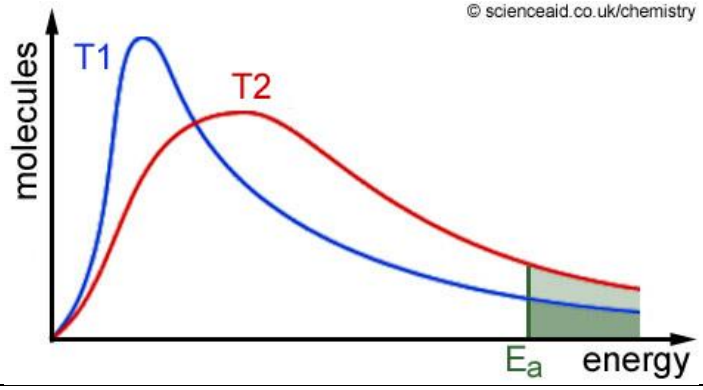
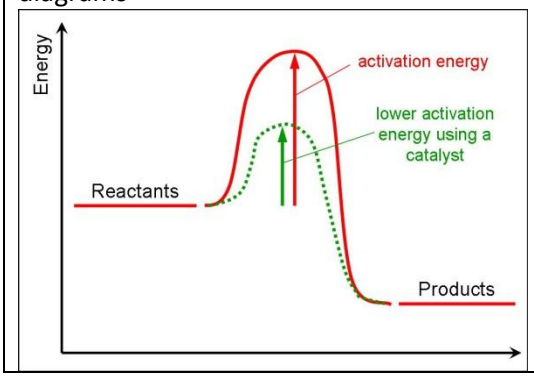
UNIT 1

CONTROLLING THE RATE OF REACTION

Learning Outcome	Understanding?
I can calculate the rate of reaction from graphs of a changing property versus time, e.g. graphs of volume against time $rate = \frac{\Delta quantity}{\Delta t}$	☺ 😐 ☹
I can use the reciprocal of $reaction\ rate = \frac{1}{t}$ to calculate time	☺ 😐 ☹
I can predict how the ate of a chemical reaction will be affected by changing the concentration, particle size, temperature or by using a catalyst	☺ 😐 ☹
I can use collision theory to explain how these factors affect the rate of a reaction	☺ 😐 ☹
I understand the concepts of collision geometry and activation energy	☺ 😐 ☹
I understand why it is important for chemists to control the rate of reaction	☺ 😐 ☹
I understand energy distribution diagrams and can explain the effect of increasing the temperature, or adding a catalyst, on the rate of a reaction 	☺ 😐 ☹
I know what is meant by an 'activated complex'	☺ 😐 ☹
I can calculate activation energy and enthalpy change from energy profile diagrams 	☺ 😐 ☹

I can show the position of an activated complex on an energy profile diagram	☺ 😐 ☹
I can show the effect of adding a catalyst on an energy profile diagram	☺ 😐 ☹

THE PERIODIC TABLE: BONDING AND STRUCTURE

Learning Outcome	Understanding?
I can identify groups and periods in the periodic table	☺ 😐 ☹
I know where to find the metals, non-metals, halogens, noble gases and transition metals on the periodic table	☺ 😐 ☹
I can explain the reactivity of elements by considering electron arrangement	☺ 😐 ☹
I can discuss the bonding and structure of: • The metallic elements (Li, Be, Mg, Al, K, Ca) • The covalent molecular elements (H_2, N_2, O_2, F_2, Cl_2, P_4, S_8 and C_{60} • The covalent network elements (B, C (diamond and graphite) and Si	☺ 😐 ☹
I can use my knowledge of bonding and structure to discuss different physical properties of elements; for example why sulphur has a higher boiling point than chlorine in terms of relative size of London dispersion forces	☺ 😐 ☹

TRENDS IN THE PERIODIC TABLE

Learning Outcome	Understanding?
I know how to use the covalent radius to state the size of an atom	☺ 😐 ☹
I can explain the meaning of electronegativity	☺ 😐 ☹
I know how to use the data booklet to find out the covalent radius and electronegativity values for elements	☺ 😐 ☹
I can explain the trend in electronegativity and covalent radius across a period or down a group	☺ 😐 ☹
I know the meaning of and can write the equation for the first and subsequent ionisation energies of elements	☺ 😐 ☹
I know where to find ionisation energy values in the data book	☺ 😐 ☹

I can describe and explain trends in first ionisation energies across a period or down a group	☺ 😐 ☹
I can explain patterns in successive ionisation energies and identify the group of an element from these	☺ 😐 ☹

