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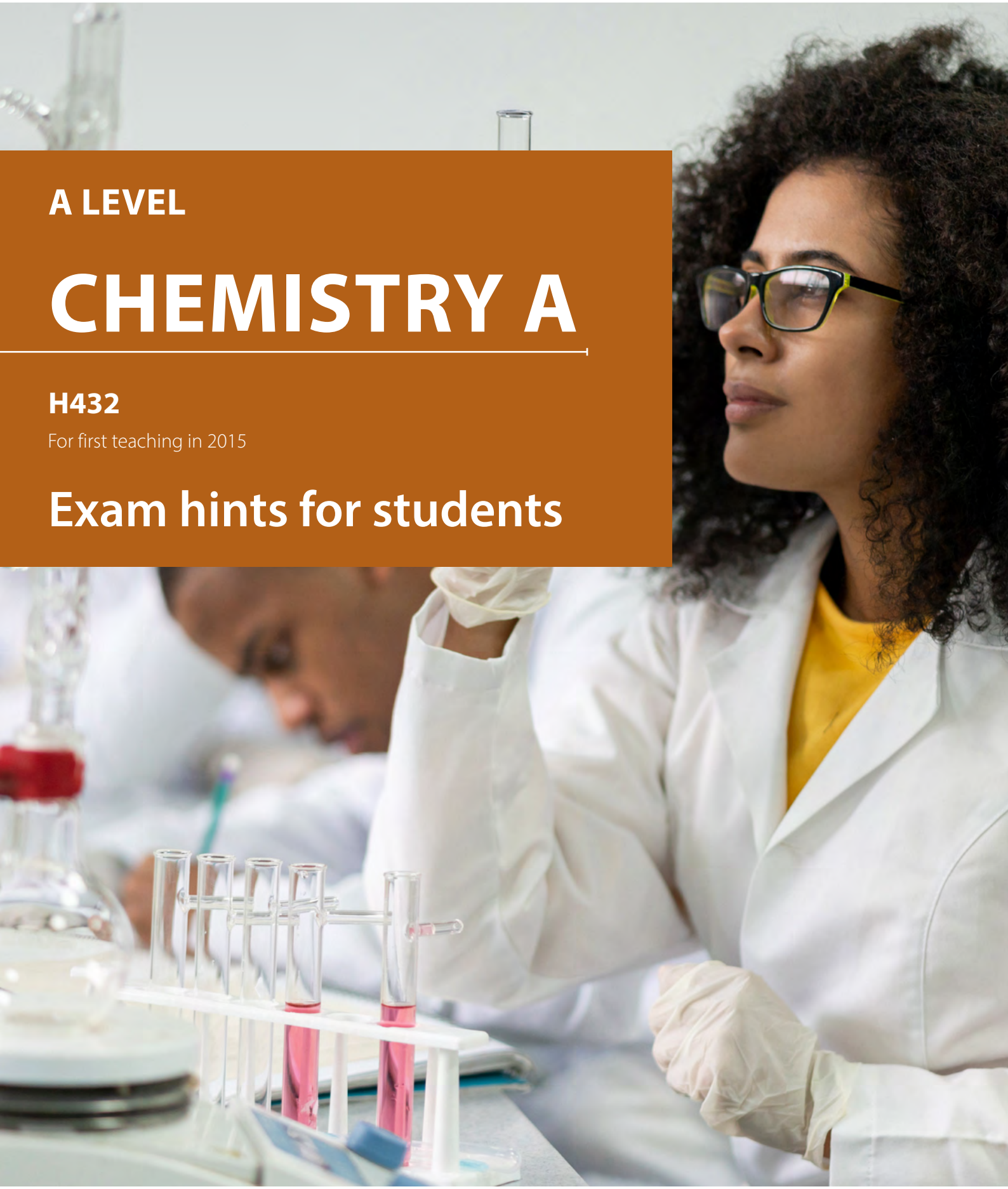


A LEVEL

CHEMISTRY A

H432

For first teaching in 2015

Exam hints for students

Version 1.1

www.ocr.org.uk/science

Exam hints for students

General

$2Fe^{3+} + H_2O_2 \rightarrow 2Fe^{3+} + 2H_2O$ ✗

$2Fe^{3+} + H_2O_2 + 2H^+ \rightarrow 2Fe^{3+} + 2H_2O$ ✓

Check equations for balancing errors after writing them. Remember that any charges should also be balanced.

