	Y12 AEC	Y12 DHN	Y13 DHN	Y13 KMF
Week 1 (w/b Wed 7th Sep)	Lesson 1: 2.1.1 - (a) isotopes as atoms of the same element with different numbers of neutrons and different masses (b) atomic structure in terms of the numbers of protons, neutrons and electrons for atoms and ions, given the atomic number, mass number and any ionic charge Lesson 2: 2.1.1 – (c) explanation of the terms *relative isotopic mass* (mass compared with 1/12th mass of carbon-12) and *relative atomic mass* (weighted mean mass compared with 1/12th mass of carbon-12), based on the mass of a ^{12}C atom, the standard for atomic masses Lesson 3: 2.1.1 - (e) use of the terms *relative molecular mass*, M_r, and *relative formula mass* and their calculation from relative atomic masses. Lesson 4: 2.1.1 - (d) use of mass spectrometry in: (i) the determination of relative isotopic masses and relative abundances of the isotope, (ii) calculation of the relative atomic mass of an element from the relative abundances of its isotopes	Lesson 1: 4.1.1 - (a) application of IUPAC rules of nomenclature for systematically naming organic compounds Lesson 2: 4.1.1 – as Lesson 1	Lesson 1: 5.1.1 - (a) explanation and use of the terms: *rate of reaction*, *order*, *overall order*, *rate constant*, *half-life*, *rate-determining step* Lesson 2: 5.1.1 - (a) explanation and use of the terms: *rate of reaction*, *order*, *overall order*, *rate constant*, *half-life*, *rate-determining step* Lesson 3: 5.1.1 - (b) deduction of: (i) orders from experimental data (ii) a rate equation from orders of the form: rate = $k[A]^m[B]^n$, where m and n are 0, 1 or 2 Lesson 4: 5.1.1 - (c) calculation of the rate constant, k, and related quantities, from a rate equation including determination of units	Lesson 1: 6.1.1 - (a) the comparison of the Kekulé model of benzene with the subsequent delocalised models for benzene in terms of p-orbital overlap forming a delocalised π-system 6.1.1 - (b) the experimental evidence for a delocalised, rather than Kekulé, model for benzene in terms of bond lengths, enthalpy change of hydrogenation and resistance to reaction **(see also 6.1.1 f)** Lesson 2: 6.1.1 - (c) use of IUPAC rules of nomenclature for systematically naming substituted aromatic compounds Lesson 3: 6.1.1 - (d) the electrophilic substitution of aromatic compounds with: (i) concentrated nitric acid in the presence of concentrated sulfuric acid (ii) a halogen in the presence of a halogen carrier (iii) a haloalkane or acyl chloride in the presence of a halogen carrier (Friedel–Crafts reaction) and its importance to synthesis by formation of a C–C bond to an aromatic ring **(see also 6.2.4 d)**
Key Words **Level 2** **Level 3**	Atomic number, isotope, neutron, proton, electron, relative abundance, relative atomic mass, relative isotopic mass, relative molecular mass	Hydrocarbon, homologous series, alkane, alkene, alkyl, alicyclic, saturated, unsaturated, isomer/ism, Structural isomer, organic compound, displayed/structural/skeletal molecular formula(e)	rate of reaction, order, overall order, rate constant, half-life, rate-determining step, Arrhenius equation, tangent, gradient	Delocalised, aromatic, electron density, Electron donating, electron withdrawing,
Common Misconceptions	I'd expect some confusion about +/- ion formation at this stage	Naming conventions can be tricky to get used to – build slowly, don't overcomplicate too quickly	Calculating order based on results can be problematic if the question uses non-whole number orders – this should not really be present but older questions do have them	Curly arrow direction, formation of the + charge and drawing the horseshoe correctly
Homework	Task suitable to ability of group	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.2	Up to & inc. 4.1.1h	Up to & inc. 5.1.1k	Up to & inc. 6.1.1l
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/research-scientist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-technician-plastics/4010921.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemical-engineer	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biochemist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 2 (w/b 12th Sep)	Lesson 1: 2.1.2 - (a) the writing of formulae of ionic compounds from ionic charges, including: (i) prediction of ionic charge from the position of an element in the periodic table (ii) recall of the names and formulae for the following ions: NO_3^-, CO_3^{2-}, SO_4^{2-}, OH^-, NH_4^+, Zn^{2+} and Ag^+ Lesson 2: 2.1.2 - (a) the writing of formulae of ionic compounds from ionic charges, including: (i) prediction of ionic charge from the position of an element in the periodic table (ii) recall of the names and formulae for the following ions: NO_3^-, CO_3^{2-}, SO_4^{2-}, OH^-, NH_4^+, Zn^{2+} and Ag^+	Lesson 1: 4.1.1 - (b) interpretation and use of the terms: (i) *general formula* (the simplest algebraic formula of a member of a homologous series) e.g. for an alkane: C_nH_{2n+2} (ii) structural formula (the minimal detail that shows the arrangement of atoms in a molecule) e.g. for butane: $CH_3CH_2CH_2CH_3$ or $CH_3(CH_2)_2CH_3$ (iii) *displayed formula* (the relative positioning of atoms and the bonds between them) (iv) *skeletal formula* (the simplified organic formula, shown by removing hydrogen atoms from alkyl chains, leaving just a carbon skeleton and associated functional groups)	Lesson 1: 5.1.1 - (c) calculation of the rate constant, k, and related quantities, from a rate equation including determination of units Lesson 2: 5.1.1 - (d) from a concentration–time graph: (i) deduction of the order (0 or 1) with respect to a reactant from the shape of the graph (ii) calculation of reaction rates from the measurement of gradients **(see also 3.2.2 b)** Lesson 3: 5.1.1 - (d) from a concentration–time graph: (i) deduction of the order (0 or 1) with respect to a reactant from the shape of the graph (ii) calculation of reaction rates from the measurement of gradients **(see also 3.2.2 b)**	Lesson 1: 6.1.1 - (e) the mechanism of electrophilic substitution in arenes for nitration and halogenation **(see also 4.1.1 h–i)** Lesson 2: 6.1.1 - (f) the explanation of the relative resistance to bromination of benzene, compared with alkenes, in terms of the delocalised electron density of the π-system in benzene compared with the localised electron density of the π-bond in alkenes **(see also 4.1.3 a, 6.1.1 a)** Lesson 3: 6.1.1 - (g) the interpretation of unfamiliar electrophilic substitution reactions of aromatic compounds, including prediction of mechanisms

	Lesson 3: 2.1.2 – (b) construction of balanced chemical equations (including ionic equations), including state symbols, for reactions studied and for unfamiliar reactions given appropriate information. Lesson 4: 2.1.2 – (b) construction of balanced chemical equations (including ionic equations), including state symbols, for reactions studied and for unfamiliar reactions given appropriate information.	Lesson 2: 4.1.1 - (c) interpretation and use of the terms: (i) *homologous series* (a series of organic compounds having the same functional group but with each successive member differing by CH_2) (ii) *functional group* (a group of atoms responsible for the characteristic reactions of a compound) (iii) *alkyl group* (of formula C_nH_{2n+1}) (iv) *aliphatic* (a compound containing carbon and hydrogen joined together in straight chains, branched chains or non-aromatic rings) (v) *alicyclic* (an aliphatic compound arranged in non-aromatic rings with or without side chains) (vi) *aromatic* (a compound containing a benzene ring) (vii) *saturated* (single carbon–carbon bonds only) and *unsaturated* (the presence of multiple carbon–carbon bonds, including C=C, C≡C and aromatic rings)	Lesson 4: 5.1.1 - (e) from a concentration–time graph of a first order reaction, measurement of constant half-life, $t_{1/2}$	
Key Words **Level 2** **Level 3**	Mass spectrometer/y, relative isotopic mass, compound ion, state symbol, nitrate, sulfate, phosphate, hydroxide	Hydrocarbon, homologous series, alkane, alkene, alkyl, alicyclic, saturated, unsaturated, isomer/ism, Structural isomer, organic compound, displayed/structural/skeletal molecular formula(e)	rate of reaction, order, overall order, rate constant, half-life, rate-determining step, Arrhenius equation, tangent, gradient, instantaneous	Delocalised, aromatic, electron density, Electron donating, electron withdrawing,
Common Misconceptions	Understanding of compound ions as discrete, whole units, and treating them as such	Naming from the wrong end, missing the longest chain due to branching		Correctly identifying ortho/meta/para position and which groups cause substitution in which place
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.2	Up to & inc. 4.1.1h	Up to & inc. 5.1.1k	Up to & inc. 6.1.1l
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/research-scientist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-technician-plastics/4010921.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemical-engineer	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biochemist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 3 (w/b 19th Sep)	Lesson 1: 2.1.3 - (a) explanation and use of the terms: (i) *amount of substance* (ii) *mole* (symbol 'mol'), as the unit for amount of substance (iii) the *Avogadro constant*, N_A (the number of particles per mole, 6.02×10^{23} mol^{-1}) (iv) *molar mass* (mass per mole, units g mol^{-1}), (v) *molar gas volume* (gas volume per mole, units dm^3 mol^{-1}) Lesson 2: 2.1.3 - (a) explanation and use of the terms: (i) *amount of substance* (ii) *mole* (symbol 'mol'), as the unit for amount of substance (iii) the *Avogadro constant*, N_A (the number of particles per mole, 6.02×10^{23} mol^{-1}) (iv) *molar mass* (mass per mole, units g mol^{-1}), (v) *molar gas volume* (gas volume per mole, units dm^3 mol^{-1}) Lesson 3: 2.1.3 - (b) use of the terms: (i) *empirical formula* (the simplest whole number ratio of atoms of each element present in a compound) (ii) *molecular formula* (the number and type of atoms of each element in a molecule) Lesson 4: 2.1.3 - (c) calculations of empirical and molecular formulae, from composition by mass or	Lesson 1: 4.1.1 - (d) use of the general formula of a homologous series to predict the formula of any member of the series Lesson 2: 4.1.1 - (e) explanation of the term *structural isomers* (compounds with the same molecular formula but different structural formulae) and determination of possible structural formulae of an organic molecule, given its molecular formula	Lesson 1: 5.1.1 - (e) from a concentration–time graph of a first order reaction, measurement of constant half-life, $t_{1/2}$ Lesson 2: 5.1.1 - (f) for a first order reaction, determination of the rate constant, k, from the constant half-life, $t_{1/2}$, using the relationship: $k = \ln 2/t_{1/2}$ Lesson 3: 5.1.1 - (f) for a first order reaction, determination of the rate constant, k, from the constant half-life, $t_{1/2}$, using the relationship: $k = \ln 2/t_{1/2}$ Lesson 4: 5.1.1 - (g) from a rate–concentration graph: (i) deduction of the order (0, 1 or 2) with respect to a reactant from the shape of the graph (ii) determination of rate constant for a first order reaction from the gradient	Lesson 1: 6.1.1 - (h) the weak acidity of phenols shown by the neutralisation reaction with NaOH but absence of reaction with carbonates **(see also 5.1.3 b)** Lesson 2: 6.1.1 - (i) the electrophilic substitution reactions of phenol: (i) with bromine to form 2,4,6-tribromophenol (ii) with dilute nitric acid to form 2-nitrophenol Lesson 3: 6.1.1 - (j) the relative ease of electrophilic substitution of phenol compared with benzene, in terms of electron pair donation to the π-system from an oxygen p-orbital in phenol **(see also 4.1.3 a)**