BONDING IN COMPOUNDS

Learning Outcome	Understanding?
I can describe how ionic and covalent bonding arises	☺ 😐 ☹
I can identify a molecule as being polar or non-polar and know how to represent this on a diagram	☺ 😐 ☹
I understand how London dispersion forces, permanent dipole-permanent dipole interactions and hydrogen bonding arise; and understand these are all types of van der Waal's forces	☺ 😐 ☹
I can use the shapes of molecules to predict whether they are polar or non-polar	☺ 😐 ☹
I can draw diagrams to show hydrogen bonding between molecules	☺ 😐 ☹
I can use electronegativity data to predict bonding type and understand the concept of the 'bonding continuum'	☺ 😐 ☹
I can relate physical properties such as melting and boiling points; viscosity, solubility and miscibility to the type of intermolecular forces present in substances	☺ 😐 ☹
I can relate hydrogen bonding in water to its density when solid and liquid	☺ 😐 ☹

UNIT 2

ALCOHOLS, CARBOXYLIC ACIDS AND ESTERS

Learning Outcome	Understanding?
I can name, draw full structural formulae and write shortened structural formulae for alcohols, carboxylic acids and esters	☺ 😐 ☹
I can name the functional groups in alcohols, carboxylic acids and esters	☺ 😐 ☹
I can describe the procedure of making an ester	☺ 😐 ☹
I can name esters and predict the reactants from the ester and vice versa	☺ 😐 ☹
I know some uses of esters	☺ 😐 ☹
I can explain the process of hydrolysis of esters and predict the products of this	☺ 😐 ☹

FATS, OILS AND SOAPS

Learning Outcome	Understanding?
I can name some sources of fats and oils	☺ 😐 ☹
I can state the benefits of fats and oils in our diet	☺ 😐 ☹
I can describe the structure of fats and oils and use these to explain their melting and boiling points	☺ 😐 ☹
I know how fats and oils are formed from fatty acids and glycerol	☺ 😐 ☹
I can predict the structure of the fatty acid from the structure of the fat or oil formed	☺ 😐 ☹
I can recognise glycerol (propan-1, 2, 3-triol)	☺ 😐 ☹
I can describe the test for unsaturated fats or oils	☺ 😐 ☹
I can explain the process of hardening oils	☺ 😐 ☹
I can explain the solubility vitamin C and vitamin A in relation to their polarity	☺ 😐 ☹

I can explain how soap is made from fats and oil	☺ 😐 ☹
I can explain the cleaning action of soap and detergent in terms of their structure	☺ 😐 ☹
I can describe where detergents are particularly useful	☺ 😐 ☹
I can describe an emulsion and name some examples	☺ 😐 ☹
I can explain why a molecule can act as an emulsifier in terms of its structure	☺ 😐 ☹

PROTEINS

Learning Outcome	Understanding?
I know some examples of proteins	☺ 😐 ☹
I can explain how proteins can be hydrolysed into their constituent amino acids	☺ 😐 ☹
I can explain how proteins are made from amino acids; recognise amino acids from proteins and vice versa	☺ 😐 ☹
I can draw and recognise an amide (peptide) link	☺ 😐 ☹
I can draw a section of protein from amino acids	☺ 😐 ☹
I can describe 'essential amino acids'	☺ 😐 ☹
I know that enzymes are proteins and that they are biological catalysts	☺ 😐 ☹

THE CHEMISTRY OF COOKING AND OXIDATION OF FOOD

Learning Outcome	Understanding?
I can predict whether a molecule is likely to be fat/oil soluble or water soluble by examining the functional group present	☺ 😐 ☹
I can predict how volatile a molecule is likely to be by examining the size and structure of the molecule	☺ 😐 ☹
I can describe the structure of an protein	☺ 😐 ☹

I can describe how heating a protein can change its structure	☺ 😐 ☹
I can state whether an alcohol is primary, secondary or tertiary and whether it is likely to be oxidised	☺ 😐 ☹
I can name some common agents capable of oxidising alcohols and aldehydes and describe the results of these tests	☺ 😐 ☹
I can draw full structural formulae, shortened structural formulae and name alcohols, aldehydes and ketones	☺ 😐 ☹
I can name and recognise the functional group in aldehydes and ketones	☺ 😐 ☹
I can name and draw products formed when an alcohol or aldehyde is oxidised	☺ 😐 ☹
I can explain why carboxylic acids are weak acids	☺ 😐 ☹
I can write equations for and predict the products when carboxylic acids react with bases to form salts	☺ 😐 ☹
I can describe oxidation of a carbon compound in terms of the oxygen hydrogen ratio	☺ 😐 ☹
I can state the function of an antioxidant and describe some uses of these	☺ 😐 ☹
I can write ion-electron equations for antioxidants	☺ 😐 ☹
I can describe the reaction of edible oils and oxygen	☺ 😐 ☹

FRAGRANCES

Learning Outcome	Understanding?
I can describe essential oils and name some of their uses	☺ 😐 ☹
I can explain that terpenes are major components of essential oils	☺ 😐 ☹
I can draw and recognise isoprene, give its systematic name and state how many isoprene units are in a terpene from its structure	☺ 😐 ☹
I can describe the oxidation of terpenes and predict the products that may be formed	☺ 😐 ☹