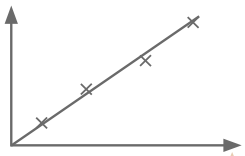
$CaF_{2(g)}$ ✗ $CaF_2(s)$ ✓

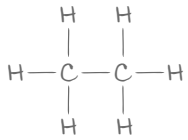
Make sure state symbols in equations are clear. Some wrote lower case 's' similarly to 'g', making it indistinguishable.

You may use a diagram in your answer.

.....

When a question provides space to draw a diagram, providing one can help make your answer clearer.





Graphs and chemical structures should be drawn in pencil – these will be picked up when the exam paper is scanned.

Your answer: ~~A~~ B

If changing the answer for an MCQ, completely cross out the wrong letter and write the correct one anew.

Longer answers don't always lead to more marks. If correct responses are contradicted, marks can be lost.

Answer : ~~1008~~ −504

Cross out answers if you need to change them. Trying to correct an answer by writing over it can make it unclear.

a. ~~~~~~~~~~ ✗

b. ~~~~~~~~~~ ✓

c. ~~~~~~~~~~ ✗

For MCQs, if you don't know the answer try eliminating options by annotating. Don't leave MCQ answers blank!

* see additional answer page

If use of additional answer pages are necessary, it's a good idea to write a note to the marker to this effect.

Determine the rate constant and a possible two-step mechanism that are consistent with these results.

Underline key instructions when reading the question and refer back to them to ensure all of them have been adressed.

Ca_2CO_3 ✗

$CaNO_3$ ✗

Make sure you know how to write correct formulae and balance straightforward equations.

Additional answer pages fragment the response. Concise responses are usually the best responses.

1. ~~~~~~~~~~

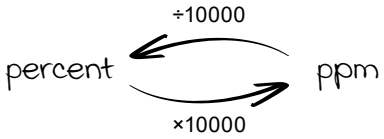
(iii) ~~~~~~~~~~ ?

Data may be presented at the start of the question and not repeated in each subsequent part.

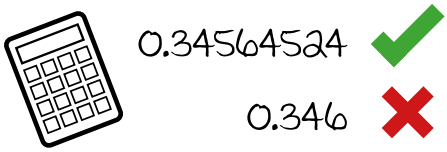
C_2H_6Cl ✗ ~~C_2H_6Cl~~ C_2H_5Cl ✓

Cross out incorrect formulae and replace them afresh. Changed numbers can be difficult to decipher and may not be credited.

Maths



Converting between percentages and parts per million (ppm) is a required skill for the Chemistry B specification.

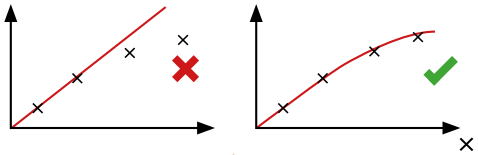


It's always more accurate to round once, for the final answer, and work with unrounded values on the calculator.

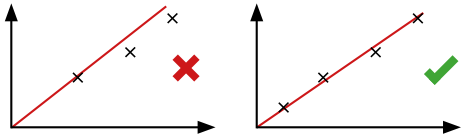
Give your answer to two significant figures.

Answer: ..25 cm³..

Make sure you give answers to the number of significant figures in the question after performing calculations.



Lines of best fit can be straight or curved. They don't have to extend to the axes or origin if not appropriate.



Lines of best fit should cover all points and have a fair distribution of points above and below the line.

$\frac{4.10}{202}$ = 0.0203 mol $\frac{4.91}{94}$ = 0.0522 mol

percentage yield = 38.89 % ECF

Show clear working for calculations. Error carried forward may mean a response still gains marks if a mistake is made.

Answer: 65000

Answer: 6.5×10^4

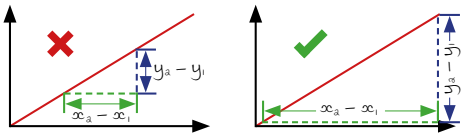
You need to be able to convert results between decimal form and standard form (e.g. $a \times 10^n$).