	percentage compositions by mass and relative molecular mass			
Key Words **Level 2** **Level 3**	Mole, balancing, Avogadro's Constant, ideal gas,	Hydrocarbon, homologous series, alkane, alkene, alkyl, alicyclic, saturated, unsaturated, isomer/ism, Structural isomer, organic compound, displayed/structural/skeletal molecular formula(e)	rate of reaction, order, overall order, rate constant, half-life, rate-determining step, Arrhenius equation, tangent, gradient, instantaneous	Delocalised, aromatic, electron density, Electron donating, electron withdrawing,
Common Misconceptions	Linking the process for working out empirical formulae with Moles, to gain an actual understanding of what they're doing, rather than just using the procedure		Differentiating between experiments where initial rate data is collected and where continuous data is collected, and the types of graph produced for each	
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.2	Up to & inc. 4.1.1h	Up to & inc. 5.1.1k	Up to & inc. 6.1.1l
Life skills Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/research-scientist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-technician-plastics/4010921.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemical-engineer	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biochemist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 4 (w/b 26th Sep)	Lesson 1: 2.1.3 - (c) calculations of empirical and molecular formulae, from composition by mass or percentage compositions by mass and relative molecular mass Lesson 2: 2.1.3 - (c) calculations of empirical and molecular formulae, from composition by mass or percentage compositions by mass and relative molecular mass Lesson 3: 2.1.3. (d) the terms *anhydrous*, *hydrated* and *water of crystallisation* and calculation of the formula of a hydrated salt from given percentage composition, mass composition or based on experimental results Lesson 4: 2.1.3. (d) the terms *anhydrous*, *hydrated* and *water of crystallisation* and calculation of the formula of a hydrated salt from given percentage composition, mass composition or based on experimental results	Lesson 1: 4.1.1 – (f) the different types of covalent bond fission: (i) homolytic fission (in terms of each bonding atom receiving one electron from the bonded pair, forming two radicals) (ii) heterolytic fission (in terms of one bonding atom receiving both electrons from the bonded pair) Lesson 2: 4.1.1 - (g) the term *radical* (a species with an unpaired electron) and use of 'dots' to represent species that are radicals in mechanisms	Lesson 1: 5.1.1 - (g) from a rate–concentration graph: (i) deduction of the order (0, 1 or 2) with respect to a reactant from the shape of the graph (ii) determination of rate constant for a first order reaction from the gradient Lesson 2: 5.1.1 - (h) the techniques and procedures used to investigate reaction rates by the initial rates method and by continuous monitoring, including use of colorimetry **(see also 3.2.2 e)** Lesson 3: 5.1.1 - (i) for a multi-step reaction, prediction of, (i) a rate equation that is consistent with the rate-determining step (ii) possible steps in a reaction mechanism from the rate equation and the balanced equation for the overall reaction Lesson 4: 5.1.1 - (j) a qualitative explanation of the effect of temperature change on the rate of a reaction and hence the rate constant **(see 3.2.2 f–g)**	Lesson 1: 6.1.1 - (k) the 2- and 4-directing effect of electron donating groups (OH, NH_2) and the 3-directing effect of electron-withdrawing groups (NO_2) in electrophilic substitution of aromatic compounds Lesson 2: 6.1.1 - (l) the prediction of substitution products of aromatic compounds by directing effects and the importance to organic synthesis **(see also 6.2.5 Organic Synthesis)**. Lesson 3: Assessment
Key Words **Level 2** **Level 3**	Mole, balancing, Avogadro's Constant, ideal gas,	Homolytic fission, heterolytic fission, radical/free radical, unpaired, initiation, propagation, termination, chain reaction	rate of reaction, order, overall order, rate constant, half-life, rate-determining step, Arrhenius equation, tangent, gradient, instantaneous	Delocalised, aromatic, electron density, Electron donating, electron withdrawing,
Common Misconceptions		Use of dot notation for radicals, use of curly arrows to show electron movement	Basic rules for constructing multi-step equations – 2 species react at a time, intermediates need to be used up, RDS species appear in rate equation	
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.2	Up to & inc. 4.1.1h	Up to & inc. 5.1.1k	Up to & inc. 6.1.1l
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/research-scientist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-technician-plastics/4010921.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemical-engineer	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biochemist

Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 5 (w/b 3rd Oct)	Lesson 1: 2.1.3. (d) the terms *anhydrous*, *hydrated* and *water of crystallisation* and calculation of the formula of a hydrated salt from given percentage composition, mass composition or based on experimental results Lesson 2: 2.1.3. (e) calculations, using amount of substance in mol, involving: (i) mass (ii) gas volume (iii) solution volume and concentration Lesson 3: Assessment Lesson 4: Exemplars	Lesson 1: 4.1.1 - (h) a 'curly arrow' described as the movement of an electron pair, showing either heterolytic fission or formation of a covalent bond Lesson 2: 4.1.1 - (i) reaction mechanisms, using diagrams, to show clearly the movement of an electron pair with 'curly arrows' and relevant dipoles.	Lesson 1: 5.1.1 (k) the Arrhenius equation: (i) the exponential relationship between the rate constant, k and temperature, T given by the Arrhenius equation, $k = Ae^{-Ea/RT}$ (ii) determination of E_a and A graphically using: ln $k = -E_a/RT +$ ln A derived from the Arrhenius equation. Lesson 2: 5.1.1 (k) the Arrhenius equation: (i) the exponential relationship between the rate constant, k and temperature, T given by the Arrhenius equation, $k = Ae^{-Ea/RT}$ (ii) determination of E_a and A graphically using: ln $k = -E_a/RT +$ ln A derived from the Arrhenius equation. Lesson 3: Assessment Lesson 4: Exemplars	Lesson 1: Exemplars Lesson 2: Feedback Lesson 3: Re-test
Key Words Level 2 Level 3	Mole, balancing, Avogadro's Constant, ideal gas,	Curly arrow, reaction mechanism, substitution reaction	rate of reaction, order, overall order, rate constant, half-life, rate-determining step, Arrhenius equation, tangent, gradient, instantaneous	Delocalised, aromatic, electron density, Electron donating, electron withdrawing,
Common Misconceptions				
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.2	Up to & inc. 4.1.1h	Up to & inc. 5.1.1k	Up to & inc. 6.1.1l
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/research-scientist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-technician-plastics/4010921.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemical-engineer	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biochemist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 6 (w/b 10th Oct)	Lesson 1: Feedback Lesson 2: PAG 1 Lesson 3: 2.1.3. (f) the ideal gas equation: $pV = nRT$ Lesson 4: 2.1.3. (g) use of stoichiometric relationships in calculations	Lesson 1: Assessment Lesson 2: Exemplars	Lesson 1: Feedback Lesson 2: Re-test Lesson 3: 5.1.2 - (a) use of the terms *mole fraction* and *partial pressure* Lesson 4: 5.1.2 - (b) calculation of quantities present at equilibrium, given appropriate data	Lesson 1: 6.1.2. (a) oxidation of aldehydes using $Cr_2O_7^{2-}/H^+$ (i.e. $K_2Cr_2O_7/H_2SO_4$) to form carboxylic acids Lesson 2: 6.1.2. (b) nucleophilic addition reactions of carbonyl compounds with: (i) $NaBH_4$ to form alcohols (ii) HCN [i.e. NaCN(aq)/H^+(aq)], to form hydroxynitriles **(see also 6.2.4 b)** Lesson 3: 6.1.2. (c) the mechanism for nucleophilic addition reactions of aldehydes and ketones with $NaBH_4$ and HCN
Key Words Level 2 Level 3	Empirical formula(e), molecular formula(e), percentage composition by mass		Equilibrium, homogeneous, heterogeneous, mole fraction, partial pressure	Delocalised, aromatic, electron density, Electron donating, electron withdrawing,
Common Misconceptions	Using the correct values for P, V and T. Introduction of K as the unit of temp.		Getting mole fraction and partial pressure confused	Curly arrow direction and starting/ending point again…
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.2	Up to & inc. 4.1.1h	Up to & inc. 5.1.1k	Up to & inc. 6.1.1l

Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/research-scientist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-technician-plastics/4010921.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemical-engineer	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biochemist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 7 (w/b 17th Oct)	Lesson 1: 2.1.3. (h) calculations to determine: (i) the percentage yield of a reaction or related quantities (ii) the atom economy of a reaction Lesson 2: 2.1.3. (i) the techniques and procedures required during experiments requiring the measurement of mass, volumes of solutions and gas volumes Lesson 3: 2.1.3. (j) the benefits for sustainability of developing chemical processes with a high atom economy. Lesson 4: 2.1.4 (a) the formulae of the common acids (HCl, H_2SO_4, HNO_3 and CH_3COOH) and the common alkalis (NaOH, KOH and NH_3) and explanation that acids release H^+ ions in aqueous solution and alkalis release OH^- ions in aqueous solution	Lesson 1: Feedback Lesson 2: 4.1.2. (a) alkanes as saturated hydrocarbons containing single C–C and C–H bonds as σ-bonds (overlap of orbitals directly between the bonding atoms); free rotation of the σ-bond	Lesson 1: 5.1.2 - (c) the techniques and procedures used to determine quantities present at equilibrium Lesson 2: 5.1.2 - (d) expressions for K_c and K_p for homogeneous and heterogeneous equilibria **(see also 3.2.3 f)** Lesson 3: Lesson 3: 5.1.2 - (e) calculations of K_c and K_p, or related quantities, including determination of units **(see also 3.2.3 f)** Lesson 4: 5.1.2 - (e) calculations of K_c and K_p, or related quantities, including determination of units **(see also 3.2.3 f)**	Lesson 1: 6.1.2. (d) use of 2,4-dinitrophenylhydrazine to: (i) detect the presence of a carbonyl group in an organic compound (ii) identify a carbonyl compound from the melting point of the derivative Lesson 2: 6.1.2. (e) use of Tollens' reagent (ammoniacal silver nitrate) to: (i) detect the presence of an aldehyde group (ii) distinguish between aldehydes and ketones, explained in terms of the oxidation of aldehydes to carboxylic acids with reduction of silver ions to silver. Lesson 3:
Key Words Level 2 Level 3	anhydrous, hydrated, water of crystallisation, mole, concentration, Avogadro's Constant	Curly arrow, reaction mechanism, substitution reaction, tetrahedral, inductive effect,	Equilibrium, homogeneous, heterogeneous, mole fraction, partial pressure	Delocalised, aromatic, electron density, Electron donating, electron withdrawing,
Common Misconceptions		Link between s and p and σπ bonds		
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.2	Up to & inc. 4.1.1h	Up to & inc. 5.1.1k	Up to & inc. 6.1.1l
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/research-scientist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-technician-plastics/4010921.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemical-engineer	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biochemist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive

	Y12 AEC	Y12 DHN	Y13 DHN	Y13 KMF
Week 8 (w/b 31st Oct)	Lesson 1: 2.1.4 (b) qualitative explanation of strong and weak acids in terms of relative dissociations Lesson 2: 2.1.4 (b) qualitative explanation of strong and weak acids in terms of relative dissociations Lesson 3: 2.1.4. (c) neutralisation as the reaction of: (i) H^+ and OH^- to form H_2O (ii) acids with bases, including	Lesson 1: 4.1.2. (b) explanation of the tetrahedral shape and bond angle around each carbon atom in alkanes in terms of electron pair repulsion (**see also 2.2.2 g–h**) Lesson 2: 4.1.2. (c) explanation of the variations in boiling points of alkanes with different carbon-chain length and branching, in terms of induced dipole–dipole interactions (London forces) (**see also 2.2.2 k**)	Lesson 1: Mock Exams Lesson 2: Mock Exams Lesson 3: Mock Exams Lesson 4: Mock Exams	Lesson 1: Mock Exams Lesson 2: Mock Exams Lesson 3: Mock Exams

	carbonates, metal oxides and alkalis (water-soluble bases), to form salts, including full equations Lesson 4: 2.1.4. (c) neutralisation as the reaction of: (i) H^+ and OH^- to form H_2O (ii) acids with bases, including carbonates, metal oxides and alkalis (water-soluble bases), to form salts, including full equations			
Key Words **Level 2** **Level 3**	Acid, base, alkali, titration, neutralisation, burette, pipette	Curly arrow, reaction mechanism, substitution reaction, tetrahedral, inductive effect,		
Common Misconceptions	How the number of moles of strong and weak acids change due to their different dissociations – this can usefully set the stage for the buffers section in Y13	Pupils will still get confused about intermolecular and intramolecular bonds at this stage		
Homework	Activelearn task suitable to ability of group	Activelearn task suitable to ability of group.	Activelearn task suitable to ability of group.	Activelearn task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.5	Up to & inc. 4.1.2	Up to & inc. 5.1.2e	Up to & inc. 6.1.2
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analyst-higher-apprentice-organic-chemistry/4013064.article		
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 9 **(w/b 7th Nov)**	Lesson 1: 2.1.4 (d) the techniques and procedures used when preparing a standard solution of required concentration and carrying out acid–base titrations Lesson 2: 2.1.4. (d) the techniques and procedures used when preparing a standard solution of required concentration and carrying out acid–base titrations Lesson 3: 2.1.4 (e) structured and non-structured titration calculations, based on experimental results of familiar and non-familiar acids and bases. Lesson 4: 2.1.4 (e) structured and non-structured titration calculations, based on experimental results of familiar and non-familiar acids and bases.	Lesson 1: 4.1.2. (d) the low reactivity of alkanes with many reagents in terms of the high bond enthalpy and very low polarity of the σ-bonds present (**see also 2.2.2 j**) Lesson 2: 4.1.2. (e) complete combustion of alkanes, as used in fuels, and the incomplete combustion of alkane fuels in a limited supply of oxygen with the resulting potential dangers from CO	Lesson 1: Mock Exams Lesson 2: Mock Exams Lesson 3: Mock Exams Lesson 4: Mock Exams	Lesson 1: Mock Exams Lesson 2: Mock Exams Lesson 3: Mock Exams
Key Words **Level 2** **Level 3**	Acid, base, alkali, titration, neutralisation, burette, pipette	Curly arrow, reaction mechanism, substitution reaction, tetrahedral, inductive effect, polarity, electronegativity		
Common Misconceptions	Good practical techniques/details.			
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.5	Up to & inc. 4.1.2	Up to & inc. 5.1.2e	Up to & inc. 6.1.2
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analyst-higher-apprentice-organic-chemistry/4013064.article	LIFE SKILLS: EMPLOYMENT:	LIFE SKILLS: EMPLOYMENT:

Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 10 (w/b 14th Nov)	Lesson 1: PAG2 Lesson 2: PAG2 Lesson 3: 2.1.5. (a) rules for assigning and calculating oxidation number for atoms in elements, compounds and ions Lesson 4: 2.1.5. (b) writing formulae using oxidation numbers	Lesson 1: 4.1.2. (f) the reaction of alkanes with chlorine and bromine by radical substitution using ultraviolet radiation, including a mechanism involving homolytic fission and radical reactions in terms of initiation, propagation and termination (**see also 4.1.1 f–g**) (g) the limitations of radical substitution in synthesis by the formation of a mixture of organic products, in terms of further substitution and reactions at different positions in a carbon chain. Lesson 2: 4.1.2 (g) the limitations of radical substitution in synthesis by the formation of a mixture of organic products, in terms of further substitution and reactions at different positions in a carbon chain.	Lesson 1: Exemplars Lesson 2: Feedback Lesson 3: 5.1.2. (f) (i) the qualitative effect on equilibrium constants of changing temperature for exothermic and endothermic reactions (ii) the constancy of equilibrium constants with changes in concentration, pressure or in the presence of a catalyst Lesson 4: 5.1.2. (g) explanation of how an equilibrium constant controls the position of equilibrium on changing concentration, pressure and temperature	Lesson 1: Exemplars Lesson 2: Feedback Lesson 3: 6.1.3. (a) explanation of the water solubility of carboxylic acids in terms of hydrogen bonding
Key Words **Level 2** **Level 3**	Oxidation, reduction, redox	Radical, initiation, propagation, termination, addition, heterolytic, homolytic, isomerism, electrophile, primary, secondary, tertiary	Equilibrium, homogeneous, heterogeneous, mole fraction, partial pressure	Bronsted-Lowry, acid, base, hydrolysis, esterification
Common Misconceptions	Treating this as just a mathematical operation will get you so far, but linking it to electronegativity can help make sense of why it's happening.	Determining which species is formed at the propagation stage, and how these propagate and terminate through these stages	Constant value of Kc can be confusing, particularly where pressure is concerned	
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.5	Up to & inc. 4.1.2	Up to & inc. 5.1.2e	Up to & inc. 6.1.2
Life skills Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analyst-higher-apprentice-organic-chemistry/4013064.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/process-chemist-higher-apprentice-pharmaceuticals/4013847.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biochemist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 11 (w/b 21st Nov)	Lesson 1: 2.1.5. (c) use of a Roman numeral to indicate the magnitude of the oxidation number when an element may have compounds/ions with different oxidation numbers Lesson 2: 2.1.5. (d) oxidation and reduction in terms of: (i) electron transfer (ii) changes in oxidation number Lesson 3: 2.1.5. (e) redox reactions of metals with acids to form salts, including full equations (**see also 2.1.4 c**) Lesson 4: 2.1.5. (f) interpretation of redox equations in **(e)**, and unfamiliar redox reactions, to make predictions in terms of oxidation numbers and electron loss/gain.	Lesson 1: Revise Lesson 2: Test	Lesson 1: 5.1.2. (h) application of the above principles in **5.1.2 How far?** for K_c, K_p to other equilibrium constants, where appropriate **(see also 5.1.3 c etc.)**. Lesson 2: 5.1.2. (h) application of the above principles in **5.1.2 How far?** for K_c, K_p to other equilibrium constants, where appropriate **(see also 5.1.3 c etc.)**. Lesson 3: 5.1.3. (a) (i) a Brønsted–Lowry acid as a species that donates a proton and a Brønsted–Lowry base as a species that accepts a proton **(see also 2.1.4 Acids)** (ii) use of the term *conjugate acid–base pairs* (iii) monobasic, dibasic and tribasic acids	Lesson 1: 6.1.3. (b) reactions in aqueous conditions of carboxylic acids with metals and bases (including carbonates, metal oxides and alkalis) Lesson 2: 6.1.3. (b) reactions in aqueous conditions of carboxylic acids with metals and bases (including carbonates, metal oxides and alkalis) Lesson 3: 6.1.3. (c) esterification of: (i) carboxylic acids with alcohols in the presence of an acid catalyst (e.g. concentrated H_2SO_4) (ii) acid anhydrides with alcohols

			Lesson 4: 5.1.3. (b) the role of H^+ in the reactions of acids with metals and bases (including carbonates, metal oxides and alkalis), using ionic equations **(see also 2.1.4 c, 2.1.5 e)**	
Key Words **Level 2** **Level 3**	Oxidation, reduction, redox		Equilibrium, homogeneous, heterogeneous, mole fraction, partial pressure Bronsted-Lowry, acid, base, buffer, conjugate, end point, equivalence point, ionic equation	Bronsted-Lowry, acid, base, hydrolysis, esterification
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.5		Up to & inc. 5.1.2e	Up to & inc. 6.1.2
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/process-chemist-higher-apprentice-pharmaceuticals/4013847.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biochemist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 12 (w/b 28th Nov)	Lesson 1: Test Lesson 2: Exemplars Lesson 3: Feedback Lesson 4: 2.2.1. (a) the number of electrons that can fill the first four shells (d) deduction of the electron configurations of: (i) atoms, given the atomic number, up to $Z = 36$ (ii) ions, given the atomic number and ionic charge, limited to s- and p-blocks up to $Z = 36$	Lesson 1: Exemplars Lesson 2: Feedback	Lesson 1: 5.1.3. (c) (i) the acid dissociation constant, K_a, for the extent of acid dissociation **(see also 2.1.4 b)** (ii) the relationship between K_a and pK_a Lesson 2: 5.1.3. (d) use of the expression for pH as: • $pH = -\log[H^+]$ • $[H^+] = 10^{-pH}$ Lesson 3: 5.1.3. (e) use of the expression for the ionic product of water, K_w Lesson 4: 5.1.3. (f) calculations of pH, or related quantities, for: (i) strong monobasic acids (ii) strong bases, using K_w	Lesson 1: 6.1.3. (c) esterification of: (i) carboxylic acids with alcohols in the presence of an acid catalyst (e.g. concentrated H_2SO_4) (ii) acid anhydrides with alcohols Lesson 2: 6.1.3. (d) hydrolysis of esters: (i) in hot aqueous acid to form carboxylic acids and alcohols (ii) in hot aqueous alkali to form carboxylate salts and alcohols Lesson 3: 6.1.3. (e) the formation of acyl chlorides from carboxylic acids using $SOCl_2$
Key Words **Level 2** **Level 3**	Oxidation, reduction, redox		Bronsted-Lowry, acid, base, buffer, conjugate, end point, equivalence point, ionic equation	Bronsted-Lowry, acid, base, hydrolysis, esterification
Common Misconceptions				Which O is removed in esterification, the acid or the alcohol..?
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.5	Up to & inc. 4.1.2	Up to & inc. 5.1.2e	Up to & inc. 6.1.2
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/process-chemist-higher-apprentice-pharmaceuticals/4013847.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biochemist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 13 (w/b 5th Dec)	Lesson 1: 2.2.1. (a) the number of electrons that can fill the first four shells (d) deduction of the electron configurations of: (i) atoms, given the atomic number, up to $Z = 36$ (ii) ions, given the	Lesson 1: 4.1.3. (a) alkenes as unsaturated hydrocarbons containing a C=C bond comprising a π-bond (sideways overlap of adjacent p-orbitals above and below the bonding C atoms) and a σ-bond (overlap of orbitals directly between	Lesson 1: 5.1.3. (g) calculations of pH, K_a or related quantities, for a weak monobasic acid using approximations	Lesson 1: 6.1.3. (f) use of acyl chlorides in synthesis in formation of esters, carboxylic acids and primary and secondary amides.

	atomic number and ionic charge, limited to s- and p-blocks up to $Z = 36$ Lesson 2: 2.2.1 (b) atomic orbitals, including: (i) as a region around the nucleus that can hold up to two electrons, with opposite spins (ii) the shapes of s- and p-orbitals (iii) the number of orbitals making up s-, p- and d-sub-shells, and the number of electrons that can fill s-, p- and d-sub-shells Lesson 3: 2.2.1 (b) atomic orbitals, including: (i) as a region around the nucleus that can hold up to two electrons, with opposite spins (ii) the shapes of s- and p-orbitals (iii) the number of orbitals making up s-, p- and d-sub-shells, and the number of electrons that can fill s-, p- and d-sub-shells Lesson 4: 2.2.1 (c) filling of orbitals: (i) for the first three shells and the 4s and 4p orbitals in order of increasing energy (ii) for orbitals with the same energy, occupation singly before pairing	the bonding atoms) (**see also 4.1.2 a**); restricted rotation of the π-bond Lesson 2: 4.1.3. (a) alkenes as unsaturated hydrocarbons containing a C=C bond comprising a π-bond (sideways overlap of adjacent p-orbitals above and below the bonding C atoms) and a σ-bond (overlap of orbitals directly between the bonding atoms) (**see also 4.1.2 a**); restricted rotation of the π-bond	Lesson 2: 5.1.3. (h) limitations of using approximations to K_a related calculations for 'stronger' weak acids Lesson 3: 5.1.3. (i) a buffer solution as a system that minimises pH changes on addition of small amounts of an acid or a base Lesson 4: 5.1.3. (i) a buffer solution as a system that minimises pH changes on addition of small amounts of an acid or a base	Lesson 2: 6.2.1. (a) the basicity of amines in terms of proton acceptance by the nitrogen lone pair and the reactions of amines with dilute acids, e.g. HC/(aq), to form salts Lesson 3: 6.2.1. (b) the preparation of: (i) aliphatic amines by substitution of haloalkanes with excess ethanolic ammonia and amines (ii) aromatic amines by reduction of nitroarenes using tin and concentrated hydrochloric acid.
Key Words **Level 2** **Level 3**	Oxidation, reduction, redox	addition, heterolytic, homolytic, isomerism, electrophile, primary, secondary, tertiary, CIP, Markownikoff	Bronsted-Lowry, acid, base, buffer, conjugate, end point, equivalence point, ionic equation	Amine, proton acceptor
Common Misconceptions	Confusion between oxidising agent and oxidised/reducing agent and reduced	Inductive effect – if pupils write methyl groups as $-CH_3$ they can sometimes overextend the inductive effect and confuse it's application to Markownikoff's rule	Buffer calculations – try using H-H Equation, but the issue can be the changes in concentration – try using an ICE calculation method	
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.5	Up to & inc. 4.1.2	Up to & inc. 5.1.2e	Up to & inc. 6.1.2
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analyst-higher-apprentice-organic-chemistry/4013064.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/process-chemist-higher-apprentice-pharmaceuticals/4013847.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/medicinal-chemist/4013025.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 14 (w/b 12th Dec)	Lesson 1: 2.2.1 (c) filling of orbitals: (i) for the first three shells and the 4s and 4p orbitals in order of increasing energy (ii) for orbitals with the same energy, occupation singly before pairing Lesson 2: 2.2.2. (a) ionic bonding as electrostatic attraction between positive and negative ions, and the construction of '*dot-and-cross*' diagrams Lesson 3: 2.2.2. (a) ionic bonding as electrostatic attraction between positive and negative ions, and the construction of '*dot-and-cross*' diagrams Lesson 4: 2.2.2. (b) explanation of the solid structures of giant ionic lattices, resulting from oppositely charged ions strongly attracted in all directions e.g. NaC*l*	Lesson 1: 4.1.3. (b) explanation of the trigonal planar shape and bond angle around each carbon in the C=C of alkenes in terms of electron pair repulsion (**see also 2.2.2 g–h, 4.1.2 b**) Lesson 2: 4.1.3. (b) explanation of the trigonal planar shape and bond angle around each carbon in the C=C of alkenes in terms of electron pair repulsion (**see also 2.2.2 g–h, 4.1.2 b**)	Lesson 1: 5.1.3. (j) formation of a buffer solution from: (i) a weak acid and a salt of the weak acid, e.g. CH_3COOH/CH_3COONa (ii) excess of a weak acid and a strong alkali, e.g. excess $CH_3COOH/NaOH$ Lesson 2: 5.1.3. (j) formation of a buffer solution from: (i) a weak acid and a salt of the weak acid, e.g. CH_3COOH/CH_3COONa (ii) excess of a weak acid and a strong alkali, e.g. excess $CH_3COOH/NaOH$ Lesson 3: 5.1.3. (k) explanation of the role of the conjugate acid–base pair in an acid buffer solution, e.g. CH_3COOH/CH_3COO^-, in the control of pH Lesson 4: 5.1.3. (l) calculation of the pH of a buffer solution, from the K_a value of a weak acid and the equilibrium concentrations of the conjugate acid–base pair; calculations of related quantities	Lesson 1: 6.2.1. (b) the preparation of: (i) aliphatic amines by substitution of haloalkanes with excess ethanolic ammonia and amines (ii) aromatic amines by reduction of nitroarenes using tin and concentrated hydrochloric acid. Lesson 2: 6.2.2. (a) the general formula for an α-amino acid as $RCH(NH_2)COOH$ and the following reactions of amino acids: (i) reaction of the carboxylic acid group with alkalis and in the formation of esters **(see also 6.1.3 c)** (ii) reaction of the amine group with acids Lesson 3: 6.2.2. (b) structures of primary and secondary amides **(see also 6.1.3 f, 6.2.3 a–b)**

