HSC Chemistry

Exam Planner

Your guide for exam goal-setting, preparation and success.

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Subject: Chemistry

EXAM DATE .....

GOAL .....

Topic: Static and Dynamic equilibrium	Do I have it in my notes?	Note-making deadline	Memorising deadline
Conduct practical investigations to analyse the reversibility of chemical reactions, for example:			
– Cobalt(II) chloride hydrated and dehydrated			
– Iron(III) nitrate and potassium thiocyanate			
– Burning magnesium			
– Burning steel wool			
Model static and dynamic equilibrium and analyse the differences between open and closed systems			
Analyse examples of non-equilibrium systems in terms of the effect of entropy and enthalpy, for example:			
– Combustion reactions			
– Photosynthesis			
Investigate the relationship between collision theory and reaction rate in order to analyse chemical equilibrium reactions			
Investigate the effects of temperature, concentration, volume and/or pressure on a system at equilibrium and explain how Le Chatelier's principle can be used to predict such effects, for example:			
– Heating cobalt(II) chloride hydrate			

– Interaction between nitrogen dioxide and dinitrogen tetroxide			
– Iron(III) thiocyanate and varying concentration of ions			
Examine how activation energy and heat of reaction affect the position of equilibrium			
Deduce the equilibrium expression (in terms of Keq) for homogeneous reactions occurring in solution			
Perform calculations to find the value of Keq and concentrations of substances within an equilibrium system, and use these values to make predictions on the direction in which a reaction may proceed			
Qualitatively analyse the effect of temperature on the value of Keq			
Conduct an investigation to determine Keq of a chemical equilibrium system, for example:			
– Keq of the iron(III) thiocyanate equilibrium			
Explore the use of Keq for different types of chemical reactions, including but not limited to:			
– Dissociation of ionic solutions			
– Dissociation of acids and bases			
Describe and analyse the processes involved in the dissolution of ionic compounds in water			
Investigate the use of solubility equilibria by Aboriginal and Torres Strait Islander Peoples when removing toxicity from foods, for example:			
– Toxins in cycad fruit			
Conduct an investigation to determine solubility rules, and predict and analyse the composition of substances when two ionic solutions are mixed, for example:			
– Potassium chloride and silver nitrate			
– Potassium iodide and lead nitrate			

– Sodium sulfate and barium nitrate			
Derive equilibrium expressions for saturated solutions in terms of Ksp and calculate the solubility of an ionic substance from its Ksp value			
Predict the formation of a precipitate given the standard reference values for Ksp			
Topic: Properties of acids and bases	**Do I have it in my notes?**	**Note-making deadline**	**Memorising deadline**
Acid/Base Reactions			
Investigate the correct IUPAC nomenclature and properties of common inorganic acids and bases			
Conduct an investigation to demonstrate the preparation and use of indicators as illustrators of the characteristics and properties of acids and bases and their reversible reactions			
Predict the products of acid reactions and write balanced equations to represent:			
– Acids and bases			
– Acids and carbonates			
– Acids and metals			
Investigate applications of neutralisation reactions in everyday life and industrial processes			
Conduct a practical investigation to measure the enthalpy of neutralisation			
Explore the changes in definitions and models of an acid and a base over time to explain the limitations of each model, including but not limited to:			
– Arrhenius' theory			
– Brønsted–Lowry theory			
Conduct a practical investigation to measure the pH of a range of acids and bases			

Calculate pH, pOH, hydrogen ion concentration ($[H^+]$) and hydroxide ion concentration ($[OH^-]$) for a range of solutions			
Conduct an investigation to demonstrate the use of pH to indicate the differences between the strength of acids and bases			
Write ionic equations to represent the dissociation of acids and bases in water, conjugate acid/base pairs in solution and amphiprotic nature of some salts, for example:			
– Sodium hydrogen carbonate			
– Potassium dihydrogen phosphate			
Construct models and/or animations to communicate the differences between strong, weak, concentrated and dilute acids and bases			
Calculate the pH of the resultant solution when solutions of acids and/or bases are diluted or mixed			
Conduct practical investigations to analyse the concentration of an unknown acid or base by titration			
Investigate titration curves and conductivity graphs to analyse data to indicate characteristic reaction profiles, for example:			
– Strong acid/strong base			
– Strong acid/weak base			
– Weak acid/strong base			
Model neutralisation of strong and weak acids and bases using a variety of media			
Calculate and apply the dissociation constant (K_a) and pK_a ($pK_a = -log_{10}(K_a)$) to determine the difference between strong and weak acids			
Explore acid/base analysis techniques that are applied:			

– In industries			
– By Aboriginal and Torres Strait Islander Peoples			
Topic: Organic Chemistry	**Do I have it in my notes?**	**Note-making deadline**	**Memorising deadline**
Investigate the nomenclature of organic chemicals, up to C8, using IUPAC conventions, including simple methyl and ethyl branched chains, including			
– Alkanes			
– Alkenes			
– Alkynes			
– Alcohols (primary, secondary and tertiary)			
– Aldehydes and ketones			
– Carboxylic acids			
– Amines and amides			
– Halogenated organic compounds			
Explore and distinguish the different types of structural isomers, including saturated and unsaturated hydrocarbons, including:			
– Chain isomers			
– Position isomers			
– Functional group isomers			
Construct models, identify the functional group, and write structural and molecular formulae for homologous series of organic chemical compounds, up to C8			
– Alkanes			