Mass = 82.7 g

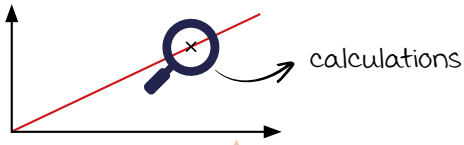
Titre = 24.35 cm^3

3 s.f.

The 'appropriate number of significant figures' is the lowest number of significant figures provided in the data.



Triangles for gradient calculation should be as large as possible - too small a triangle gives a larger error in the value.



Read the scales on graphs carefully and check any reading is correct before using it in subsequent calculations.

$$\ln k = -\frac{E_a}{RT} + \ln A$$

Candidates need more practice in relating chemical equations to the equation for a straight line, y = mx + c.

Practicals

titre:	13.50 cm^3	1.35 cm^3
% error:	0.74%	7.4%

When carrying out a titration, be aware that a larger titre value will have a lower associated percentage error.

make sure hair is tied back ✗

make sure bags are under desks ✗

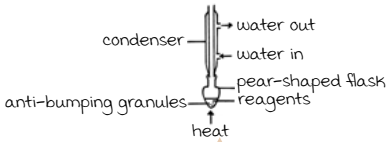
When a question asks for safety precautions, a response beyond normal safe lab practice is usually expected.

Remember that precision is the closeness of agreement between different results. It is not the same as accuracy.

Accuracy is a measure of how close a result is to the true value.

	trial	1	2	3
Initial reading (cm^3)	0.00	22.65	0.00	20.35
Final reading (cm^3)	22.65	43.55	20.35	41.35
Titre (cm^3)	22.65	20.90	20.35	21.00

Titration readings must be to 2 decimal places, with the final digit a 5 or a 0. Only use concordant titres to calculate means.



The overall standard of diagrams could be improved - they should be neatly drawn and clearly labelled.

tap or flick the tube to allow the solid to reach the bottom

When preparing a solid for melting point analysis, note the need to tap the tube so the solid reaches the bottom.

Titration	1	2	3
Initial reading (cm^3)			
Final reading (cm^3)			
Titre (cm^3)			

Communicate results clearly: show headings and units, and show numerical values to the accuracy of apparatus used.

$$\frac{22.45 + 22.45}{2} = 22.50$$

It is good practice to show working for how a mean titre has been calculated.

$$\frac{0.005\,g}{1.74} \times \qquad \frac{0.005\,g \times 2}{1.74} \checkmark$$

When calculating percentage uncertainties consider if a value is from a single reading or from the difference between two readings.

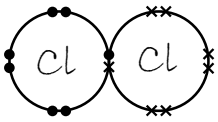
Specification points – Module 2

oxidation state = 2 ✗
oxidation state = +2 ✓

When providing oxidation numbers for elements, it is important to make sure the sign is also included.

potassium (VII) chlorate ✗
potassium chlorate(VIII) ✓

Most candidates need more practice at writing systematic names using oxidation numbers.



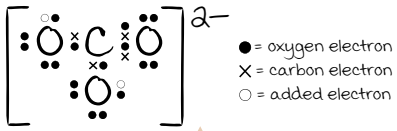
✓

Draw large 'dots-and-cross' diagrams so that dots and crosses can be clearly distinguished.

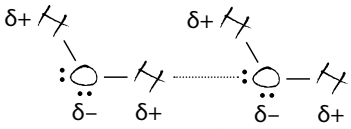
$4KClO_3 \rightarrow KCl + 3KClO_4$

Chlorine disproportionates ✓

Emphasise disproportionation in terms of an element rather than vague terms such as 'species'.



Make sure all electrons are accounted for in dot-and-cross diagrams. Added electrons should use a different symbol.



✓

Responses often omitted dipoles and lone pairs when depicting hydrogen bonding.

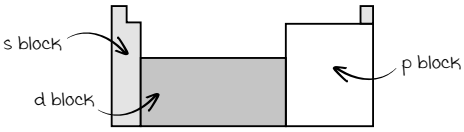
van der Waals' forces ✗
induced dipole-dipole interactions ✓

Note that uses of the term 'van der Waals forces' are not now acceptable and are ignored.

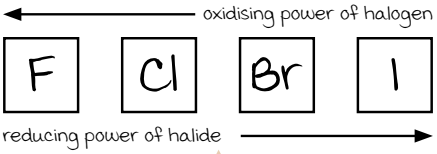
intramolecular forces ✗
intermolecular forces ✓

Avoid confusion between intermolecular bonds (between molecules) and intramolecular bonds (within molecules).