Key Words **Level 2** **Level 3**	Electron configuration, shell, sub-shell	addition, heterolytic, homolytic, isomerism, electrophile, primary, secondary, tertiary, CIP, Markownikoff	Bronsted-Lowry, acid, base, buffer, conjugate, end point, equivalence point, ionic equation	Amine, proton acceptor
Common Misconceptions	Trend in bond strength as it relates to charge and radius can be taught usefully here	Inductive effect – if pupils write methyl groups as $-CH_3$ they can sometimes overextend the inductive effect and confuse it's application to Markownikoff's rule		
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.1.5	Up to & inc. 4.1.2	Up to & inc. 5.1.2e	Up to & inc. 6.1.2
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analyst-higher-apprentice-organic-chemistry/4013064.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/process-chemist-higher-apprentice-pharmaceuticals/4013847.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/medicinal-chemist/4013025.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 15 (w/b 19th Dec)	Lesson 1: 2.2.2. (b) explanation of the solid structures of giant ionic lattices, resulting from oppositely charged ions strongly attracted in all directions e.g. NaCl Lesson 2: 2.2.2. (c) explanation of the effect of structure and bonding on the physical properties of ionic compounds, including melting and boiling points, solubility and electrical conductivity in solid, liquid and aqueous states Lesson 3: 2.2.2. (d) covalent bond as the strong electrostatic attraction between a shared pair of electrons and the nuclei of the bonded atoms Lesson 4: 2.2.2. (e) construction of '*dot-and-cross*' diagrams of molecules and ions to describe: (i) single covalent bonding (ii) multiple covalent bonding (iii) dative covalent (coordinate) bonding	Lesson 1: 4.1.3. (c) (i) explanation of the terms: • *stereoisomers* (compounds with the same structural formula but with a different arrangement in space); • *E/Z isomerism* (an example of stereoisomerism, in terms of restricted rotation about a double bond and the requirement for two different groups to be attached to each carbon atom of the C=C group); • *cis–trans isomerism* (a special case of *E*/*Z* isomerism in which two of the substituent groups attached to each carbon atom of the C=C group are the same) (ii) use of Cahn–Ingold–Prelog (CIP) priority rules to identify the *E* and *Z* stereoisomers (d) determination of possible *E/Z* or *cis–trans* stereoisomers of an organic molecule, given its structural formula Lesson 2: 4.1.3. (c) (i) explanation of the terms: • *stereoisomers* (compounds with the same structural formula but with a different arrangement in space); • *E/Z isomerism* (an example of stereoisomerism, in terms of restricted rotation about a double bond and the requirement for two different groups to be attached to each carbon atom of the C=C group); • *cis–trans isomerism* (a special case of *E*/*Z* isomerism in which two of the substituent groups attached to each carbon atom of the C=C group are the same) (ii) use of Cahn–Ingold–Prelog (CIP) priority rules to identify the *E* and *Z* stereoisomers (d) determination of possible *E/Z* or *cis–trans* stereoisomers of an organic molecule, given its structural formula	Lesson 1: 5.1.3. (m) explanation of the control of blood pH by the carbonic acid–hydrogencarbonate buffer system Lesson 2: 5.1.3. (n) pH titration curves for combinations of strong and weak acids with strong and weak bases, including: (i) sketch and interpretation of their shapes (ii) explanation of the choice of suitable indicators, given the pH range of the indicator (iii) explanation of indicator colour changes in terms of equilibrium shift between the HA and A^- forms of the indicator Lesson 3: 5.1.3. (n) pH titration curves for combinations of strong and weak acids with strong and weak bases, including: (i) sketch and interpretation of their shapes (ii) explanation of the choice of suitable indicators, given the pH range of the indicator (iii) explanation of indicator colour changes in terms of equilibrium shift between the HA and A^- forms of the indicator Lesson 4: PAG11	Lesson 1: 6.2.2. (c) optical isomerism (an example of stereoisomerism, in terms of nonsuperimposable mirror images about a chiral centre) **(see also 4.1.3 c–d)** Lesson 2: 6.2.2. (d) identification of chiral centres in a molecule of any organic compound. Lesson 3: 6.2.2. (d) identification of chiral centres in a molecule of any organic compound.
Key Words **Level 2** **Level 3**	Enthalpy, bonding pair, lone pair, dative covalent bond, intermolecular forces, dipole, dispersion, polar, non-polar, electronegativity	addition, heterolytic, homolytic, isomerism, electrophile, primary, secondary, tertiary, CIP, Markownikoff	Bronsted-Lowry, acid, base, buffer, conjugate, end point, equivalence point, ionic equation	Amine, proton acceptor
Common Misconceptions		Cis/trans as a special case of E/Z		
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.

Assessment this half-term	Up to & inc. 2.1.5	Up to & inc. 4.1.2	Up to & inc. 5.1.2e	Up to & inc. 6.1.2
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analytical-chemists-thames-water/4011778.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analyst-higher-apprentice-organic-chemistry/4013064.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/process-chemist-higher-apprentice-pharmaceuticals/4013847.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/medicinal-chemist/4013025.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive

Foundation	Y12 AEC	Y12 DHN	Y13 DHN	Y13 KMF
Week 16 (w/b Wed 4th Jan)	Lesson 1: 2.2.2. (f) use of the term *average bond enthalpy* as a measurement of covalent bond strength Lesson 2: 2.2.2. (g) the shapes of, and bond angles in, molecules and ions with up to six electron pairs (including lone pairs) surrounding the central atom as predicted by electron pair repulsion, including the relative repulsive strengths of bonded pairs and lone pairs of electrons Lesson 3: 2.2.2. (h) electron pair repulsion to explain the following shapes of molecules and ions: linear, non-linear, trigonal planar, pyramidal, tetrahedral and octahedral Lesson 4: 2.2.2. (i) electronegativity as the ability of an atom to attract the bonding electrons in a covalent bond; interpretation of Pauling electronegativity values	Lesson 1: 4.1.3. (e) the reactivity of alkenes in terms of the relatively low bond enthalpy of the π-bond Lesson 2: 4.1.3 (f) addition reactions of alkenes with: (i) hydrogen in the presence of a suitable catalyst, e.g. Ni, to form alkanes (ii) halogens to form dihaloalkanes, including the use of bromine to detect the presence of a double C=C bond as a test for unsaturation in a carbon chain (iii) hydrogen halides to form haloalkanes (iv) steam in the presence of an acid catalyst, e.g. H_3PO_4, to form alcohols (g) definition and use of the term *electrophile* (an electron pair acceptor) (h) the mechanism of electrophilic addition in alkenes by heterolytic fission (**see also 4.1.1 h–i**)	Lesson 1: PAG11 Lesson 2: PAG11 Lesson 3: 5.2.1. (a) explanation of the term *lattice enthalpy* (formation of 1 mol of ionic lattice from gaseous ions, $\Delta_{LE}H$) and use as a measure of the strength of ionic bonding in a giant ionic lattice **(see also 2.2.2 b–c)** Lesson 4: 5.2.1. (b) use of the lattice enthalpy of a simple ionic solid (i.e. NaCl, $MgCl_2$) and relevant energy terms for: (i) the construction of Born–Haber cycles (ii) related calculations	Lesson 1: 6.2.3. (a) condensation polymerisation to form: (i) polyesters (ii) polyamides Lesson 2: 6.2.3. (a) condensation polymerisation to form: (i) polyesters (ii) polyamides Lesson 3: 6.2.3. (b) the acid and base hydrolysis of: (i) the ester groups in polyesters (ii) the amide groups in polyamides
Key Words Level 2 Level 3	Enthalpy, bonding pair, lone pair, dative covalent bond, intermolecular forces, dipole, dispersion, polar, non-polar, electronegativity, enthalpy	addition, heterolytic, homolytic, isomerism, electrophile, primary, secondary, tertiary, CIP, Markownikoff	Enthalpy, lattice enthalpy, enthalpy of formation, enthalpy of combustion, enthalpy of solution, Born-Haber cycle, electron affinity,	Condensation, polymerisation, monomer, esterification, repeating unit, hydrolysis
Common Misconceptions		Curly arrows, conservation of charge at each stage	When calculating LE from a Born-Haber cycle remember that it is clockwise from elements = anticlockwise from elements. Attention to detail can be an issue – signs, state symbols, number of moles all need to be correct	
Homework	Activelearn task suitable to ability of group	Activelearn task suitable to ability of group.	Activelearn task suitable to ability of group.	Activelearn task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.2.2o	Up to & inc. 4.1.3k	Up to & inc. 5.2.2k	Up to & inc. 6.2.4d
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analyst-higher-apprentice-organic-chemistry/4013064.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analyst-higher-apprentice-organic-chemistry/4013064.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sustainability-manager/4010821.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biomedical-scientist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive

Week 17 (w/b 9th Jan)	Lesson 1: 2.2.2. (j) explanation of: (i) a polar bond and permanent dipole within molecules containing covalently-bonded atoms with different electronegativities (ii) a polar molecule and overall dipole in terms of permanent dipole(s) and molecular shape Lesson 2: 2.2.2. (k) intermolecular forces based on permanent dipole–dipole interactions and induced dipole– dipole interactions Lesson 3: 2.2.2. (l) hydrogen bonding as intermolecular bonding between molecules containing N, O or F and the H atom of –NH, –OH or HF Lesson 4: 2.2.2. (m) explanation of anomalous properties of H_2O resulting from hydrogen bonding, e.g.: (i) the density of ice compared with water (ii) its relatively high melting and boiling points	Lesson 1: 4.1.3 (f) addition reactions of alkenes with: (i) hydrogen in the presence of a suitable catalyst, e.g. Ni, to form alkanes (ii) halogens to form dihaloalkanes, including the use of bromine to detect the presence of a double C=C bond as a test for unsaturation in a carbon chain (iii) hydrogen halides to form haloalkanes (iv) steam in the presence of an acid catalyst, e.g. H_3PO_4, to form alcohols (g) definition and use of the term *electrophile* (an electron pair acceptor) (h) the mechanism of electrophilic addition in alkenes by heterolytic fission (**see also 4.1.1 h–i**) Lesson 2: 4.1.3 (i) use of Markownikoff's rule to predict formation of a major organic product in addition reactions of H–X to unsymmetrical alkenes, e.g. H–Br to propene, in terms of the relative stabilities of carbocation intermediates in the mechanism	Lesson 1: 5.2.1. (c) explanation and use of the terms: (i) *enthalpy change of solution* (dissolving of 1 mol of solute, $\Delta_{sol}H$) (ii) *enthalpy change of hydration* (dissolving of 1 mol of gaseous ions in water, $\Delta_{hyd}H$) Lesson 2: 5.2.1. (c) explanation and use of the terms: (i) *enthalpy change of solution* (dissolving of 1 mol of solute, $\Delta_{sol}H$) (ii) *enthalpy change of hydration* (dissolving of 1 mol of gaseous ions in water, $\Delta_{hyd}H$) Lesson 3: 5.2.1. (d) use of the enthalpy change of solution of a simple ionic solid (i.e. NaCl, $MgCl_2$) and relevant energy terms (*enthalpy change of hydration* and *lattice enthalpy*) for: (i) the construction of enthalpy cycles (ii) related calculations Lesson 3: 5.2.1. (e) qualitative explanation of the effect of ionic charge and ionic radius on the exothermic value of a lattice enthalpy and enthalpy change of hydration.	Lesson 1: 6.2.3. (b) the acid and base hydrolysis of: (i) the ester groups in polyesters (ii) the amide groups in polyamides Lesson 2: 6.2.3. (c) prediction from addition and condensation polymerisation of: (i) the repeat unit from a given monomer(s) (ii) the monomer(s) required for a given section of a polymer molecule (iii) the type of polymerisation Lesson 3: 6.2.4. (a) the use of C–C bond formation in synthesis to increase the length of a carbon chain **(see also 6.1.1 d, 6.1.2 b)**
Key Words **Level 2** **Level 3**	Enthalpy, bonding pair, lone pair, dative covalent bond, intermolecular forces, dipole, dispersion, polar, non-polar, electronegativity, enthalpy	addition, heterolytic, homolytic, isomerism, electrophile, primary, secondary, tertiary, CIP, Markownikoff	Enthalpy, lattice enthalpy, enthalpy of formation, enthalpy of combustion, enthalpy of solution, Born-Haber cycle, electron affinity,	Condensation, polymerisation, monomer, esterification, repeating unit, hydrolysis
Common Misconceptions	Identification of IM forces correctly in different compounds	Use of curly arrows	The calculations aren't hugely difficult, but the attention to detail needed makes them more difficult than they seem: + and – can be confused	Pupils sometimes forget about the C in the nitrile group
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.2.2o	Up to & inc. 4.1.3k	Up to & inc. 5.2.2k	Up to & inc. 6.2.4d
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analyst-higher-apprentice-organic-chemistry/4013064.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sustainability-manager/4010821.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biomedical-scientist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 18 (w/b 16th Jan)	Lesson 1: 2.2.2. (n) explanation of the solid structures of simple molecular lattices, as covalently bonded molecules attracted by intermolecular forces, e.g. I_2, ice Lesson 2: 2.2.2. (o) explanation of the effect of structure and bonding on the physical properties of covalent compounds with simple molecular lattice structures including melting and boiling points, solubility and electrical conductivity. Lesson 3: Assessment Lesson 4: Exemplar	Lesson 1: 4.1.3 (j) addition polymerisation of alkenes and substituted alkenes, including: (i) the repeat unit of an addition polymer deduced from a given monomer (ii) identification of the monomer that would produce a given section of an addition polymer Lesson 2: 4.1.3. (k) the benefits for sustainability of processing waste polymers by: (i) combustion for energy production (ii) use as an organic feedstock for the production of plastics and other organic chemicals (iii) removal of toxic waste products, e.g. removal of HCl formed during disposal by combustion of halogenated plastics (e.g. PVC) (l) the benefits to the environment of development of biodegradable and photodegradable polymers.	Lesson : 5.2.2. (a) explanation and use of the terms *oxidising agent* and *reducing agent* **(see also 2.1.5 Redox)** Lesson 2: 5.2.2. (b) construction of redox equations using half-equations and oxidation numbers (c) interpretation and prediction of reactions involving electron transfer Lesson 3: 5.2.2. (d) the techniques and procedures used when carrying out redox titrations including those involving Fe^{2+}/MnO_4^- and $I_2/S_2O_3^{2-}$ **(see also 2.1.5 e–f)** (e) structured and non-structured titration calculations, based on experimental results of redox titrations involving: (i) Fe^{2+}/MnO_4^- and $I_2/S_2O_3^{2-}$ (ii) non-familiar redox systems Lesson 4: 5.2.2. (f) use of the term standard electrode (redox) potential, $E^{\ominus}$ including its measurement using a hydrogen electrode (g) the techniques and procedures used for the measurement of cell potentials of: (i) metals or non-metals in contact with their ions in aqueous solution (ii) ions of the same element in different oxidation states in contact with a Pt electrodE	Lesson 1: 6.2.4. (b) formation of C–C≡N⁻ by reaction of: (i) haloalkanes with CN^- and ethanol, including nucleophilic substitution mechanism **(see also 4.2.2 c)** (ii) carbonyl compounds with HCN, including nucleophilic addition mechanism **(see also 6.1.2 b–c)** Lesson 2: 6.2.4. (b) formation of C–C≡N⁻ by reaction of: (i) haloalkanes with CN^- and ethanol, including nucleophilic substitution mechanism **(see also 4.2.2 c)** (ii) carbonyl compounds with HCN, including nucleophilic addition mechanism **(see also 6.1.2 b–c)** Lesson 3: 6.2.4. (b) formation of C–C≡N⁻ by reaction of: (i) haloalkanes with CN^- and ethanol, including nucleophilic substitution mechanism **(see also 4.2.2 c)** (ii) carbonyl compounds with HCN, including nucleophilic addition mechanism **(see also 6.1.2 b–c)**

