

VCE Chemistry

Exam Planner

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



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Subject: Chemistry

EXAM DATE

GOAL

Topic: What are the options for energy production?	Do I have it in my notes?	Note-making deadline	Memorising deadline
The definition of a fuel, including the distinction between fossil fuels and biofuels with reference to origin and renewability (ability of a resource to be replaced by natural processes within a relatively short period of time)			
Combustion of fuels as exothermic reactions with reference to the use of the joule as the SI unit of energy, energy transformations and their efficiencies and measurement of enthalpy change including symbol (ΔH) and common units (kJ mol^{-1} , kJ g^{-1} , MJ/tonne)			
The writing of balanced thermochemical equations, including states, for the complete and incomplete combustion of hydrocarbons, methanol and ethanol, using experimental data and data tables			
The definition of gas pressure including units, the universal gas equation and standard laboratory conditions (SLC) at $25\text{ }^{\circ}\text{C}$ and 100 kPa			
Calculations related to the combustion of fuels including use of mass-mass, mass-volume and volume-volume stoichiometry in calculations of enthalpy change (excluding solution stoichiometry) to determine heat energy released, reactant and product amounts and net volume of greenhouse gases at a given temperature and pressure (or net mass) released per MJ of energy obtained			
The use of specific heat capacity of water to determine the approximate amount of heat energy released in the combustion of a fuel.			
The comparison of fossil fuels (coal, crude oil, petroleum gas, coal seam gas) and biofuels (biogas, bioethanol, biodiesel) with reference to energy content, renewability and environmental impacts related to sourcing and combustion			
The comparison of the suitability of petrodiesel and biodiesel as transport fuels with reference to sources, chemical structures, combustion products, flow along fuel lines (implications of hygroscopic properties and impact of outside temperature on viscosity) and the environmental impacts associated with their extraction and production.			

Redox reactions with reference to electron transfer, reduction and oxidation reactions, reducing and oxidising agents, and use of oxidation numbers to identify conjugate reducing and oxidising agents			
The writing of balanced half-equations for oxidation and reduction reactions and balanced ionic equations, including states, for overall redox reactions			
Galvanic cells as primary cells and as portable or fixed chemical energy storage devices that can produce electricity (details of specific cells not required) including common design features (anode, cathode, electrolytes, salt bridge and separation of half-cells) and chemical processes (electron and ion flows, half-equations and overall equations)			
The comparison of the energy transformations occurring in spontaneous exothermic redox reactions involving direct contact between reactants (transformation of chemical energy to heat energy) compared with those occurring when the reactants are separated in galvanic cells (transformation of chemical energy to electrical energy)			
The use of the electrochemical series in designing and constructing galvanic cells and as a tool for predicting the products of redox reactions, deducing overall equations from redox half-equations and determining maximum cell voltage under standard conditions.			
The common design features of fuel cells including use of porous electrodes for gaseous reactants to increase cell efficiency (details of specific cells not required)			
The comparison of the use of fuel cells and combustion of fuels to supply energy with reference to their energy efficiencies (qualitative), safety, fuel supply (including the storage of hydrogen), production of greenhouse gases and applications			
The comparison of fuel cells and galvanic cells with reference to their definitions, functions, design features, energy transformations, energy efficiencies (qualitative) and applications.			

Topic: How can the yield of a chemical product be optimised?	Do I have it in my notes?	Note-making deadline	Memorising deadline
Chemical reactions with reference to collision theory, including qualitative interpretation of Maxwell-Boltzmann distribution curves			
The comparison of exothermic and endothermic reactions including their enthalpy changes and representations in energy profile diagrams			
Factors affecting the rate of a chemical reaction including temperature, surface area concentration of solutions, gas pressures and presence of a catalyst			
The role of catalysts in changing the rate of chemical reactions with reference to alternative reaction pathways and their representation in energy profile diagrams.			
The distinction between reversible and irreversible reactions, and between rate and extent of a reaction			
Homogenous equilibria involving aqueous solutions or gases with reference to collision theory and representation by balanced chemical or thermochemical equations (including states) and by concentration-time graphs			
Calculations involving equilibrium expressions and equilibrium constants (K_c only) for a closed homogeneous equilibrium system including dependence of value of equilibrium constant, and its units, on the equation used to represent the reaction and on the temperature			
Le Chatelier's principle: identification of factors that favour the yield of a chemical reaction, representation of equilibrium system changes using concentration-time graphs and applications, including competing equilibria involved in the occurrence and treatment of carbon monoxide poisoning resulting from incomplete combustion of fuels.			
Electrolysis of molten liquids and aqueous solutions using different electrodes			