Specification points – Module 3



The block of the periodic table that an element is in refers to the orbital in which its highest energy electron is found.

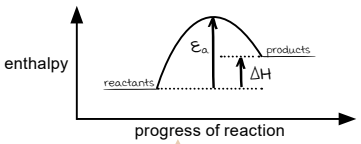


Down the group, oxidising power of the halogens decreases but reducing power of the halide ions increases.

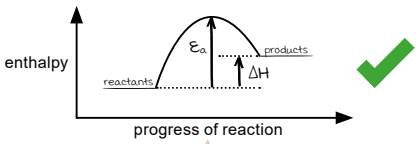
The overall equation is shown bellow.

$2O_3 \rightarrow 3O_2$ $\Delta_r H = -284\,kJ\,mol^{-1}$

Be aware that given enthalpy changes relate to the molar quantities shown in the equation provided.



Values for activation energy (E_a) are typically positive, so negative values can be ruled out as a possibility.



Arrows in enthalpy profile diagrams should be single headed to show the direction of the enthalpy change.

The enthalpy change is bigger ✗

The enthalpy change is more exothermic ✓

The enthalpy change is more negative ✓

When comparing the magnitude of negative values, 'more negative' or 'less negative' should be used.

$I_2(s) \rightarrow 2I(g)$ ✗

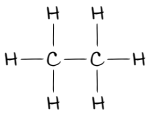
$\frac{1}{2}I_2(s) \rightarrow I(g)$ ✓

Most candidates were unable to write a correct equation for the standard enthalpy change of atomisation of iodine.

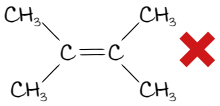
Specification points – Module 4 (1)

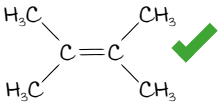
molecular: C_3H_6

structural: CH_3CH_3

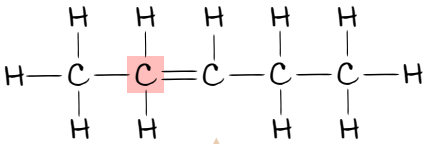
display: 

When asked to provide a formula, read the question carefully and ensure you give the type of formula it asks for.

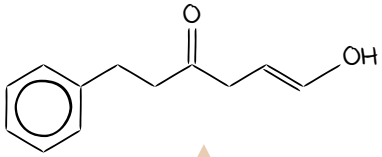




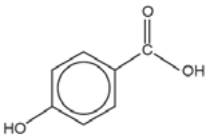
All structures should show correct connectivity (the correct bonds to the correct atoms in the structure).



When drawing organic compounds, make sure that all the atoms have the correct number of bonds.



Unless a question asks for a particular type of formula to be drawn, skeletal formulae are clearer and easier to draw.



carboxylic acid

alcohol ✗

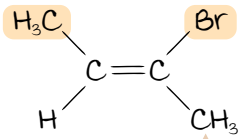
phenol

When naming the functional groups in a molecule, don't just list various groups, as incorrect groups are marked first.

2-methyl-butan-3-ol ✗

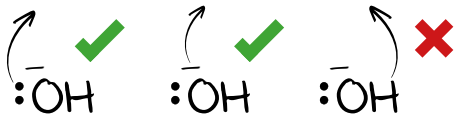
3-methyl-butan-2-ol ✓

When naming organic compounds, functional groups take priority for numbering over alkyl chains.



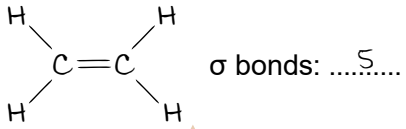
Z isomer

CIP rules for naming alkenes are based on atomic numbers of substituents, not their molecular or atomic masses.

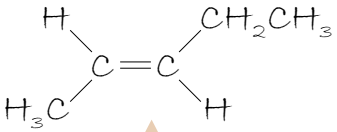


Curly arrows start from a bond, charge, or lone pair. If they can't be traced back to one of these they'll lose the mark.

