**Reading Girls’ School**



Quality of Education – Curriculum INTENT

Subject Curriculum Road Map – Chemistry

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Chemistry | Term 1 | Term 2 | Term 3 | Term 4 | Term 5 | Term 6 |
| Year 7  | Mixtures and Solutions | Mixtures and Solutions | Particles | Elements, Atoms and Compounds | Acids and Alkalis | Acids and Alkalis |
| **National curriculum link** | **Pure and impure substances  the concept of a pure substance  mixtures, including dissolving  diffusion in terms of the particle model****simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography  the identification of pure substances.** | **The particulate nature of matter  the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure  changes of state in terms of the particle model.** | **Atoms, elements and compounds  a simple (Dalton) atomic model  differences between atoms, elements and compounds  chemical symbols and formulae for elements and compounds  conservation of mass changes of state and chemical reactions.** | **Chemical reactions  chemical reactions as the rearrangement of atoms  representing chemical reactions using formulae and using equations  combustion, thermal decomposition, oxidation and displacement reactions  defining acids and alkalis in terms of neutralisation reactions  the pH scale for measuring acidity/alkalinity; and indicators  reactions of acids with metals to produce a salt plus hydrogen  reactions of acids with alkalis to produce a salt plus water  what catalysts do.** |
| Year 8  | Reactants and Products | Periodic Table | Periodic Table | Acid reactions | Acid reactions | Earth Systems |
| **National curriculum link** | **Energetics  energy changes on changes of state (qualitative)  exothermic and endothermic chemical reactions (qualitative).****Word equations.****Burning fuels, thermal decomposition, conservation of mass.** | **The Periodic Table  the varying physical and chemical properties of different elements  the principles underpinning the Mendeleev Periodic Table  the Periodic Table: periods and groups; metals and non-metals  how patterns in reactions can be predicted with reference to the Periodic Table  the properties of metals and non-metals  the chemical properties of metal and non-metal oxides with respect to acidity.** | **Materials  the order of metals and carbon in the reactivity series, metal extraction  the use of carbon in obtaining metals from metal oxides  properties of ceramics, polymers and composites (qualitative).****Reactions of metals, metal oxides, metal carbonates with acids.** | **Earth and atmosphere  the composition of the Earth  the structure of the Earth  the rock cycle and the formation of igneous, sedimentary and metamorphic rocks  Earth as a source of limited resources and the efficacy of recycling  the carbon cycle****the composition of the atmosphere  the production of carbon dioxide by human activity and the impact on climate.** |
| Year 9  | Atomic structure and the periodic table | Bonding, structure, and the properties | Bonding, structure, and the properties | Quantitative chemistry | Chemical changes | Energy changes |
| National curriculum link | Atomic structure and the Periodic Table  a simple model of the atom consisting of the nucleus and electrons, relative atomic mass, electronic charge and isotopes  the number of particles in a given mass of a substance  the modern Periodic Table, showing elements arranged in order of atomic number  position of elements in the Periodic Table in relation to their atomic structure and arrangement of outer electrons  properties and trends in properties of elements in the same group  characteristic properties of metals and non-metals  chemical reactivity of elements in relation to their position in the Periodic Table | Structure, bonding and the properties of matter  changes of state of matter in terms of particle kinetics, energy transfers and the relative strength of chemical bonds and intermolecular forces  types of chemical bonding: ionic, covalent, and metallic  bulk properties of materials related to bonding and intermolecular forces  bonding of carbon leading to the vast array of natural and synthetic organic compounds that occur due to the ability of carbon to form families of similar compounds, chains and rings  structures, bonding and properties of diamond, graphite, fullerenes and graphene. | Rate and extent of chemical change  factors that influence the rate of reaction: varying temperature or concentration, changing the surface area of a solid reactant or by adding a catalyst  factors affecting reversible reactions. | Chemical changes  determination of empirical formulae from the ratio of atoms of different kinds  balanced chemical equations, ionic equations and state symbols  identification of common gases  the chemistry of acids; reactions with some metals and carbonates  pH as a measure of hydrogen ion concentration and its numerical scale  electrolysis of molten ionic liquids and aqueous ionic solutions  reduction and oxidation in terms of loss or gain of oxygen. | Energy changes in chemistry  Measurement of energy changes in chemical reactions (qualitative)  Bond breaking, bond making, activation energy and reaction profiles (qualitative) |
| Year 10  | Chemical changes (cont. from year 9) | Energy Changes | Rate and extent of chemical change | Organic Chemistry | Polymers | Chemical Analysis | Chemistry of the Atmosphere |
| National curriculum link | Titration and making salts required practicals, Electrolysis. | Exothermic and endothermic reactions, temperature changes required practical, reaction profiles, cells, batteries and fuel cells | Calculating rates of reaction, factors which affect rates of reaction, collision theory and activation energy, catalysts.Reversible reactions and Le Chatelier’s Principle, energy changes in reversible reactions, equilibrium, the effect of changes in concentration, temperature and pressure upon equilibria (higher tier only). | Carbon compounds as fuels and feedstock, crude oil, hydrocarbons and alkanes, fractional distillation and petrochemicals, properties of hydrocarbons, cracking and alkenes, structures and reactions of alkenes and alcohols, carboxylic acids. | Synthetic and naturally occurring polymers: addition polymerisation, condensation polymerisation, amino acids (HT only), DNA and other naturally occurring polymers. | Chemical analysis  distinguishing between pure and impure substances  separation techniques for mixtures of substances: filtration, crystallisation, chromatography, simple and fractional distillation  quantitative interpretation of balanced equations  concentrations of solutions in relation to mass of solute and volume of solvent. | Earth and atmospheric science  evidence for composition and evolution of the Earth’s atmosphere since its formation  evidence, and uncertainties in evidence, for additional anthropogenic causes of climate change  potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth’s climate  common atmospheric pollutants: sulphur dioxide, oxides of nitrogen, particulates and their sources |
| Year 11 | Chemical Analysis | Chemistry of Atmosphere | Using Resources | Revision | Revision | Revision |
| **National curriculum link** | Chemical analysis  distinguishing between pure and impure substances  separation techniques for mixtures of substances: filtration, crystallisation, chromatography, simple and fractional distillation  quantitative interpretation of balanced equations  concentrations of solutions in relation to mass of solute and volume of solvent. | Earth and atmospheric science  evidence for composition and evolution of the Earth’s atmosphere since its formation  evidence, and uncertainties in evidence, for additional anthropogenic causes of climate change  potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth’s climate  common atmospheric pollutants: sulphur dioxide, oxides of nitrogen, particulates and their sources |  The Earth’s water resources and obtaining potable water, sewage treatment, distillation and reverse osmosis. Chemical and allied industries  life cycle assessment and recycling to assess environmental impacts associated with all the stages of a product's life  the viability of recycling of certain materials  carbon compounds, both as fuels and feedstock, and the competing demands for limited resources  fractional distillation of crude oil and cracking to make more useful materials  extraction and purification of metals related to the position of carbon in a reactivity series.Properties of thermosetting and thermosoftening polymers.Glass, ceramics, composites.Fertilisers and the Haber Process. |  |  |  |