SKINCARE

Learning Outcome	Understanding?
I can explain why UV light can be damaging to skin	☺ 😐 ☹
I can explain how sunblock can prevent damage from UV light	☺ 😐 ☹
I can describe what a free radical is	☺ 😐 ☹
I can write equations for the three steps in a free radical reaction and name these steps	☺ 😐 ☹
I can describe a 'free radical scavenger'	☺ 😐 ☹
I can describe and explain the use of free radical scavengers	☺ 😐 ☹

UNIT 3

GETTING THE MOST FROM REACTANTS

Learning Outcome	Understanding?
I can explain how industrial processes are designed to maximise profit and minimise the impact on the environment	☺ 😐 ☹
I can describe some of the factors influencing industrial process design	☺ 😐 ☹
I can describe some environmental consideration in industrial process design	☺ 😐 ☹
I can balance equations and use these to calculate the mass of a reactant or product	☺ 😐 ☹
I can express quantities in terms of moles	☺ 😐 ☹
I can perform calculations involving solutions, volumes and concentrations	☺ 😐 ☹
I can perform calculations to identify the excess reactant and the limiting reagent	☺ 😐 ☹
I can perform calculations involving molar gas volumes	☺ 😐 ☹
I can calculate the volumes of reactant and product gases from the number of moles of each reactant and product	☺ 😐 ☹

PERCENTAGE YIELD AND ATOM ECONOMY

Learning Outcome	Understanding?
I can explain that the efficiency with which reactants are converted into the desired product is measured in terms of the percentage yield and atom economy	☺ 😐 ☹
I can perform percentage yield calculations $\text{Percentage yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100$	☺ 😐 ☹
I can perform atom economy calculations $\text{atom economy} = \frac{\text{mass of desired product(s)}}{\text{total mass of reactants}} \times 100$	☺ 😐 ☹
I can use the percentage yield and atom economy to comment on the choice of route for making a chemical	☺ 😐 ☹

EQUILIBRIA

Learning Outcome	Understanding?
I know what is meant by the term 'dynamic equilibrium'	☺ 😐 ☹
I know what is meant by a 'closed system'	☺ 😐 ☹
I understand why chemists want to alter the position of equilibrium	☺ 😐 ☹
I understand and can predict the effect of changing the temperature and concentration on a system at equilibrium	☺ 😐 ☹
I understand there a catalyst no effect on the position of equilibrium	☺ 😐 ☹

CHEMICAL ENERGY

Learning Outcome	Understanding?
I can calculate the enthalpy change of a reaction using $E_h = cm\Delta T$	☺ 😐 ☹
I know the definition of enthalpy of combustion and enthalpy of formation	☺ 😐 ☹
I can describe how enthalpy of combustion data can be obtained by experiment	☺ 😐 ☹
I can evaluate different experimental methods used to obtain enthalpy of combustion data	☺ 😐 ☹
I know the definition of Hess's Law	☺ 😐 ☹
I can use Hess's Law to calculate the enthalpy change for a chemical reaction	☺ 😐 ☹
I understand that bond breaking is endothermic and bond making is exothermic	☺ 😐 ☹
I can use bond enthalpies to calculate the enthalpy change for a reaction	☺ 😐 ☹
I understand where mean bond enthalpy data come from	☺ 😐 ☹

OXIDISING AND REDUCING AGENTS

Learning Outcome	Understanding?
I know the definition of oxidising and reducing agents	☺ 😐 ☹
I can identify a substance as an oxidising or reducing agent	☺ 😐 ☹
I can write balanced redox equations	☺ 😐 ☹
I can combine ion-electron equations to make an overall redox equation	☺ 😐 ☹
I understand the relationship between electronegativity and the ability of a substance to act as a reducing or oxidising agent	☺ 😐 ☹
I know the strongest reducing agents are found in Group 1	☺ 😐 ☹
I know the strongest oxidising agents are found in Group 7	☺ 😐 ☹
I can use the electrochemical series to identify highly effective reducing and oxidising agents	☺ 😐 ☹
I can write ion-electron equations for more complex oxidations and reductions involving compounds	☺ 😐 ☹
I know examples of everyday oxidising agents and why these are used	☺ 😐 ☹

CHEMICAL ANALYSIS

Learning Outcome	Understanding?
I can describe the basic principles of chromatography in terms of mobile and stationary phases	☺ 😐 ☹
I can interpret simple chromatograms	☺ 😐 ☹
I can explain the difference in separation of two compounds based on their size or polarity	☺ 😐 ☹

VOLUMETRIC ANALYSIS

Learning Outcome	Understanding?
I can used a balanced equation to calculate the quantity of an unknown reactant using information from a titration experiment	☺ 😐 ☹
I can use balanced redox equations to calculate the quantity of an unknown reactant using information from a redox titration experiment	☺ 😐 ☹
I know what is meant by the terms 'indicator' and 'standard solution'	☺ 😐 ☹
I know that redox titrations involving potassium permanganate are self-indicating	☺ 😐 ☹