The general operating principles of commercial electrolytic cells, including basic structural features and selection of suitable electrolyte (molten or aqueous) and electrode (inert or reactive) materials to obtain desired products (no specific cell is required)			
The use of the electrochemical series to explain or predict the products of an electrolysis, including identification of species that are preferentially discharged, balanced half-equations, a balanced ionic equation for the overall cell reaction, and states			
The comparison of an electrolytic cell with a galvanic cell with reference to the energy transformations involved and basic structural features and processes			
The application of stoichiometry and Faraday's Laws to determine amounts of product, current or time for a particular electrolytic process.			
The operation of rechargeable batteries (secondary cells) with reference to discharging as a galvanic cell and recharging as an electrolytic cell, including the redox principles (redox reactions and polarity of electrodes) and the factors affecting battery life with reference to components and temperature (no specific battery is required).			
Topic: How can the diversity of carbon compounds be explained and categorised?	Do I have it in my notes?	Note-making deadline	Memorising deadline
The carbon atom with reference to valence number, bond strength, stability of carbon bonds with other elements and the formation of isomers (structural and stereoisomers) to explain carbon compound diversity, including identification of chiral centres in optical isomers of simple organic compounds and distinction between cis- and trans- isomers in simple geometric isomers			
Structures including molecular, structural, semi-structural, and skeletal formulas of alkanes (including cyclohexane), alkenes, alkynes, benzene, haloalkanes, primary amines, primary amides, alcohols (primary, secondary, tertiary), aldehydes, ketones, carboxylic acids and non-branched esters			
IUPAC systematic naming of organic compounds up to C8 with no more than two functional groups for a molecule, limited to non-cyclic hydrocarbons, haloalkanes, primary amines, alcohols (primary, secondary, tertiary), carboxylic acids and non-branched esters.			
An explanation of trends in physical properties (boiling point, viscosity) and flashpoint with reference to structure and bonding			

Organic reactions, including appropriate equations and reagents, for the oxidation of primary and secondary alcohols, substitution reactions of haloalkanes, addition reactions of alkenes, hydrolysis reactions of esters, and the esterification reaction between an alcohol and a carboxylic acid			
The pathways used to synthesise primary haloalkanes, primary alcohols, primary amines, carboxylic acids and esters including calculations of atom economy and percentage yield of single-step or overall pathway reactions.			
The principles and applications of mass spectroscopy (excluding features of instrumentation and operation) and interpretation of qualitative and quantitative data, including identification of molecular ion peak, determination of molecular mass and identification of simple fragments			
The principles and applications of infrared spectroscopy (IR) (excluding features of instrumentation and operation) and interpretation of qualitative and quantitative data including use of characteristic absorption bands to identify bonds			
The principles (including spin energy levels) and applications of proton and carbon-13 nuclear magnetic resonance spectroscopy (NMR) (excluding features of instrumentation and operation); analysis of carbon-13 NMR spectra and use of chemical shifts to determine number and nature of different carbon environments in a simple organic compound; and analysis of high resolution proton NMR spectra to determine the structure of a simple organic compound using chemical shifts, areas under peak and peak splitting patterns (excluding coupling constants) and application of the n+1 rule			
Determination of the structures of simple organic compounds using a combination of infrared spectroscopy (IR) and proton and carbon-13 nuclear magnetic resonance spectroscopy (NMR) (limited to data analysis)			
The principles of chromatography including use of high performance liquid chromatography (HPLC) and construction and use of a calibration curve to determine the concentration of an organic compound in a solution			
Determination of the concentration of an organic compound by volumetric analysis, including the principles of direct acid-base and redox titrations (excluding back titrations).			