Key Words **Level 2** **Level 3**	Enthalpy, bonding pair, lone pair, dative covalent bond, intermolecular forces, dipole, dispersion, polar, non-polar, electronegativity, enthalpy	addition, heterolytic, homolytic, isomerism, electrophile, primary, secondary, tertiary, CIP, Markownikoff	Enthalpy, lattice enthalpy, enthalpy of formation, enthalpy of combustion, enthalpy of solution, Born-Haber cycle, electron affinity, oxidising/reducing agent, oxidation, reduction, disproportionation, entropy, Gibbs free energy	Alkylation, acylation, nucleophile, addition, substitution, reduction,
Common Misconceptions	Trends across periods are related to type of intramolecular bond, trends within types of intramolecular bond are related to strength of intermolecular bond (i.e P-Cl MP/BP trends).	Correctly identifying monomers from polymers and vice-versa	Balancing has to be in terms of change of oxidation number as well as chemically	
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.2.2o	Up to & inc. 4.1.3k	Up to & inc. 5.2.2k	Up to & inc. 6.2.4d
Life skills Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/analyst-higher-apprentice-organic-chemistry/4013064.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sustainability-manager/4010821.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biomedical-scientist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 19 (w/b 23rd Jan)	Lesson 1: Feedback Lesson 2: Re-test Lesson 3: 3.1.1 - (a) the periodic table as the arrangement of elements: (i) by increasing atomic (proton) number (ii) in periods showing repeating trends in physical and chemical properties (periodicity) (iii) in groups having similar chemical properties (b) (i) the periodic trend in electron configurations across Periods 2 and 3 (**see also 2.2.1 d**) (ii) classification of elements into s-, p- and d-blocks Lesson 4: 3.1.1 - (c) first ionisation energy (removal of 1 mol of electrons from 1 mol of gaseous atoms) and successive ionisation energy, and: (i) explanation of the trend in first ionisation energies across Periods 2 and 3, and down a group, in terms of attraction, nuclear charge and atomic radius (ii) prediction from successive ionisation energies of the number of electrons in each shell of an atom and the group of an element	Lesson 1: Assessment Lesson 2: Feedback	Lesson 1: 5.2.2. (h) calculation of a standard cell potential by combining two standard electrode potentials (i) prediction of the feasibility of a reaction using standard cell potentials and the limitations of such predictions in terms of kinetics and concentration Lesson 2: 5.2.2. (j) application of principles of electrode potentials to modern storage cells (k) explanation that a fuel cell uses the energy from the reaction of a fuel with oxygen to create a voltage and the changes that take place at each electrode. Lesson 3: 5.2.2. (j) application of principles of electrode potentials to modern storage cells (k) explanation that a fuel cell uses the energy from the reaction of a fuel with oxygen to create a voltage and the changes that take place at each electrode. Lesson 4: Assessment	Lesson 1: 6.2.4. (c) reaction of nitriles from (b): (i) by reduction (e.g. with H_2/Ni) to form amines (ii) by acid hydrolysis to form carboxylic acids Lesson 2: 6.2.4. (d) formation of a substituted aromatic C–C by alkylation (using a haloalkane) and acylation (using an acyl chloride) in the presence of a halogen carrier (Friedel–Crafts reaction) **(see also 6.1.1 d)**. Lesson 3: Assessment
Key Words **Level 2** **Level 3**	Electron configuration, Ionisation energy, atomic radius, shielding		Standard hydrogen electrode, half-cell, electrode, oxidation, reduction, feasibility, potential difference	Alkylation, acylation, nucleophile, addition, substitution, reduction,
Common Misconceptions	Trends in IE can be pernickety – but if they just write about shielding/number of shells, effective nuclear attraction it's fairly straightforward		E = Ep – En. Identify the negative and positive electrodes first Feasible does not mean fast – it just means it can happen. A large E_a may mean it is very slow/negligible	
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.2.2o	Up to & inc. 4.1.3k	Up to & inc. 5.2.2k	Up to & inc. 6.2.4d
Career opportunities	EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemist	EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/pharmacologist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sustainability-manager/4010821.article	EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biomedical-scientist

Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 20 (w/b 30th Jan)	Lesson 1: 3.1.1 - (c) first ionisation energy (removal of 1 mol of electrons from 1 mol of gaseous atoms) and successive ionisation energy, and: (i) explanation of the trend in first ionisation energies across Periods 2 and 3, and down a group, in terms of attraction, nuclear charge and atomic radius (ii) prediction from successive ionisation energies of the number of electrons in each shell of an atom and the group of an element Lesson 2: 3.1.1 - (d) explanation of: (i) metallic bonding as strong electrostatic attraction between cations (positive ions) and delocalised electrons (ii) a giant metallic lattice structure, e.g. all metals	Lesson 1: Exemplars Lesson 2: 4.2.1. (a) (i) the polarity of alcohols and an explanation, in terms of hydrogen bonding, of the water solubility and the relatively low volatility of alcohols compared with alkanes (**see also 2.2.2 l and 4.1.2 c**) (ii) classification of alcohols into primary, secondary and tertiary alcohols	Lesson 1: Feedback Lesson 2: Exemplars Lesson 3: 5.2.3. (a) explanation and use of the terms *oxidising agent* and *reducing agent* **(see also 2.1.5 Redox)** Lesson 4: 5.2.3. (b) construction of redox equations using half-equations and oxidation numbers	Lesson 1: Feedback Lesson 2: Exemplars
Key Words **Level 2** **Level 3**	Electron configuration, Ionisation energy, atomic radius, shielding	Primary, secondary, tertiary, oxidation, combustion, aldehyde, ketone, carboxylic acid	Standard hydrogen electrode, half-cell, electrode, oxidation, reduction, feasibility, potential difference	
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.2.2o	Up to & inc. 4.1.3k	Up to & inc. 5.2.2k	Up to & inc. 6.2.4d
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemist	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/pharmacologist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sustainability-manager/4010821.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biomedical-scientist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 21 (w/b 6th Feb)	Lesson 1: 3.1.1 – (e) explanation of the solid giant covalent lattices of carbon (diamond, graphite and graphene) and silicon as networks of atoms bonded by strong covalent bonds Lesson 2: 3.1.1 - (f) explanation of physical properties of giant metallic and giant covalent lattices, including melting and boiling points, solubility and electrical conductivity in terms of structure and bonding (g) explanation of the variation in melting points across Periods 2 and 3 in terms of structure and bonding (**see also 2.2.2 o**). Lesson 3: 3.1.2 - (a) the outer shell s^2 electron configuration and the loss of these electrons in redox reactions to form 2+ ions Lesson 4: 3.1.2 - (b) the relative reactivities of the Group 2 elements Mg → Ba shown by their redox reactions with: (i) oxygen (ii) water (iii) dilute acids	Lesson 1: 4.2.1. (b) combustion of alcohols Lesson 2: 4.2.1. (c) oxidation of alcohols by an oxidising agent, e.g. $Cr_2O_7^{2-}/H_+$ (i.e. $K_2Cr_2O_7/H_2SO_4$), including: (i) the oxidation of primary alcohols to form aldehydes and carboxylic acids; the control of the oxidation product using different reaction conditions (ii) the oxidation of secondary alcohols to form ketones (iii) the resistance to oxidation of tertiary alcohols	Lesson 1: 5.2.3. (c) interpretation and prediction of reactions involving electron transfer Lesson 2: 5.2.3. (d) the techniques and procedures used when carrying out redox titrations including those involving Fe^{2+}/MnO_4^- and $I_2/S_2O_3^{2-}$ **(see also 2.1.5 e–f)** Lesson 3: 5.2.3. (d) the techniques and procedures used when carrying out redox titrations including those involving Fe^{2+}/MnO_4^- and $I_2/S_2O_3^{2-}$ **(see also 2.1.5 e–f)** Lesson 4: PAG8	Lesson 1: 6.2.5. (a) the techniques and procedures used for the preparation and purification of organic solids involving use of a range of techniques **(see also 4.2.3 a)** including: (i) organic preparation • use of Quickfit apparatus • distillation and heating under reflux (ii) purification of an organic solid • filtration under reduced pressure • recrystallisation • measurement of melting points Lesson 2: 6.2.5. (b) for an organic molecule containing several functional groups: (i) identification of individual functional groups (ii) prediction of properties and reactions Lesson 3: 6.2.5. (c) multi-stage synthetic routes for preparing organic compounds.

Key Words **Level 2** **Level 3**	Electron configuration, Ionisation energy, atomic radius, shielding, lattice, electrostatic	Primary, secondary, tertiary, oxidation, combustion, aldehyde, ketone, carboxylic acid	Standard hydrogen electrode, half-cell, electrode, oxidation, reduction, feasibility, potential difference	Distillation, reflux, recrystallisation, melting point,
Common Misconceptions		Difference between reflux and distillation and their effects	Predicting direction can be problematic, but identify the negative electrode and then arrange it so that it is a source of electrons	
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.2.2o	Up to & inc. 4.1.3k	Up to & inc. 5.2.2k	Up to & inc. 6.2.4d
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemist	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/pharmacologist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sustainability-manager/4010821.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biomedical-scientist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 22 (w/b 13th Feb)	Lesson 1: 3.1.2 - (c) the trend in reactivity in terms of the first and second ionisation energies of Group 2 elements down the group (**see also 3.1.1 c**) Lesson 2: 3.1.2 - (d) the action of water on Group 2 oxides and the approximate pH of any resulting solutions, including the trend of increasing alkalinity Lesson 3: 3.1.2 - (e) uses of some Group 2 compounds as bases, including equations, for example (but not limited to): (i) $Ca(OH)_2$ in agriculture to neutralise acid soils (ii) $Mg(OH)_2$ and $CaCO_3$ as 'antacids' in treating indigestion. Lesson 4: 3.1.3 - (a) existence of halogens as diatomic molecules and explanation of the trend in the boiling points of Cl_2, Br_2 and I_2, in terms of induced dipole–dipole interactions (London forces) (**see also 2.2.2 k**)	Lesson 1: 4.2.1 (d) elimination of H_2O from alcohols in the presence of an acid catalyst (e.g. H_3PO_4 or H_2SO_4) and heat to form alkenes Lesson 2: 4.2.1 (e) substitution with halide ions in the presence of acid (e.g. NaBr/H_2SO_4) to form haloalkanes	Lesson 1: PAG8 Lesson 2: 5.2.3. (e) structured and non-structured titration calculations, based on experimental results of redox titrations involving: (i) Fe^{2+}/MnO_4^- and $I_2/S_2O_3^{2-}$ (ii) non-familiar redox systems Lesson 3: 5.2.3. (e) structured and non-structured titration calculations, based on experimental results of redox titrations involving: (i) Fe^{2+}/MnO_4^- and $I_2/S_2O_3^{2-}$ (ii) non-familiar redox systems Lesson 4: 5.2.3. (f) use of the term standard electrode (redox) potential, $E^\ominus$ including its measurement using a hydrogen electrode	Lesson 1: PAG6 Lesson 2: PAG6 Lesson 3: PAG6
Key Words **Level 2** **Level 3**	Electron configuration, Ionisation energy, atomic radius, shielding, lattice, electrostatic	Primary, secondary, tertiary, oxidation, combustion, aldehyde, ketone, carboxylic acid, addition, elimination, substitution	Standard hydrogen electrode, half-cell, electrode, oxidation, reduction, feasibility, potential difference	Distillation, reflux, recrystallisation, melting point,
Common Misconceptions	Base/alkali	Identification reaction type (elimination/substitution/addition/etc	Backtracking through equations to work out initial concentrations/percentage purities can be problematic – encourage annotation of equations with numbers of moles.	
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 2.2.2o	Up to & inc. 4.1.3k	Up to & inc. 5.2.2k	Up to & inc. 6.2.4d
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/chemist	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/pharmacologist	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sustainability-manager/4010821.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/biomedical-scientist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive

	Y12 AEC	Y12 DHN	Y13 DHN	Y13 KMF
Week 23 (w/b 27th Feb)	Lesson 1: 3.1.3. (b) the outer shell s^2p^5 electron configuration and the gaining of one electron in many redox reactions to form 1– ions Lesson 2: 3.1.3. (c) the trend in reactivity of the halogens Cl_2, Br_2 and I_2, illustrated by reaction with other halide ions Lesson 3: 3.1.3. (d) explanation of the trend in reactivity shown in **(c)**, from the decreasing ease of forming 1– ions, in terms of attraction, atomic radius and electron shielding Lesson 4: 3.1.3. (e) explanation of the term *disproportionation* as oxidation and reduction of the same element, illustrated by: (i) the reaction of chlorine with water as used in water treatment (ii) the reaction of chlorine with cold, dilute aqueous sodium hydroxide, as used to form bleach (iii) reactions analogous to those specified in **(i)** and **(ii)**	Lesson 1: Test Lesson 2: Exemplar	Lesson 1: 5.2.3. (g) the techniques and procedures used for the measurement of cell potentials of: (i) metals or non-metals in contact with their ions in aqueous solution (ii) ions of the same element in different oxidation states in contact with a Pt electrode (h) calculation of a standard cell potential by combining two standard electrode potentials Lesson 2: 5.2.3. (i) prediction of the feasibility of a reaction using standard cell potentials and the limitations of such predictions in terms of kinetics and concentration Lesson 3: 5.2.3. (j) application of principles of electrode potentials to modern storage cells Lesson 4: 5.2.3. (k) explanation that a fuel cell uses the energy from the reaction of a fuel with oxygen to create a voltage and the changes that take place at each electrode.	Lesson 1: 6.3.1. (a) interpretation of one-way TLC chromatograms in terms of R_f values Lesson 2: 6.3.1. (b) interpretation of gas chromatograms in terms of: (i) retention times (ii) the amounts and proportions of the components in a mixture Lesson 3: 6.3.1. (b) interpretation of gas chromatograms in terms of: (i) retention times (ii) the amounts and proportions of the components in a mixture
Key Words Level 2 Level 3	atomic radius, shielding, lattice, electrostatic, base, oxidation, reduction, diatomic, electronegativity, disproportionation, redox, precipitation, intermolecular forces,		Standard hydrogen electrode, half-cell, electrode, oxidation, reduction, feasibility, potential difference	Mobile phase, stationary phase, retention time, Rf value, TLC
Homework	Activelearn task suitable to ability of group	Activelearn task suitable to ability of group.	Activelearn task suitable to ability of group.	Activelearn task suitable to ability of group.
Assessment this half-term	Up to & inc. 3.1.3g	Up to & inc. 4.2.1	Up to & inc. 5.2.3k	Up to & inc. 6.3.1b
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT:	LIFE SKILLS: EMPLOYMENT:	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/medicinal-chemist/4013025.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/computational-toxicologist/4011388.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 24 (w/b 6th Mar)	Lesson 1: 3.1.3. (f) the benefits of chlorine use in water treatment (killing bacteria) contrasted with associated risks (e.g. hazards of toxic chlorine gas and possible risks from formation of chlorinated hydrocarbons) Lesson 2: 3.1.3. (g) the precipitation reactions, including ionic equations, of the aqueous anions Cl^-, Br^- and I^- with aqueous silver ions, followed by aqueous ammonia, and their use as a test for different halide ions. Lesson 3: Test Lesson 4: Exemplars	Lesson 1: 4.2.2. (a) hydrolysis of haloalkanes in a substitution reaction: (i) by aqueous alkali (ii) by water in the presence of $AgNO_3$ and ethanol to compare experimentally the rates of hydrolysis of different carbon– halogen bonds Lesson 2: 4.2.2. (b) definition and use of the term *nucleophile* (an electron pair donor) (c) the mechanism of nucleophilic substitution in the hydrolysis of primary haloalkanes with aqueous alkali (**see also 4.1.1 h–i**)	Lesson 1: Mock Exams Lesson 2: Mock Exams Lesson 3: Mock Exams Lesson 4: Mock Exams	Lesson 1: Mock Exams Lesson 2: Mock Exams Lesson 3: Mock Exams
Key Words Level 2 Level 3	atomic radius, shielding, lattice, electrostatic, base, oxidation, reduction, diatomic, electronegativity, disproportionation, redox, precipitation, intermolecular forces,	Primary, secondary, tertiary, oxidation, combustion, aldehyde, ketone, carboxylic acid, addition, elimination, substitution, hydrolysis		

Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 3.1.3g	Up to & inc. 4.2.1	Up to & inc. 5.2.3k	Up to & inc. 6.3.1b
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT:	LIFE SKILLS: EMPLOYMENT:	LIFE SKILLS: EMPLOYMENT:	LIFE SKILLS: EMPLOYMENT:
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 25 (w/b 13th Mar)	Lesson 1: Feedback Lesson 2: PAG4 Lesson 3: 3.1.4. (a) qualitative analysis of ions on a test-tube scale; processes and techniques needed to identify the following ions in an unknown compound: (i) anions: • CO_3^{2-}, by reaction with $H^+(aq)$ forming $CO_2(g)$ (**see 2.1.4 c**); • SO_4^{2-}, by precipitation with $Ba^{2+}(aq)$; • Cl^-, Br^-, I^- (**see 3.1.3 g**) (ii) cations: NH_4^+ by reaction with warm NaOH(aq) forming NH_3. Lesson 4: 3.1.4. (a) qualitative analysis of ions on a test-tube scale; processes and techniques needed to identify the following ions in an unknown compound: (i) anions: • CO_3^{2-}, by reaction with $H^+(aq)$ forming $CO_2(g)$ (**see 2.1.4 c**); • SO_4^{2-}, by precipitation with $Ba^{2+}(aq)$; • Cl^-, Br^-, I^- (**see 3.1.3 g**) (ii) cations: NH_4^+ by reaction with warm NaOH(aq) forming NH_3.	Lesson 1: 4.2.2. (d) explanation of the trend in the rates of hydrolysis of primary haloalkanes in terms of the bond enthalpies of carbon–halogen bonds (C–F, C–Cl, C–Br and C–I) Lesson 2: 4.2.2. (e) production of halogen radicals by the action of ultraviolet (UV) radiation on CFCs in the upper atmosphere and the resulting catalysed breakdown of the Earth's protective ozone layer, including equations to represent: (i) the production of halogen radicals (ii) the catalysed breakdown of ozone by Cl• and other radicals e.g. •NO.	Lesson 1: Mock Exams Lesson 2: Mock Exams Lesson 3: Mock Exams Lesson 4: Mock Exams	Lesson 1: Mock Exams Lesson 2: Mock Exams Lesson 3: Mock Exams
Key Words Level 2 Level 3	atomic radius, shielding, lattice, electrostatic, base, oxidation, reduction, diatomic, electronegativity, disproportionation, redox, precipitation, intermolecular forces,	Primary, secondary, tertiary, oxidation, combustion, aldehyde, ketone, carboxylic acid, addition, elimination, substitution, hydrolysis		
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 3.1.3g	Up to & inc. 4.2.1	Up to & inc. 5.2.3k	Up to & inc. 6.3.1b
Life skills Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/director-of-irc-in-biomedical-materials/4010858.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/director-of-irc-in-biomedical-materials/4010858.article	LIFE SKILLS: EMPLOYMENT:	LIFE SKILLS: EMPLOYMENT:
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 26 (w/b 20th Mar)	Lesson 1: 3.2.1. (a) explanation that some chemical reactions are accompanied by enthalpy changes that are exothermic (ΔH, negative) or endothermic (ΔH, positive)	Lesson 1: 4.2.3. (a) the techniques and procedures for: (i) use of Quickfit apparatus including for distillation and heating under reflux (ii) preparation and purification of an organic liquid including: • use of a separating funnel to remove an	Lesson 1: Exemplars Lesson 2: Feedback Lesson 3: PAG12 Lesson 4: PAG12	Lesson 1: 6.3.1. (c) qualitative analysis of organic functional groups on a test-tube scale; processes and techniques needed to identify the following functional groups in an unknown compound: (i) alkenes by reaction with bromine **(see also 4.1.3 f)** (ii) haloalkanes

	Lesson 2: 3.2.1. (b) construction of enthalpy profile diagrams to show the difference in the enthalpy of reactants compared with products (c) qualitative explanation of the term *activation energy*, including use of enthalpy profile diagrams Lesson 3: 3.2.1. (d) explanation and use of the terms: (i) *standard conditions* and *standard states* (physical states under standard conditions) **(ii) *enthalpy change of reaction* (enthalpy change associated with a stated equation, $\Delta_r H$)** (iii) *enthalpy change of formation* (formation of 1 mol of a compound from its elements, $\Delta_f H$) (iv) *enthalpy change of combustion* (complete combustion of 1 mol of a substance, $\Delta_c H$) (v) *enthalpy change of neutralisation* (formation of 1 mol of water from neutralisation, $\Delta_{neut} H$) Lesson 4: 3.2.1. (d) explanation and use of the terms: (i) *standard conditions* and *standard states* (physical states under standard conditions) **(ii) *enthalpy change of reaction* (enthalpy change associated with a stated equation, $\Delta_r H$)** (iii) *enthalpy change of formation* (formation of 1 mol of a compound from its elements, $\Delta_f H$) (iv) *enthalpy change of combustion* (complete combustion of 1 mol of a substance, $\Delta_c H$) (v) *enthalpy change of neutralisation* (formation of 1 mol of water from neutralisation, $\Delta_{neut} H$)	organic layer from an aqueous layer; • drying with an anhydrous salt (e.g. $MgSO_4$, $CaCl_2$); • redistillation Lesson 2: 4.2.3. (a) the techniques and procedures for: (i) use of Quickfit apparatus including for distillation and heating under reflux (ii) preparation and purification of an organic liquid including: • use of a separating funnel to remove an organic layer from an aqueous layer; • drying with an anhydrous salt (e.g. $MgSO_4$, $CaCl_2$); • redistillation		by reaction with aqueous silver nitrate in ethanol **(see also 4.2.2 a)** (iii) phenols by weak acidity but no reaction with CO_3^{2-} **(see also 6.1.1 h)** (iv) carbonyl compounds by reaction with 2,4-DNP **(see also 6.1.2 d)** (v) aldehydes by reaction with Tollens' reagent **(see also 6.1.2 e)** (vi) primary and secondary alcohols and aldehydes by reaction with acidified dichromate **(see also 4.2.1 c, 6.1.2a)** (vii) carboxylic acids by reaction with CO_3^{2-} **(see also 6.1.3 b)**. Lesson 2: as lesson 1 Lesson 3: as lesson 1
Key Words **Level 2** **Level 3**	Enthalpy, lattice enthalpy, enthalpy of formation, enthalpy of combustion, enthalpy of solution, Born-Haber cycle, electron affinity,	Primary, secondary, tertiary, oxidation, combustion, aldehyde, ketone, carboxylic acid, addition, elimination, substitution, hydrolysis Reflux, distillation, liebig condenser, separating funnel	Standard hydrogen electrode, half-cell, electrode, oxidation, reduction, feasibility, potential difference	Mobile phase, stationary phase, retention time, Rf value, TLC
Common Misconceptions	Identifying the different types of enthalpy change correctly, understanding what they mean and how they relate to the correct construction of Hess Cycles			Strongly consider doing NMR first – it's new, will need more time, whereas this is just a recap
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 3.1.3g	Up to & inc. 4.2.1	Up to & inc. 5.2.3k	Up to & inc. 6.3.1b
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/computational-toxicologist/4011388.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/computational-toxicologist/4011388.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/medicinal-chemist/4013025.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/computational-toxicologist/4011388.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 27 (w/b 27th Mar)	Lesson 1: 3.2.1. (d) explanation and use of the terms: (i) *standard conditions* and *standard states* (physical states under standard conditions) **(ii) *enthalpy change of reaction* (enthalpy change associated with a stated equation, $\Delta_r H$)** (iii) *enthalpy change of formation* (formation of 1 mol of a compound from its elements, $\Delta_f H$) (iv) *enthalpy change of combustion* (complete combustion of 1 mol of a substance, $\Delta_c H$) (v) *enthalpy*	Lesson 1: 4.2.3. (b) for an organic molecule containing several functional groups: (i) identification of individual functional groups (ii) prediction of properties and reactions Lesson 2: 4.2.3. (b) for an organic molecule containing several functional groups: (i) identification of individual functional groups (ii) prediction of properties and reactions	Lesson 1: 5.3.1. (a) the electron configuration of atoms and ions of the d-block elements of Period 4 (Sc–Zn), given the atomic number and charge **(see also 2.2.1 d)** Lesson 2: 5.3.1. (b) the elements Ti–Cu as transition elements i.e. d-block elements that have an ion with an incomplete d-sub-shell Lesson 3: 5.3.1. (c) illustration, using at least two transition elements, of: (i) the existence of more than one oxidation state for each element in its compounds **(see also 5.3.1 k)** (ii) the formation of coloured ions **(see also 5.3.1 h, j–k)** (iii) the	Lesson 1: PAG7 Lesson 2: PAG7 Lesson 3: PAG7

