



CHEMISTRY OVERVIEW YEAR 4

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| <p>1) Matter</p> <p>10 hours</p> | <p>Change</p> | <p>Models</p> | <p>Identities and relationships</p> | <p>When matter changes we observe similarities and differences that help us build models to explain underlying relationships.</p> | <p>A,B,C,D All strands</p> | <p>Communication skills Collaboration skills Organization skills Affective skill Critical-thinking skills Creative-thinking skills</p> | <p>Measurements skills Timeline of a brief history of ideas about exploring matter States and properties of matter Density= mass/volume Standard notation and SI Units Pure and impure substances The effects of impurities of the properties of pure substances (investigation) Physical and chemical changes</p> |
| <p>2) Pure substances and mixtures. Separation techniques</p> <p>10 hours</p> | <p>Change</p> | <p>Conditions</p> | <p>Personal and cultural expression</p> | <p>Changing conditions for matter has allowed us to make attractive products that express who we are and where we are from.</p> | <p>A,D all strands</p> | <p>Organization skills Affective skill Critical-thinking skills Creative-thinking skills Transfer skills:</p> | <p>Relationships between arrangements of matter Types of mixtures (solutions, oils, alloys, emulsions) -concept map Colloids- making cosmetic materials Molecular gastronomy Separation techniques: between solids, solids from liquids, between liquids. Calculation of Rf</p> |
| <p>3) Classification of elements- The periodic table</p> <p>10 hours</p> | <p>Systems</p> | <p>Patterns</p> | <p>Scientific and technical innovation</p> | <p>Scientific and technological innovation has allowed us to identify patterns in the properties of chemical elements and so build systems to classify them.</p> | <p>A: All strands</p> | <p>Communication skills Collaboration skills Organization skills Reflection skills Creative-thinking skills</p> | <p>Physical and chemical properties of metals: alkali metals, alkaline earth metals, rare earth metals and non-metals: halogens and noble gases Rare earth elements Atoms vs. ions Chemical elements: names and symbols Periodic table: arrangement of groups of elements Periodic trends within groups and periods</p> |



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| <p>4) Chemical Bonding</p> <p>10 hours</p> | <p>Relationships</p> | <p>Evidence</p> | <p>Identities and relationships</p> | <p>Chemical and physical properties provide evidence of the relationships both between and within atoms.</p> | <p>A,B,C,D All strands</p> | <p>Communication skills Collaboration skills Critical-thinking skills Organization skills Information literacy skills</p> | <p>Bonding relationships between groups of elements in the periodic table-periodic trends Metallic bonding Ionic bonding/solids Covalent molecular substances Polar molecules Inter- and intra-molecular forces and different types of chemical interactions between particles (molecules, ions or atoms) Covalent molecular network solids Names and chemical formulas (using IUPAC rules) of common chemical compounds (simple cases) The numbers of atoms of different elements represented in the symbolic representation of a chemical compound Valency and chemical symbols</p> <p>Extended: Relationships between specific macro properties in synthetic molecules and details of their molecular structure</p> |
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| <p>5) Chemical equations and our environment</p> <p>10 hours</p> | <p>Change</p> | <p>Interactions</p> | <p>Globalization and sustainability</p> | <p>The chemical industry has brought change that affects global interactions with positive and negative environmental impacts.</p> | <p>A,B,C,D All strands</p> | <p>Communication skills: Collaboration skills: Organization skills: Affective skills: Critical-thinking skills: Transfer skills:</p> | <p>Chemical environmental pollution Precipitates (ionic compounds with low solubility), as an example of a type of chemical reaction Balanced chemical equations ‘by inspection’ – balancing chemical equations and the law of conservation of mass The history of ideas about acids and bases. Indicators of acids and bases-The pH scale Concentration of an acid or a base and the pH Acid–base reactions Formation of salts, by reacting (a) acids and carbonates, (b) metal oxides and acids, and (c) metals with acids Corrosive effects of acids and bases Factors affecting the solubility of an ionic compound The pH of an oxide to extend understanding of periodic table trends Redox and non-redox reactions Formulate balanced chemical equations ‘algebraically’ for chemical equations in which simple compounds cannot be balanced ‘by inspection’ Formulate balanced equations to describe neutralization reactions Acid pollution caused by emissions (acid rain, ocean acidification and case studies associated with mining)</p> |
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CHEMISTRY OVERVIEW YEAR 5