Topic: What is the chemistry of food?	Do I have it in my notes?	Note-making deadline	Memorising deadline
<p>Proteins: formation of dipeptides and polypeptides as condensation polymers of 2-amino acids; primary (including peptide links), secondary, tertiary and quaternary structure and bonding; distinction between essential and non-essential amino acids as dietary components</p>			
<p>Carbohydrates: formation of disaccharides from monosaccharides, and of complex carbohydrates (specifically starch and cellulose) as condensation polymers of monosaccharides; glycosidic links; storage of excess glucose in the body as glycogen; comparison of glucose, fructose, sucrose and the artificial sweetener aspartame with reference to their structures and energy content</p>			
<p>Fats and oils (triglycerides): common structural features including ester links; distinction between fats and oils with reference to melting points; explanation of different melting points of triglycerides with reference to the structures of their fatty acid tails and the strength of intermolecular forces; chemical structures of saturated and unsaturated (monounsaturated and polyunsaturated) fatty acids; distinction between essential and nonessential fatty acids; and structural differences between omega-3 fatty acids and omega-6 fatty acids</p>			
<p>vitamins: inability of humans to synthesise most vitamins (except Vitamin D) making them essential dietary requirements; comparison of structural features of Vitamin C (illustrative of a water-soluble vitamin) and Vitamin D (illustrative of a fat-soluble vitamin) that determine their solubility in water or oil.</p>			
<p>Metabolism of food as a source of energy and raw materials: general principles of metabolism of food involving enzyme-catalysed chemical reactions with reference to the breakdown of large biomolecules in food by hydrolytic reactions to produce smaller molecules, and the subsequent synthesis of large biologically important molecules by condensation reactions of smaller molecules</p>			
<p>Enzymes as protein catalysts: active site; modelling of process by which enzymes control specific biochemical reactions (lock-and-key models); explanation of effects of changes in pH (formation of zwitterions and denaturation), increased temperature (denaturation) and decreased temperature (reduction in activity) on enzyme activity with reference to structure and bonding; action of enzymes in narrow pH ranges; and use of reaction rates to measure enzyme activity</p>			
<p>The distinction between denaturation of a protein and hydrolysis of its primary structure</p>			

Hydrolysis of starch in the body: explanation of the ability of all humans to hydrolyse starch but not cellulose, and of differential ability in humans to hydrolyse lactose; glycaemic index (GI) of foods as a ranking of carbohydrates based on the hydrolysis of starches (varying proportions of amylose and amylopectin) to produce glucose in the body			
Hydrolysis of fats and oils from foods to produce glycerol and fatty acids; oxidative rancidity with reference to chemical reactions and processes, and the role of antioxidants in slowing rate of oxidative rancidity			
The principles of the action of coenzymes (often derived from vitamins) as organic molecules that bind to the active site of an enzyme during catalysis, thereby changing the surface shape and hence the binding properties of the active site to enable function as intermediate carriers of electrons and/or groups of atoms (no specific cases required).			
The comparison of energy values of carbohydrates, proteins and fats and oils			
Glucose as the primary energy source, including a balanced thermochemical equation for cellular respiration			
The principles of calorimetry; solution and bomb calorimetry, including determination of calibration factor and consideration of the effects of heat loss; and analysis of temperature-time graphs obtained from solution calorimetry.			
Topic: Practical investigation	Do I have it in my notes?	Note-making deadline	Memorising deadline
Independent, dependent and controlled variables			
Chemical concepts specific to the investigation and their significance, including definitions of key terms, and chemical representations			
The characteristics of scientific research methodologies and techniques of primary qualitative and quantitative data collection relevant to the selected investigation: consideration of precision, accuracy, reliability and validity of data; and minimisation of experimental bias			
Ethics of and concerns with research including identification and application of relevant health and safety guidelines			

Methods of organising, analysing and evaluating primary and/or secondary data to identify patterns and relationships including sources of error and uncertainty, and limitations of data and methodologies			
Models and theories and their use in organising and understanding observed phenomena and chemical concepts including their limitations			
The nature of evidence that supports or refutes a hypothesis, model or theory			
The key findings of the selected investigation and their relationship to thermochemical, equilibrium and/or organic structure and bonding concepts			
The conventions of scientific report writing and/or scientific poster presentation including chemical terminology and representations, symbols, chemical equations, formulas, units of measurement, significant figures, standard abbreviations and acknowledgment of references.			

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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