	change of neutralisation (formation of 1 mol of water from neutralisation, $\Delta_{neut}H$) Lesson 2: 3.2.1. (d) explanation and use of the terms: (i) *standard conditions* and *standard states* (physical states under standard conditions) **(ii) *enthalpy change of reaction* (enthalpy change associated with a stated equation, Δ_rH)** (iii) *enthalpy change of formation* (formation of 1 mol of a compound from its elements, Δ_fH) (iv) *enthalpy change of combustion* (complete combustion of 1 mol of a substance, Δ_cH) (v) *enthalpy change of neutralisation* (formation of 1 mol of water from neutralisation, $\Delta_{neut}H$) Lesson 3: 3.2.1. (e) determination of enthalpy changes directly from appropriate experimental results, including use of the relationship: $q = mc\Delta T$ Lesson 4: 3.2.1. (e) determination of enthalpy changes directly from appropriate experimental results, including use of the relationship: $q = mc\Delta T$		catalytic behaviour of the elements and their compounds and their importance in the manufacture of chemicals by industry **(see 3.2.2 d)** Lesson 4: 5.3.1. (d) explanation and use of the term *ligand* in terms of coordinate (dative covalent) bonding to a metal ion or metal, including bidentate ligands	
Key Words **Level 2** **Level 3**	Enthalpy, lattice enthalpy, enthalpy of formation, enthalpy of combustion, enthalpy of solution, Born-Haber cycle, electron affinity,	Primary, secondary, tertiary, oxidation, combustion, aldehyde, ketone, carboxylic acid, addition, elimination, substitution, hydrolysis Reflux, distillation, liebig condenser, separating funnel	Standard hydrogen electrode, half-cell, electrode, oxidation, reduction, feasibility, potential difference	Mobile phase, stationary phase, retention time, Rf value, TLC
Common Misconceptions		Naming compounds with multiple functional groups can be problematic	d-block element does not equal transition metal.	
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 3.1.3g	Up to & inc. 4.2.1	Up to & inc. 5.2.3k	Up to & inc. 6.3.1b
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/computational-toxicologist/4011388.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/computational-toxicologist/4011388.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/medicinal-chemist/4013025.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/computational-toxicologist/4011388.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive

	Y12 AEC	Y12 DHN	Y13 DHN	Y13 KMF
Week 28 (w/b 17th Apr)	Lesson 1: 3.2.1. (f) (i) explanation of the term *average bond enthalpy* (breaking of 1 mol of bonds in gaseous molecules) (ii) explanation of exothermic and endothermic reactions in terms of enthalpy changes associated with the breaking and making of chemical bonds (iii) use of average bond enthalpies to calculate enthalpy changes and related quantities (**see also 2.2.2 f**) Lesson 2: 3.2.1. (g) Hess' law for construction of enthalpy cycles and calculations to determine indirectly: **(i) an enthalpy change of reaction from enthalpy changes of combustion** (ii) an enthalpy change of reaction from enthalpy changes of formation (iii) enthalpy changes from unfamiliar enthalpy cycles	Lesson 1: 4.2.3. (c) two-stage synthetic routes for preparing organic compounds. Lesson 2: 4.2.3. (c) two-stage synthetic routes for preparing organic compounds.	Lesson 1: 5.3.1. (e) use of the terms *complex ion* and *coordination number* and examples of complexes with: (i) six-fold coordination with an octahedral shape (ii) four-fold coordination with either a planar or tetrahedral shape **(see also 2.2.2 g–h)** Lesson 2: 5.3.1. (f) types of stereoisomerism shown by complexes, including those associated with bidentate and multidentate ligands: (i) *cis–trans* isomerism e.g. $Pt(NH_3)_2Cl_2$ **(see also 4.1.3 c–d)** (ii) optical isomerism e.g. $[Ni(NH_2CH_2CH_2NH_2)_3]^{2+}$ **(see also 6.2.2 c)** (g) use of *cis*-platin as an anti-cancer drug and its action by binding to DNA preventing cell division Lesson 3: 5.3.1. (h) ligand substitution reactions and the accompanying colour changes in the formation of: (i)	Lesson 1: 6.3.2. (a) analysis of a carbon-13 NMR spectrum of an organic molecule to make predictions about: (i) the number of carbon environments in the molecule (ii) the different types of carbon environment present, from chemical shift values (iii) possible structures for the molecule Lesson 2: 6.3.2. (a) analysis of a carbon-13 NMR spectrum of an organic molecule to make predictions about: (i) the number of carbon environments in the molecule (ii) the different types of carbon environment present, from chemical shift values (iii) possible structures for the molecule Lesson 3: 6.3.2. (a) analysis of a carbon-13 NMR spectrum of an organic molecule to make predictions

	Lesson 3: 3.2.1. (g) Hess' law for construction of enthalpy cycles and calculations to determine indirectly: **(i) an enthalpy change of reaction from enthalpy changes of combustion** (ii) an enthalpy change of reaction from enthalpy changes of formation (iii) enthalpy changes from unfamiliar enthalpy cycles Lesson 4: 3.2.1. (h) the techniques and procedures used to determine enthalpy changes directly and indirectly.		$[Cu(NH_3)_4(H_2O)_2]^{2+}$ and $[CuCl_4]^{2-}$ from $[Cu(H_2O)_6]^{2+}$ (ii) $[Cr(NH_3)_6]^{3+}$ from $[Cr(H_2O)_6]^{3+}$ **(see also 5.3.1 j)** (i) explanation of the biochemical importance of iron in haemoglobin, including ligand substitution involving O_2 and CO Lesson 4: 5.3.1. (j) reactions, including ionic equations, and the accompanying colour changes of aqueous Cu^{2+}, Fe^{2+}, Fe^{3+}, Mn^{2+} and Cr^{3+} with aqueous sodium hydroxide and aqueous ammonia, including: (i) precipitation reactions (ii) complex formation with excess aqueous sodium hydroxide and aqueous ammonia	about: (i) the number of carbon environments in the molecule (ii) the different types of carbon environment present, from chemical shift values (iii) possible structures for the molecule
Key Words **Level 2** **Level 3**	Enthalpy, lattice enthalpy, enthalpy of formation, enthalpy of combustion, enthalpy of solution, Born-Haber cycle, electron affinity,	Primary, secondary, tertiary, oxidation, combustion, aldehyde, ketone, carboxylic acid, addition, elimination, substitution, hydrolysis Reflux, distillation, liebig condenser, separating funnel	Transition metal, complex, ligand, mono-/bi-/multi-dentate, co-ordination number, dative covalent bond, planar, trigonal, trigonal pyramidal, trigonal bipyramidal, octahedral	Chemical shift, coupling, deuterated solvent, singlet, doublet, triplet, quartet, multiplet, n+1, TMS, spin-spin splitting
Common Misconceptions	Lack of care with – and + during the calculation stage		Pupils will not enjoy the memorisation of colours and colour changes for substitution reactions, but it's on the syllabus…	Depending on the ability, getting into spin-spin coupling can be useful, or just confusing when explaining why certain peak groups are present
Homework	Activelearn task suitable to ability of group	Activelearn task suitable to ability of group.	Activelearn task suitable to ability of group.	Activelearn task suitable to ability of group.
Assessment this half-term	Up to & inc. 3.2.1h	Up to & inc. 4.2.4b	Up to & inc. Paper 1/2/3	Up to & inc. Paper 1/2/3
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/chief-chemist/4010842.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sports-scientist-british-olympic-association/4010823.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 29 (w/b 24th Apr)	Lesson 1: 3.2.1. (h) the techniques and procedures used to determine enthalpy changes directly and indirectly. Lesson 2: PAG3 Lesson 3: PAG3 Lesson 4: PAG3	Lesson 1: PAG5 Lesson 2: PAG5	Lesson 1: 5.3.1. (j) reactions, including ionic equations, and the accompanying colour changes of aqueous Cu^{2+}, Fe^{2+}, Fe^{3+}, Mn^{2+} and Cr^{3+} with aqueous sodium hydroxide and aqueous ammonia, including: (i) precipitation reactions (ii) complex formation with excess aqueous sodium hydroxide and aqueous ammonia Lesson 2: 5.3.1. (k) redox reactions and accompanying colour changes for: (i) interconversions between Fe^{2+} and Fe^{3+} (ii) interconversions between Cr^{3+} and $Cr_2O_7^{2-}$ (iii) reduction of Cu^{2+} to Cu^{+} and disproportionation of Cu^{+} to Cu^{2+} and Cu Lesson 3: 5.3.1. (k) redox reactions and accompanying colour changes for: (i) interconversions between Fe^{2+} and Fe^{3+} (ii) interconversions between Cr^{3+} and $Cr_2O_7^{2-}$ (iii) reduction of Cu^{2+} to Cu^{+} and disproportionation of Cu^{+} to Cu^{2+} and Cu Lesson 4: 5.3.1. (l) interpretation and prediction of unfamiliar reactions including ligand substitution, precipitation, redox.	Lesson 1: 6.3.2. (b) analysis of a high resolution proton NMR spectrum of an organic molecule to make predictions about: (i) the number of proton environments in the molecule (ii) the different types of proton environment present, from chemical shift values (iii) the relative numbers of each type of proton present from relative peak areas, using integration traces or ratio numbers, when required (iv) the number of non-equivalent protons adjacent to a given proton from the spin– spin splitting pattern, using the $n + 1$ rule (v) possible structures for the molecule Lesson 2: as Lesson 1 Lesson 3: as Lesson 1
Key Words **Level 2** **Level 3**	Enthalpy, lattice enthalpy, enthalpy of formation, enthalpy of combustion, enthalpy of solution, Born-Haber cycle, electron affinity,	Primary, secondary, tertiary, oxidation, combustion, aldehyde, ketone, carboxylic acid, addition, elimination, substitution, hydrolysis Reflux, distillation, liebig condenser, separating funnel	Transition metal, complex, ligand, mono-/bi-/multi-dentate, co-ordination number, dative covalent bond, planar, trigonal, trigonal pyramidal, trigonal bipyramidal, octahedral	Chemical shift, coupling, deuterated solvent, singlet, doublet, triplet, quartet, multiplet, n+1, TMS, spin-spin splitting
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.