– Alkenes			
– Alkynes			
Conduct an investigation to compare the properties of organic chemical compounds within a homologous series, and explain these differences in terms of bonding			
Analyse the shape of molecules formed between carbon atoms when a single, double or triple bond is formed between them			
Explain the properties within and between the homologous series of alkanes with reference to the intermolecular and intramolecular bonding present			
Describe the procedures required to safely handle and dispose of organic substances			
Examine the environmental, economic and sociocultural implications of obtaining and using hydrocarbons from the Earth			
Investigate, write equations and construct models to represent the reactions of unsaturated hydrocarbons when added to a range of chemicals, including but not limited to:			
– Hydrogen (H_2)			
– Halogens (X_2)			
– Hydrogen halides (HX)			
– Water (H_2O)			
Investigate, write equations and construct models to represent the reactions of saturated hydrocarbons when substituted with halogens			
Investigate the structural formulae, properties and functional group including:			
– Primary			
– Secondary			
– Tertiary alcohols			

– Tertiary alcohols			
Explain the properties within and between the homologous series of alcohols with reference to the intermolecular and intramolecular bonding present			
Conduct a practical investigation to measure and reliably compare the enthalpy of combustion for a range of alcohols			
Write equations, state conditions and predict products to represent the reactions of alcohols, including but not limited to			
– Combustion			
– Dehydration			
– Substitution with HX			
– Oxidation			
Investigate the production of alcohols, including:			
– Substitution reactions of halogenated organic compounds			
– Fermentation			
Investigate the products of the oxidation of primary and secondary alcohols			
Compare and contrast fuels from organic sources to biofuels, including ethanol			
Investigate the structural formulae, properties and functional group including:			
– Primary, secondary and tertiary alcohols			
– Aldehydes and ketones			
– Amines and amides			

– Carboxylic acids			
Explain the properties within and between the homologous series of carboxylic acids amines and amides with reference to the intermolecular and intramolecular bonding present			
Investigate the production, in a school laboratory, of simple esters			
Investigate the differences between an organic acid and organic base			
Investigate the structure and action of soaps and detergents			
Draft and construct flow charts to show reaction pathways for chemical synthesis, including those that involve more than one step			
Model and compare the structure, properties and uses of addition polymers of ethylene and related monomers, for example:			
– Polyethylene (PE)			
– Polyvinyl chloride (PVC)			
– Polystyrene (PS)			
– Polytetrafluoroethylene (PTFE)			
Model and compare the structure, properties and uses of condensation polymers, for example:			
– Nylon			
– Polyesters			
Topic: Static and dynamic equilibrium	**Do I have it in my notes?**	**Note-making deadline**	**Memorising deadline**
Analyse the need for monitoring the environment			

Conduct qualitative investigations – using flame tests, precipitation and complexation reactions as appropriate – to test for the presence in aqueous solution of the following ions:			
– Cations: barium (Ba^{2+}), calcium (Ca^{2+}), magnesium (Mg^{2+}), lead(II) (Pb^{2+}), silver ion (Ag^{+}), copper(II) (Cu^{2+}), iron(II) (Fe^{2+}), iron(III) (Fe^{3+})			
– Anions: chloride (Cl^{-}), bromide (Br^{-}), iodide (I^{-}), hydroxide (OH^{-}), acetate (CH_3COO^{-}), carbonate (CO_3^{2-}), sulfate (SO_4^{2-}), phosphate (PO_4^{3-})			
Conduct investigations and/or process data involving:			
– Gravimetric analysis			
– Precipitation titrations			
Conduct investigations and/or process data to determine the concentration of coloured species and/or metal ions in aqueous solution, including but not limited to, the use of:			
– Colourimetry			
– Ultraviolet-visible spectrophotometry			
– Atomic absorption spectroscopy			
Conduct qualitative investigations to test for the presence in organic molecules of the following functional groups:			
– Carbon–carbon double bonds			
– Hydroxyl groups			
– Carboxylic acids			
Investigate the processes used to analyse the structure of simple organic compounds addressed in the course, including but not limited to:			
– Proton and carbon-13 NMR			

– Mass spectrometry			
– Infrared spectroscopy			
Evaluate the factors that need to be considered when designing a chemical synthesis process, including but not limited to:			
– Availability of reagents			
– Reaction conditions			
– Yield and purity			
– Industrial uses (eg pharmaceutical, cosmetics, cleaning products, fuels)			
– Environmental, social and economic issues			

Practice Schedule

PRACTICE EXAM	DEADLINE
Practice Exam 1	
Practice Exam 2	
Practice Exam 3	
Practice Exam 4	
Practice Exam 5	
EXAM DATE:	

Congratulations!

You're ready! Now relax and think about how good it will feel leaving the exam room knowing the hard work has paid off. Congratulations and good luck (not that you need it)!

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www.connecteducation.education

hello@connecteducation.com.au

1300 667 945