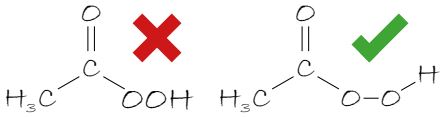
Specification points – Module 4 (2)



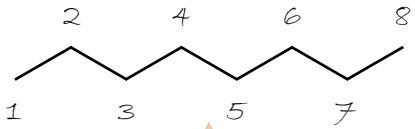
When totalling up sigma bonds in a molecule, remember double bonds are made up of a sigma bond and a pi bond.



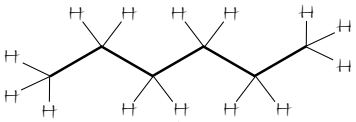
Draw displayed or structural formulae for cis/trans isomers. This helps when showing the arrangement of groups around the C=C group.



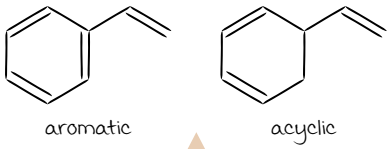
Candidates should ensure that functional groups are clearly displayed when this is specified.



Check organic formulae, as mistakes are easily made. Check the number of C atoms in skeletal formulae.



To work out organic formulae adding H atoms to skeletal formulae is a good strategy.



An alicylic molecule is one with a carbon ring with single or double bonds which is not aromatic.

Specification points – Module 5

$$K_p = \frac{p(CO)^4}{p(C)^4\, p(Fe_3O_4)^4}$$

Candidates should include only gaseous and aqueous species in the expression for a heterogenous equilibrium.

$$K_p = \frac{[NH_3]^2}{[N_2]^2 \times [H_2]^3} \qquad K_p = \frac{p(NH_3)^2}{p(N_2)^2 \times p(H_2)^3}$$

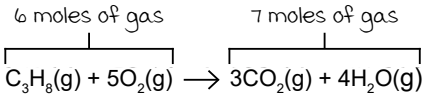
Square brackets indicate a concentration and shouldn't be used in K_p expressions.

$\Delta H = +267\ kJ\ mol^{-1}$

$\Delta S = +596\ J\ K^{-1}\ mol^{-1}$

$\varepsilon^\circ = -3.04\ V$

Make sure either positive or negative signs are shown for enthalpy values, entropy values, and electrode potentials.

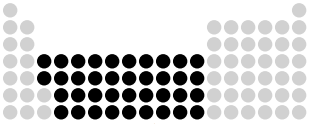


Reactions with more moles of gas in the products than the reactants will have a positive entropy change.

E = ..0.281.. V

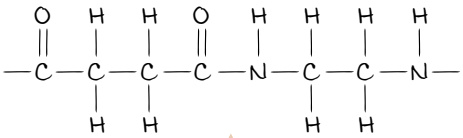
E = ..+ 0.281.. V

When giving E values for electrochemical cells ensure that you put a + or – in front of the value given as appropriate.

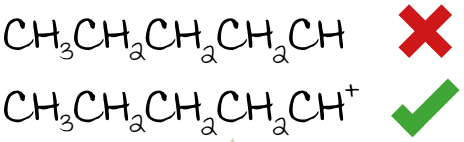


Learn reactions and reagents in the transition elements section of the specification.

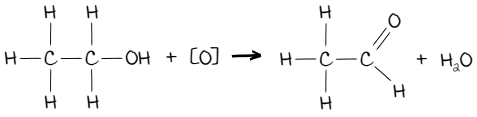
Specification points – Module 6



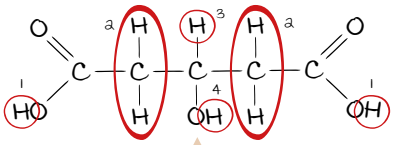
When asked to 'draw a section' of a protein or polymer, the end bonds of the structure should be left open.



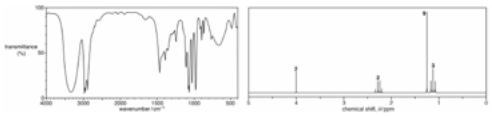
Make sure that the positive charges on ions produced during mass spectrometry are shown clearly.



Describing a synthesis with equations along with words where possible is a good strategy to avoid writing lots of text.



When analysing ^{1}H NMR spectra, using a diagram to identify the different H environments is good practice.



When analysing spectra organise answers by discussing each spectrum in turn. Analysis is made easier if candidates label the spectrum.

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