COURSE OUTLINE
YEAR 11 CHEMISTRY ATAR: 2022
UNIT 2

Term	Week	Topic and key teaching points	Syllabus content	Assessment
2	10	**Intermolecular forces and gases**	**SU** the valence shell electron pair repulsion (VSEPR) theory and Lewis structure diagrams can be used to explain, predict and draw the shapes of molecules **SU** observable properties, including vapour pressure, melting point, boiling point and solubility, can be explained by considering the nature and strength of intermolecular forces within a covalent molecular substance	
Term 3	1	**Intermolecular forces and gases**	**SU** the polarity of molecules can be explained and predicted using knowledge of molecular shape, understanding of symmetry, and comparison of the electronegativity of atoms involved in the bond formation **SU** the shape and polarity of molecules can be used to explain and predict the nature and strength of intermolecular forces, including dispersion forces, dipole-dipole forces and hydrogen bonding	

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YEAR 11 CHEMISTRY ATAR: 2022
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Term 3	1	**Chromatography**	**SU** data from chromatography techniques, including thin layer chromatography (TLC), gas chromatography (GC), and high- performance liquid chromatography (HPLC), can be used to determine the composition and purity of substances; the separation of the components is caused by the variation in strength of the interactions between atoms, molecules or ions in the mobile and stationary phases **HE** Chromatographic techniques, including thin layer chromatography (TLC), gas chromatography (GC), and high performance liquid chromatography (HPLC), are used to determine the components of a wide range of mixtures in various settings. The decision to use a particular **HE** chromatographic technique depends on a number of factors, including the properties of the substances being separated, the amount of substance available for analysis and the sensitivity of the equipment. Chromatographic techniques have a wide range of analytical and forensic applications, including monitoring air and water pollutants, drug testing of urine and blood samples, and testing for food additives and quality.	
Term 3	2-3	**Gases**	**SU** the behaviour of an ideal gas, including the qualitative relationships between pressure, temperature and volume, can be explained using the Kinetic Theory **SU** the mole concept can be used to calculate the mass of substances and volume of gases (at standard temperature and pressure) involved in a chemical reaction (including application of Ideal Gas Law - $PV = nRT$)	

	4	**Aqueous solutions and Acidity**	**HE** The supply of potable drinking water is an extremely important issue for both Australia and countries in the Asian region. Water sourced from groundwater and seawater undergoes a number of purification and treatment processes (such as desalination, chlorination, fluoridation) before it is delivered into the supply system. Chemists regularly monitor drinking water quality to ensure that it meets the regulations for safe levels of solutes. **HE** Heavy metal contamination in ground water is monitored to ensure that the concentrations are at an acceptable levels. Several methods can be used to reduce heavy metal contamination; the method used is influenced by economic and social factors. **SU** the shape and polarity of molecules can be used to explain and predict the nature and strength of intermolecular forces, including dispersion forces, dipole-dipole forces and hydrogen bonding	**TASK 8 – Report and Quiz, Ionic equations and observations**
	5	**Solutions**	**SU** the unique physical properties of water, including melting point, boiling point, density in solid and liquid phases and surface tension, can be explained by its molecular shape and hydrogen bonding between molecules **SU** the solubility of substances in water, including ionic and polar and non-polar molecular substances, can be explained by the intermolecular forces, including ion-dipole interactions between species in the substances **SU** the presence of specific ions in solutions can be identified by observing the colour of the solution, flame tests and observing various chemical reactions, including precipitation and acid- base reactions	

	6		**SU** solutions can be classified as saturated, unsaturated or supersaturated; the concentration of a solution is defined as the quantity of solute dissolved in a quantity of solution; this can be represented in a variety of ways, including by the number of moles of the solute per litre of solution (mol L^{-1}) and the mass of the solute per litre of solution (g L^{-1}) or parts per million (ppm)	**TASK 9 – Report and Quiz, Water treatment**
	7		**SU** the presence of specific ions in solutions can be identified by observing the colour of the solution, flame tests and observing various chemical reactions, including precipitation and acid- base reactions	
	8-9	**Acids**	**SU** the Arrhenius model can be used to explain the behaviour of strong and weak acids and bases in aqueous solutions **SU** indicator colour and the pH scale are used to classify aqueous solutions as acidic, basic or neutral **SU** pH is used as a measure of the acidity of solutions and is dependent on the concentration of hydrogen ions in the solution	**TASK 10 – Test 4 Intermolecular Forces, Chromatography and Gases**

			SU patterns of the reactions of acids and bases, including reactions of acids with bases, metals and carbonates and the reactions of bases with acids and ammonium salts, allow products and observations to be predicted from reactants; ionic equations represent the reacting species and products in these reactions	
	10	**Calculations**	**SU** the mole concept can be used to calculate the mass of solute, and solution concentrations and volumes involved in a chemical reaction	**TASK 11 – Report and Quiz, using indicators**
	1	**Rates of chemical reactions**	**SU** varying the conditions under which chemical reactions occur can affect the rate of the reaction	
Term 4	2-3		**SU** the rate of chemical reactions can be quantified by measuring the rate of formation of products or the depletion of reactants **SU** collision theory can be used to explain and predict the effects of concentration, temperature, pressure, the presence of catalysts and surface area on the rate of chemical reactions **SU** the activation energy is the minimum energy required for a chemical reaction to occur and is related to the strength and number	

			of the existing chemical bonds; the magnitude of the activation energy influences the rate of a chemical reaction **SU** energy profile diagrams, which can include the transition state and catalysed and un-catalysed pathways, can be used to represent the enthalpy changes and activation energy associated with a chemical reaction	
	4		**SU** Catalysts, including enzymes and metal nanoparticles, affect the rate of certain reactions by providing an alternative reaction pathway with a reduced activation energy, hence increasing the proportion of collisions that lead to a chemical change **HE** Catalysts are used in many industrial processes in order to increase the rates of reactions that would otherwise be uneconomically slow. Catalysts are also used to reduce the emission of pollutants produced by car engines. Motor vehicles have catalytic converters which are used to catalyse reactions that reduce the amount of carbon monoxide, unburnt petrol and nitrogen oxides that are emitted.	**TASK 12 – Test 5, Acids, Bases, Solutions, Rate of reaction**
	5		**SEMESTER TWO REVISION**	

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	6-7	**SEMESTER TWO EXAM**	**TASK 13 – Semester 1 and 2 content**