**Stage 1 Chemistry Teaching and Learning Program**

Semester One Aligns with LAP 04

**Health and Fitness**

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| Week | Understandings | Teaching Strategies | Assessment |
| 1 – 2 | * 1. Properties and uses of materials | What type of materials are used to make **sporting equipment** and why?  Wheels on sports equipment, eg skateboards, bicycles  Discuss properties of metals and polymers  Drink bottles  Discuss properties of glass and polymers  Sports tops  Discuss properties of cotton and nylon  Tennis racquets  Discuss properties of wood, nylon, carbon fibre  Compare the size of atoms with nanoparticles.  **SHE**  **Sunscreens** contain nanoparticles of titanium dioxide and zinc oxide to protect our skin from damaging UV rays.  What are the benefits and risks of using nanoparticles on our skin? Are the nanoparticles safe to use on our skin?  Discuss the monitoring and assessment carried out by scientists and evaluate the risk posed by using nanoparticles in sunscreens  <http://www.cancer.org.au/preventing-cancer/sun-protection/nanoparticles-and-sunscreen.html>  <https://www.ewg.org/sunscreen/report/nanoparticles-in-sunscreen/>  **SIS – Design practical activity**:  Use sun sensitive paper to test the effectiveness of various sunscreen lotions. | Formative SHE task  Formative design task |
| 3 | * 1. Atomic Structure   1.4 The Periodic Table | Examine the structure of atoms and their electrons, and the relationship between electronic configuration and position in PT.  **SHE** Discuss the evidence that has led to the development of our current understanding of atomic structure.  **SIS** Use flame tests to identify metallic elements.  Note trends in elements down groups and across periods.  Note position of metallic and non-metallic elements including zinc, titanium, oxygen, carbon.  Radioisotopes used for imaging parts of the body. | Formative exercises on atomic structure, electronic configuration, PT |
| 4 | * 1. Quantities of atoms | **Sport drink – rehydration?**  Atomic mass, moles, mass calculations  Can any chemical be poisonous? Discuss LD50  <http://www.medicaldaily.com/taste-death-ld50-3-popular-drinks-can-kill-you-298918>  The case of dihydrogen monoxide  The question natural vs synthetic compounds.  Can energy drinks be harmful to our health? Investigate amounts of caffeine in beverages.  <https://en.wikipedia.org/wiki/Caffeine>  <http://australianbeverages.org/for-consumers/caffeine-facts/> | Formative calculations of moles,  Formative class presentation on findings. |
| 5 - 6 | 2.1: Types of materials | **SIS** Test the electrical conductivity of various substances to classify them as metallic, ionic, covalent network, or molecular.  Relate properties of materials to structure type.  Use of sodium and potassium ions in conducting nervous impulses in the body.  Use of copper in electrical wires and connections in sports machines.  Use of molecular liquids in cosmetics.  Use of polymers in sporting equipment. | **AT1: SHE task**  How has the development of new materials, or drug testing techniques, affected sports performance at Olympic level? |
| 6 - 7 | 2.2 Bonding between atoms  1.1 Discuss separation of substances on the basis of evaporation. | **Salt replacement (hydrolytes)**  Why is salt crystalline?  **SIS** Practical activity – Make plasticine models of ionic lattices.  Sports drinks help athletes replace water, electrolytes, and energy after training or competition. Is sodium present in sports drinks?  Other salts: | Formative exercises: writing electronic configuration of ions, ionic formulae, determining structure from properties |
| 8 | 2.3 Quantities of molecules and ions | Some athletes use smelling salts (NH4)2CO3H2O to boost their performance.  Calculate moles of ionic substances in cold and hot packs for sports injuries. | Formative calculations of moles, percentage composition by mass |
| 8 - 9 | 2.2 Bonding between atoms | **Useful metals in sport**  Why are metals malleable and ductile?  **SIS** Practical activity – Use a bubble-raft or ball bearings to model a metallic lattice.  Investigate alloys, for example in F1 car wheels.  Investigate why carbon fibre has replaced metal in the construction of F1 cars: formula1.about.com/od/car1/a/carbon\_fiber.htm | Formative revision questions on topics 1 and 2 |
| 10 - 11 | 2.2 Bonding between atoms  3.1 Molecule polarity | **Water revisited**  Why is water so important for the functioning of our bodies?  Discuss molecular shape and polarity.  Practical demonstration – detection of charged particles in streams of water, hexane and methanol from burettes.  **SIS** Practical activity – make 3D models of molecules using different types/colours of lollies to represent atoms and toothpicks. | **AT2: Practical test**  Identification of structure types including short answer questions on related concepts, under teacher supervision. |
| 11 - 12 | 3.2 Interactions between molecules | Why does water have a relatively high boiling point for its size?  The physical properties of molecular substances can be explained by considering the nature and strength of the forces of attraction between the molecules.  Compare the boiling points of other substances with small molecules  Review an infographic on DNA structure: <https://infogr.am/dna-structure-and-functions> | Formative questions on molecular shape and polarity.  Investigate why A only binds to T, C only with G in the DNA structure |
| 12 | 4.3: Quantities in reactions | Calculate concentration of aqueous solutions in g L-1 and mol l-1 | Formative concentration calculations |
| 13 - 14 | 4.1 Highly polar molecular substances are more soluble in water than nonpolar molecules of a similar size. | What makes sunscreen waterproof?  Discuss miscibility of polar and non-polar substances  Practical activity: make a sample of cold cream. | **AT1: Design practical investigation**  Is cold cream a more effective cleanser than soap? |
| 14 | 1.1 Discuss separation of substances on the basis of polarity | **Performance in sport**  Drug testing in sport  Detection using chromatography  **SIS** Practical activity – TLC to separate aspirin samples  <http://www.rsc.org/learn-chemistry/content/filerepository/CMP/00/000/045/Aspirin.pdf> | Formative investigation – chemicals detected using chromatography. |
| 15 - 16 | 3.3 Hydrocarbons | Carbohydrates for energy  Structure and naming of hydrocarbons.  Practical demonstration – fractional distillation of petroleum and testing of fractions for odour, viscosity and flammability.  Combustion reactions of hydrocarbons. Combustion of glucose in respiration.  Discuss properties and uses of petroleum products.  Other organic compounds. | Formative exercises on naming, structural formulae of hydrocarbons and writing combustion equations. |
| 17 - 18 | 3.4 Polymers | Why are plastics used for many consumer products often very flexible?  Addition polymers such as polyethene, PVC and Perspex.  **SIS** Practical activity – use model kits to join ethene monomers to form 2 long chains of polyethene. Demonstrate intertwined chains.  **SHE**  Discuss the economic, social and environmental considerations for producing polymers, for packaging materials, from renewable materials. | **AT2: SAT – Test on topics 1, 2 and 3** |