Assessment this half-term	Up to & inc. 3.2.1h	Up to & inc. 4.2.4b	Up to & inc. Paper 1/2/3	Up to & inc. Paper 1/2/3
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/chief-chemist/4010842.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sports-scientist-british-olympic-association/4010823.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 30 (w/b Tue 2nd May)	Lesson 1: Assessment Lesson 2: Exemplars Lesson 3: Feedback Lesson 4: Re-test	Lesson 1: 4.2.4. (a) infrared (IR) radiation causes covalent bonds to vibrate more and absorb energy Lesson 2: 4.2.4. (a) infrared (IR) radiation causes covalent bonds to vibrate more and absorb energy	Lesson 1: 5.3.2. (a) qualitative analysis of ions on a test-tube scale: processes and techniques needed to identify the following ions in an unknown compound: (i) anions: CO_3^{2-}, Cl^-, Br^-, I^-, SO_4^{2-} **(see 3.1.4 a)** (ii) cations: NH_4^+; Cu^{2+}, Fe^{2+}, Fe^{3+}, Mn^{2+}, Cr^{3+} **(see 3.1.4 a, 5.3.1 j)**. Lesson 2: 5.3.2. (a) qualitative analysis of ions on a test-tube scale: processes and techniques needed to identify the following ions in an unknown compound: (i) anions: CO_3^{2-}, Cl^-, Br^-, I^-, SO_4^{2-} **(see 3.1.4 a)** (ii) cations: NH_4^+; Cu^{2+}, Fe^{2+}, Fe^{3+}, Mn^{2+}, Cr^{3+} **(see 3.1.4 a, 5.3.1 j)**. Lesson 3: 5.3.2. (a) qualitative analysis of ions on a test-tube scale: processes and techniques needed to identify the following ions in an unknown compound: (i) anions: CO_3^{2-}, Cl^-, Br^-, I^-, SO_4^{2-} **(see 3.1.4 a)** (ii) cations: NH_4^+; Cu^{2+}, Fe^{2+}, Fe^{3+}, Mn^{2+}, Cr^{3+} **(see 3.1.4 a, 5.3.1 j)**. Lesson 4: 5.3.2. (a) qualitative analysis of ions on a test-tube scale: processes and techniques needed to identify the following ions in an unknown compound: (i) anions: CO_3^{2-}, Cl^-, Br^-, I^-, SO_4^{2-} **(see 3.1.4 a)** (ii) cations: NH_4^+; Cu^{2+}, Fe^{2+}, Fe^{3+}, Mn^{2+}, Cr^{3+} **(see 3.1.4 a, 5.3.1 j)**.	Lesson 1: 6.3.2. (c) prediction of a carbon-13 or proton NMR spectrum for a given molecule Lesson 2: 6.3.2. (d) (i) the use of tetramethylsilane, TMS, as the standard for chemical shift measurements (ii) the need for deuterated solvents, e.g. $CDCl_3$, when running an NMR spectrum (iii) the identification of O–H and N–H protons by proton exchange using D_2O Lesson 3: 6.3.2. (e) deduction of the structures of organic compounds from different analytical data including: (i) elemental analysis **(see also 2.1.3 c)** (ii) mass spectra **(see also 4.2.4 f–g)** (iii) IR spectra **(see also 4.2.4 d–e)** (iv) NMR spectra.
Key Words **Level 2** **Level 3**		Fragmentation, fragment ion, M peak, M+1 Peak	Transition metal, complex, ligand, mono-/bi-/multi-dentate, co-ordination number, dative covalent bond, planar, trigonal, trigonal pyramidal, trigonal bipyramidal, octahedral, substitution, precipitation, redox	Chemical shift, coupling, deuterated solvent, singlet, doublet, triplet, quartet, multiplet, n+1, TMS, spin-spin splitting
Common Misconceptions		Pupils will tend to view the troughs as peaks	This is a summary of all the chemical tests in the inorganic/physical section so far – boring but necessary and useful	Encourage pupils rto note down, individually, what each part is telling them – even if the y can't identify the compound(s) being asked about they can still get most of the marks this way.
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 3.2.1h	Up to & inc. 4.2.4b	Up to & inc. Paper 1/2/3	Up to & inc. Paper 1/2/3
Life skills Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/chief-chemist/4010842.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sports-scientist-british-olympic-association/4010823.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive

Week 31 (w/b 8th May)	Lesson 1: 3.2.2. (a) the effect of concentration, including the pressure of gases, on the rate of a reaction, in terms of frequency of collisions Lesson 2: 3.2.2. (b) calculation of reaction rate from the gradients of graphs measuring how a physical quantity changes with time Lesson 3: 3.2.2. (c) explanation of the role of a catalyst: (i) in increasing reaction rate without being used up by the overall reaction (ii) in allowing a reaction to proceed via a different route with lower activation energy, as shown by enthalpy profile diagrams Lesson 4: 3.2.2. (d) (i) explanation of the terms *homogeneous* and *heterogeneous* catalysts (ii) explanation that catalysts have great economic importance and benefits for increased sustainability by lowering temperatures and reducing energy demand from combustion of fossil fuels with resulting reduction in CO_2 emissions	Lesson 1: 4.2.4. (b) absorption of infrared radiation by atmospheric gases containing C=O, O–H and C–H bonds (e.g. H_2O, CO_2 and CH_4), the suspected link to global warming and resulting changes to energy usage Lesson 2: 4.2.4. (b) absorption of infrared radiation by atmospheric gases containing C=O, O–H and C–H bonds (e.g. H_2O, CO_2 and CH_4), the suspected link to global warming and resulting changes to energy usage	Lesson 1: PAG4 Lesson 2: PAG4 Lesson 3: PAG4 Lesson 4: Assessment	Lesson 1: 6.3.2. (e) deduction of the structures of organic compounds from different analytical data including: (i) elemental analysis **(see also 2.1.3 c)** (ii) mass spectra **(see also 4.2.4 f–g)** (iii) IR spectra **(see also 4.2.4 d–e)** (iv) NMR spectra. Lesson 2: 6.3.2. (e) deduction of the structures of organic compounds from different analytical data including: (i) elemental analysis **(see also 2.1.3 c)** (ii) mass spectra **(see also 4.2.4 f–g)** (iii) IR spectra **(see also 4.2.4 d–e)** (iv) NMR spectra. Lesson 3: Assessment
Key Words Level 2 Level 3	Enthalpy, lattice enthalpy, enthalpy of formation, enthalpy of combustion, enthalpy of solution, Born-Haber cycle, electron affinity,	Fragmentation, fragment ion, M peak, M+1 Peak	Transition metal, complex, ligand, mono-/bi-/multi-dentate, co-ordination number, dative covalent bond, planar, trigonal, trigonal pyramidal, trigonal bipyramidal, octahedral, substitution, precipitation, redox	Chemical shift, coupling, deuterated solvent, singlet, doublet, triplet, quartet, multiplet, n+1, TMS, spin-spin splitting
Common Misconceptions	Failing to differentiate between moles and moles per dm^3.			
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 3.2.1h	Up to & inc. 4.2.4b	Up to & inc. Paper 1/2/3	Up to & inc. Paper 1/2/3
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/chief-chemist/4010842.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sports-scientist-british-olympic-association/4010823.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 32 (w/b 15th May)	Lesson 1: 3.2.2. (e) the techniques and procedures used to investigate reaction rates including the measurement of mass, gas volumes and time Lesson 2: 3.2.2. (e) the techniques and procedures used to investigate reaction rates including the measurement of mass, gas volumes and time Lesson 3: 3.2.2. (e) the techniques and procedures used to investigate reaction rates including the measurement of mass, gas volumes and time Lesson 4: 3.2.2. (e) the techniques and procedures used to investigate reaction rates including the measurement of mass, gas volumes and time	Lesson 1: Assessment Lesson 2: Exemplars	Lesson 1: Exemplars Lesson 2: Feedback Lesson 3: Re-test Lesson 4: Revision for A-level exams	Lesson 1: Exemplars Lesson 2: Feedback Lesson 3: Re-test
Key Words Level 2 Level 3	Boltzmann, gradient, tangent, collision theory, homogeneous, heterogeneous, catalyst, activation energy			
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.

Assessment this half-term	Up to & inc. 3.2.1h	Up to & inc. 4.2.4b	Up to & inc. Paper 1/2/3	Up to & inc. Paper 1/2/3
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/chief-chemist/4010842.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sports-scientist-british-olympic-association/4010823.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/forensic-scientist/4010920.article
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 33 (w/b 22nd May)	Lesson 1: 3.2.2. (f) qualitative explanation of the Boltzmann distribution and its relationship with activation energy (see also **3.2.1 c**) Lesson 2: 3.2.2. (g) explanation, using Boltzmann distributions, of the qualitative effect on the proportion of molecules exceeding the activation energy and hence the reaction rate, for: (i) temperature changes (ii) catalytic behaviour (**see also 3.2.2 c**). Lesson 3: 3.2.3. (a) explanation that a dynamic equilibrium exists in a closed system when the rate of the forward reaction is equal to the rate of the reverse reaction and the concentrations of reactants and products do not change Lesson 4: 3.2.3. (b) le Chatelier's principle and its application for homogeneous equilibria to deduce qualitatively the effect of a change in temperature, pressure or concentration on the position of equilibrium	Lesson 1: Feedback Lesson 2: Re-test	Lesson 1: Revision for A-level exams Lesson 2: Revision for A-level exams Lesson 3: Revision for A-level exams Lesson 4: Revision for A-level exams	Lesson 1: Revision for A-level exams Lesson 2: Revision for A-level exams Lesson 3: Revision for A-level exams
Key Words Level 2 Level 3	Boltzmann, gradient, tangent, collision theory, homogeneous, heterogeneous, catalyst, activation energy			
Homework	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.	Task suitable to ability of group.
Assessment this half-term	Up to & inc. 3.2.1h	Up to & inc. 4.2.4b	Up to & inc. Paper 1/2/3	Up to & inc. Paper 1/2/3
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/chief-chemist/4010842.article	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/sports-scientist-british-olympic-association/4010823.article	LIFE SKILLS: EMPLOYMENT:	LIFE SKILLS: EMPLOYMENT:
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive

	Y12 AEC	Y12 DHN
Week 34 (w/b 5th Jun)	Lesson 1: 3.2.3. (c) explanation that a catalyst increases the rate of both forward and reverse reactions in an equilibrium by the same amount resulting in an unchanged position of equilibrium	Lesson 1: 4.2.4. (d) interpretations and predictions of an infrared spectrum of familiar or unfamiliar substances using supplied data Lesson 2: 4.2.4. (e) use of infrared spectroscopy to monitor gases causing air pollution (e.g. CO and NO

	Lesson 2: 3.2.3. (d) the techniques and procedures used to investigate changes to the position of equilibrium for changes in concentration and temperature. Lesson 3: 3.2.3. (e) explanation of the importance to the chemical industry of a compromise between chemical equilibrium and reaction rate in deciding the operational conditions Lesson 4: 3.2.3. (f) expressions for the equilibrium constant, K_c, for homogeneous reactions and calculations of the equilibrium constant, K_c , from provided equilibrium concentrations	from car emissions) and in modern breathalysers to measure ethanol in the breath
Key Words **Level 2** **Level 3**	Boltzmann, gradient, tangent, collision theory, homogeneous, heterogeneous, catalyst, activation energy	Fragmentation, fragment ion, M peak, M+1 Peak
Common Misconceptions	Construction of K_c expressions, putting product under reactant, forgetting stoichiometry	
Homework	Activelearn task suitable to ability of group	Activelearn task suitable to ability of group.
Assessment this half-term		
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/environmental-chemist/4010879.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/climate-scientist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 35 (w/b 12th Jun)	Lesson 1: 3.2.3. (g) estimation of the position of equilibrium from the magnitude of K_c. Lesson 2: 3.2.3. (g) estimation of the position of equilibrium from the magnitude of K_c. Lesson 3: Revise Lesson 4: Revise	Lesson 1: 4.2.4. (f) use of a mass spectrum of an organic compound to identify the molecular ion peak and hence to determine molecular mass Lesson 2: 4.2.4. (g) analysis of fragmentation peaks in a mass spectrum to identify parts of structures.
Key Words **Level 2** **Level 3**	Dynamic equilibrium, compromise, homogeneous equilibrium, le chatelier's principle,	Fragmentation, fragment ion, M peak, M+1 Peak
Common Misconceptions	What K_C actually means becomes increasingly important in Y13 and the buffers/acids and bases work	Identification of fragments and constructing molecules from these
Homework	Task suitable to ability of group.	Task suitable to ability of group.
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/environmental-chemist/4010879.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/climate-scientist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive

Week 36 (w/b 19th Jun	Lesson 1: Mock Exams Lesson 2: Mock Exams Lesson 3: Mock Exams Lesson 4: Mock Exams	Lesson 1: Mock Exams Lesson 2: Mock Exams
Homework	Task suitable to ability of group.	Task suitable to ability of group.
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 37 (w/b 26th Jun)	Lesson 1: Mock Exams Lesson 2: Mock Exams Lesson 3: Mock Exams Lesson 4: Mock Exams	Lesson 1: Mock Exams Lesson 2: Mock Exams
Homework	Task suitable to ability of group.	Task suitable to ability of group.
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/environmental-chemist/4010879.article	LIFE SKILLS: EMPLOYMENT:
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive
Week 38 (w/b 3rd Jul)	Lesson 1: Feedback Lesson 2: Exemplars Lesson 3: Feedback Lesson 4:: Exemplars	Lesson 1: 4.2.4. (h) deduction of the structures of organic compounds from different analytical data including: (i) elemental analysis **(see also 2.1.3c)** (ii) mass spectra (iii) IR spectra Lesson 2: 4.2.4. (h) deduction of the structures of organic compounds from different analytical data including: (i) elemental analysis **(see also 2.1.3c)** (ii) mass spectra (iii) IR spectra
Key Words **Level 2** **Level 3**		Fragmentation, fragment ion, M peak, M+1 Peak
Homework	Task suitable to ability of group.	Task suitable to ability of group.
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT:	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/climate-scientist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive

Week 39 (w/b 10th Jul)	Lesson 1: PAG10 Lesson 2: PAG10 Lesson 3: PAG10 Lesson 4: PAG10	Lesson 1: CPAC mop up Lesson 2: CPAC mop up
Homework	Task suitable to ability of group.	Task suitable to ability of group.
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/environmental-chemist/4010879.article	LIFE SKILLS: EMPLOYMENT:
Week 40 (w/b 17th Jul)	Lesson 1: PAG9 Lesson 2: PAG9 Lesson 3: PAG9 Lesson 4: PAG9	Lesson 1: CPAC mop up Lesson 2: CPAC mop up
Homework	Task suitable to ability of group.	Task suitable to ability of group.
Career opportunities Employment Links	LIFE SKILLS: EMPLOYMENT: https://edu.rsc.org/job-profiles/environmental-chemist/4010879.article	LIFE SKILLS: EMPLOYMENT: https://nationalcareers.service.gov.uk/job-profiles/climate-scientist
Employability Skills	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive	Aiming high Literacy Creativity Numeracy Leadership Independence Listening Communication Presenting Teamwork Problem solving Staying positive