{-9} m.
- A **nanoparticle** is a structure that is 1 – 100 nm in size and contains a few hundred atoms.
- A **period** is a horizontal row in the Periodic Table.
- A **group** is a vertical column in the Periodic Table.
- The **relative atomic mass (A_r)** is the mass of the atom compared with that of the carbon-12 isotope which has a mass of exactly 12.
- One **mole** of a substance in grams is numerically equal to the **relative formula mass (M_r)**.
- **Percentage yield** = $\frac{\text{actual yield}}{\text{theoretical yield}} \times 100$
- An **indicator** is a chemical that gives a **colour change** in acidic, alkaline and neutral solutions.
- A **base** is a substance that reacts with an acid producing a salt and water.
- An **alkali** is a soluble base.
- A **strong acid** completely ionises in water.
- A **weak acid** partially ionises in water.

- A **strong alkali** completely ionises in water.
- A **weak alkali** partially ionises in water.
- The **concentration** of a solution is measured in moles per cubic decimetre, mol/dm^3 i.e. it is the amount of a substance in moles in a given volume (1dm^3) of solution.
- **Neutralisation** is the reaction between the hydrogen ions in an acid and the hydroxide ions in an alkali to produce water.
- A **salt** is a compound formed when some or all of the hydrogen ions in an acid are replaced by metal ions or ammonium ions.
- A **pure substance** is a single element or compound not mixed with any other substance.
- A **mixture** is defined as two or more substances mixed* together, which are usually easy to separate.**NB not "joined", "bonded" or equivalent – these words would negate the definition*
- The **melting point** (or melting temperature) is the temperature at which a solid changes into a liquid.
- The **boiling point** (or boiling temperature) is the temperature at which a liquid changes into a gas.
- A **formulation** is a mixture which has been designed as a useful product and is formed by mixing together several different substances in carefully measured quantitites to ensure the product has the required properties.
- Water is the most common solvent. *For the purposes of GCSE DAS water is named in the relevant points of the definitions below.*
- A **soluble** substance is one which dissolves in water.
- An **insoluble** substance is one which does not dissolve in water.
- A **solute** is a (soluble) substance which dissolves in water.
- A **solvent** is the liquid in which a solute dissolves.
- A **solution** is formed when a solute dissolves in a solvent.
- The **residue** is the solid which remains on the filter paper.
- The **filtrate** is the solution which passes through the filter paper.
- A **distillate** is the liquid which is collected by condensation of a vapour during the distillation process.
- **Miscible** liquids mix.
- **Immiscible** liquids do not mix.
- **Evaporation** occurs when a liquid changes to a gas below the boiling point.
- **Condensation** occurs when a gas changes to a liquid.
- $\mathbf{R_f} = \frac{\text{distance moved by spot}}{\text{distance moved by solvent}}$

  ***$\mathbf{R_f}$** means the retardation factor (the definition will not be asked) and the distance moved should be measured to the centre of the spot.
- **Anhydrous copper(ll) sulfate** is a white solid which does not contain any water of crystallisation

Unit C2

- A **displacement reaction** is a reaction in which a more reactive element takes the place of a less reactive element in a compound.
- A **redox reaction** is one in which oxidation and reduction occur at the same time.
- **Oxidation** is gain of oxygen, loss of hydrogen or loss of electrons
- **Reduction** is loss of oxygen, gain of hydrogen or gain of electrons.
- **Rust** is hydrated iron(III) oxide
- The **activation energy** is the minimum energy needed/required for a reaction to occur.
- A **catalyst** is a substance that increases the rate of a chemical reaction without being used up.
- **A catalyst** acts by providing an alternative reaction pathway of lower activation energy
- A **reversible reaction** is a reaction where reactants can change into products and the products can change back into the reactants.
- An equilibrium is described as **dynamic equilibrium** when the rate of the forward reaction is equal to the rate of the reverse reaction resulting in the amounts of reactants and products remaining constant.
- An equilibrium reaction is considered to be a **closed system** where only the reactants and products are present.
- A **homologous series** is a family of organic compounds which:
    - Have the same general formula
    - show similar chemical properties
    - show a gradation in their physical properties

  and in which
    - successive members differ by a CH_2 unit
- A **hydrocarbon** is a compound / molecule which consists of (OR contains only) carbon and hydrogen (atoms).
- **Cracking** involves the breakdown of larger/longer saturated hydrocarbon molecules (alkanes) into smaller/shorter ones which are more useful, some of which are unsaturated (alkenes).
- A **functional group** is a reactive group in a molecule.
- The **empirical formula** is the simplest whole number ratio of the atoms of each element in a compound.
- A **general formula** is a type of empirical formula that represents the composition of any member of a particular homogous series. e.g. C_nH_{2n+2} – alkanes; C_nH_{2n} – alkenes; $C_nH_{2n+1}OH$ – alcohols
- A **molecular formula** is the actual number of atoms of each element in a molecule. e.g. C_2H_6 – ethane; C_2H_4 – ethene; C_2H_5OH or C_2H_6O – ethanol.
- The **empirical formula** of a compound is the simplest whole number ratio of each type of atom in a compound. It can be the same as the compound's **molecular formula** - but not always. (e.g. propene has a molecular formula of C_3H_6 and an empirical formula of CH_2; propane has a molecular formula of C_3H_8 and its empirical formula is also C_3H_8)
- A **structural formula** shows the arrangement of the atoms in a molecule and uses lines to show the covalent bonds which join the atoms together.
- **Combustion** is the reaction in which a fuel reacts with oxygen producing oxides and releasing heat.
- **Complete combustion** of a hydrocarbon produces carbon dioxide and water.
- **Incomplete combustion** of a hydrocarbon produces carbon monoxide and water. Carbon (soot) may also be produced.
- A **saturated** compound contains no C=C bonds.
- An **unsaturated** compound contains at least one C=C bond.
- **Polymerisation** is the process of creating a very long chain molecule from small molecules.
- **Monomers** are compounds which can join together to form polymers.

- **Addition polymerisation** occurs when small molecules join together to form long chain molecules called polymers.
- **Water of crystallisation** is water that is chemically bonded into the crystal structure.
- **Hydrated** means that solid crystals contain water of crystallisation.
- **Dehydration** means removal of water of crystallisation.
- An **anhydrous** substance does not contain water of crystallisation.
- The **degree of hydration** is the number of moles of water of crystallisation chemically bonded in 1 mole of the compound.
- **Atom economy** = $\frac{\text{mass of desired product}}{\text{total mass of products}} \times 100$
- **Electrolysis** is the decomposition of a liquid electrolyte using a direct current of electricity.
- The **electrolyte** is the liquid or solution that conducts electricity and is decomposed by it.
- The negative electrode is called the **cathode**.
- The positive electrode is called the **anode**.
- **Inert electrodes** do not take part in the reactions.
- **Bauxite** is aluminium ore.
- An **exothermic** reaction gives out heat to the surroundings.
- An **endothermic** reaction takes in heat from the surroundings.
- **Bond breaking** takes in energy and is an endothermic process
- **Bond making** releases energy and is an exothermic process.
- **In an exothermic reaction** the energy released on making the bonds in named products is greater than the energy needed to break the bonds in named reactants.
- **In an endothermic reaction** the energy released on making the bonds in named products is less than the energy needed to break the bonds in named reactants.
- A **clean fuel** is one which produces non-polluting products only (such as water) when it is burned/undergoes combustion.