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| <p>1) Chemical change- Kinetic theory- Quantitative Chemistry</p> <p>10 hours</p> | <p>Change</p> | <p>Movement Transfer</p> | <p>Orientation in time and space</p> | <p>Physical and chemical changes require the transfer of kinetic energy between particles of matter over time,</p> | <p>A,B,C,D All strands</p> | <p>Communication skills Organization skills Media literacy skills Critical-thinking skills Transfer skills</p> | <p>Particle phenomena- the movement of particles Particle/kinetic theory -Maxwell–Boltzmann distribution and state changes Brownian motion - Diffusion The effect of temperature on the rate of a reaction The effect of surface textures on the rate of a reaction The mole concept and complete chemical calculations involving molar quantities</p> |
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| | | | | affecting the space they occupy. | | | Quantitative chemistry- Electrolysis -Titration Equations for exothermic and endothermic reactions, including ΔH The contribution of enthalpy and entropy to the feasibility of a reaction |
| 2) Redox chemistry 10 hours | Relationships | Interaction Function | Identities and relationships | Protons define the identity of an element, but its relationship and interaction with other elements are a function of its outer electrons. | A,B,C,D All strands | Communication skills Reflection skills Transfer skills Collaboration skills: Organization skills Affective skills Information literacy skills Critical-thinking skills Creative-thinking skills | Colour (visible radiation) emitted from heated atoms Energy carried by photons (light waves) -links between chemistry and physics Electron configurations of atoms : Octet rule-valence electrons and periodic trends Electron shell notation Dot and cross diagrams - Lewis shell diagrams Single displacement reactions and voltaic cells Analyse electrochemicals in the voltaic cell and in redox reactions Reactivity series of metals The effect of a 'sacrificial metal' for protecting an element against corrosion Corrosion protection as a redox reaction Patinas on copper and copper alloys Factors that minimize the corrosion of iron Redox chemistry involving metal oxidation or reduction The extraction of copper metal from copper(II) oxide Processes used for the extraction of metals Extended: Calculate the energy of radiation emitted during flame tests Describe electrons in atoms in terms of s, p, d and f orbital notation |
| 3) Thermochemistry 10 hours | Change | Energy | Fairness and development | Global exploitation of energy resources relies on energy changes in chemical | A,B,C,D All strands | Communication skills Collaboration skills Organization skills Reflection skills Critical-thinking skills | Factor affecting the length of time for which a candle burns in a closed environment Patterns found in the flashpoints in the combustion of fuels Energy changes during combustion reactions |



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| | | | | reactions; global development depends on the fair and equitable exchange of those resources. | | Creative-thinking skills Transfer skills | Safety strategies for building fires Fuels fit for different purposes Chemical solutions to the 'fuel crisis' that use alternatives to fossil fuels- A fuel cell Changes during endothermic and exothermic reactions (energy level diagrams- calculations to quantify thermal energy produced or absorbed) Thermochemical equations. The relationship between the identity of a metal ion and the current generated in a Daniell cell Circuit including a 'fruit battery' Enthalpy changes (ΔH) using bond energy tables and experimental measurements Exothermic reactions vs. explosive exothermic reactions Factors that affect how hand-warmers work Extended: Evaluate Gibbs free energy and the feasibility of a reaction |
| 4) Chemical equilibrium 10 hours | Change | Balance | Orientation in space and time | Change in the balance called chemical equilibrium is affected by the collisions of particles in space and time. | A,B,C,D All strands | Communication skills Organization skills Reflection skills Information literacy skills Critical-thinking skills Transfer skills | Catalysts The role of enzymes as catalysts in biological contexts The role of a catalyst (manganese(IV) oxide) experimentally Factors that affects the efficiency of a catalyst Reaction rates-Factors affecting reaction rates- graphical representations of reaction kinetics-Reaction curves Dynamic equilibrium and reversible reactions The Haber process Le Chatelier's principle |
| 5) Organic chemistry 10 hours | Systems | Form Function | Scientific and technical innovation | The versatile bonding of carbon atoms has allowed humanity to invent systems of molecules of various forms to fulfil different functions. | A,D: All strands | Communication skills Organization skills Critical-thinking skills Creative-thinking skills Reflection skills Transfer skills | The meaning of the terms 'organic chemistry'/'inorganic chemistry'-Examples Organic compounds –hydrocarbons The structure of carbon Homologous series: <ul style="list-style-type: none"> • Alkanes • Alkenes • Alkynes • Alcohols • Carboxylic acids |

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| | | | | | | | | The IUPAC system for naming organic compounds, Isomers and their structural formulas Extraction of different hydrocarbons by the distillation of crude oil, cracking and reforming Soaps and detergents-Saponification Polymers- Condensation polymerization and addition polymerization Plastics |
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