AQA Qualifications

A-LEVEL

Chemistry

CHEM2 Chemistry in Action

Mark scheme

2420
June 2016

Version: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

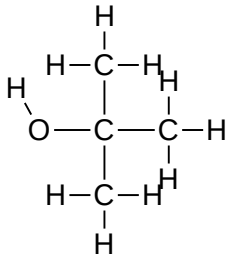
Further copies of this Mark Scheme are available from aqa.org.uk

Question	Answers	Mark	Additional Comments/Guidance
1a)	more (electron) shells / (outer) electrons further from the nucleus / larger atoms / more shielding so weaker <u>attraction</u> of nucleus/protons for (outer) electrons	1 1	If 'molecules' mentioned CE = 0 It = Ba Mark independently **ALLOW** energy levels for shells Both ideas must be comparative **NOT** hold/pull/bonded for 'attraction' idea of nucleus or protons must be clear **ALLOW** M2 if electrons implied from mention in M1 **ALLOW** converse if it is clear that answer refers to Ca
1b)	<u>White</u> solid / <u>white</u> ash Bright light / white light $Mg + H_2O \rightarrow MgO + H_2$	1 1 1	**ALLOW** 'white smoke/powder' **IGNORE** 'product' **NOT** ppt **IGNORE** fumes **IGNORE** tube/glass goes black **ALLOW** glow/flame for light **IGNORE** state symbols
1c)	$BaSO_4$ is insoluble but $Ba(NO_3)_2$ is soluble **OR** $BaSO_4$ precipitates but $Ba(NO_3)_2$product(s) of second reaction is soluble/remains in solution **OR** $BaSO_4$ is insoluble but no reaction occurs in second case $Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$	1 1	**NOT** just 'no observation' in second case **<u>Comparison</u> of solubilities must be implied** **NOT** Barium is soluble/insoluble **Correct state symbols required**
Total		**7**	

Question	Answers	Mark	Additional Comments/Guidance
2a)			If enthalpy of formation definition given CE=O
	The <u>enthalpy / heat energy change</u> when <u>1 mol</u> (of a substance)	1	**NOT** just 'energy' **ALLOW** alternatives for substance e.g. molecule/compound/element
	is <u>burned/reacts completely in oxygen</u>	1	**ALLOW** reacts in excess oxygen
	with all reactants and products in their <u>standard states</u> **OR** With all reactants and products in their normal states at 298K/given temp & 100kPa	1	**ALLOW** 'everything' for 'reactants and products' Penalise incorrect conditions if given **ALLOW** 'normal states under standard conditions'
2b)			Correct answer scores 3
	$\Delta H = \Sigma\Delta H_c$(reactants) - $\Sigma\Delta H_c$ (products) **OR** correctly and fully balanced cycle	1	
	$\Delta H = [3(-394) + 4(-286)] – (-2010)$ **OR** $\Delta H = -2326 + 2010$	1	M2 also scores M1
	$\Delta H = -316$ (kJ mol^{-1}) +316 scores 1 mark only	1	**IGNORE** units Check for AE in working – can award M3 as ecf (error carried forward) from M2 if M2 not given due to AE

2c)	ΔH/-1893 = ΣB(reactants) - ΣB(products) **OR** ΔH/-1893 = ΣBonds broken - ΣBonds formed **OR** ΔH/-1893 = 2B(C-C) + 7B(C-H) + B(C-O) + B(O-H) + 4½ B(O=O) – 6B(C=O) – 8B(O-H)	1	Correct answer gains 3 marks
	-1893= 2B(C-C) + 7(412) + 360 + 463 + 4½(496) – 6(805) – 8(463) **OR** -1893= 2B(C-C) +5939 – 8534 **OR** -1893= 2B(C-C) -2595 **OR** 2B(C-C) = 702	1	M2 also scores M1 May see no 463 in bonds broken and 7x463 in made (gives 5476 – 8071)
	B(C-C) = (+)351(kJ mol^{-1})	1	If **NOT** 351 check for AE. This would lose M2, but could gain M1 and M3 (+)234 scores 1 (due to 3(C-C)) **NOT** M3 from incorrect M2 unless incorrect M2 is due to AE **IGNORE** Units If no other mark awarded then **ALLOW** 1 if 5939 or 5476 or 8534 or 8071 seen
Total		**9**	

Question	Answers	Mark	Additional Comments/Guidance
3a) i.	$CH_3Cl + 2Cl_2 \rightarrow CHCl_3 + 2HCl$	1	**IGNORE** state symbols **ALLOW** multiples
3a) ii.	(Free-)radical substitution	1	This answer only
3a) iii.	Initiation: $Cl_2 \rightarrow 2Cl\bullet$ 1st Propagation step $Cl\bullet + CH_2Cl_2 \rightarrow \bullet CHCl_2 + HCl$ 2nd Propagation step $\bullet CHCl_2 + Cl_2 \rightarrow CHCl_3 + Cl\bullet$ Termination $2 \bullet CHCl_2 \rightarrow C_2H_2Cl_4$	1 1 1 1	Penalise absence of dot once only Penalise + and/or – charges every time **ALLOW** • anywhere on $\bullet CHCl_2$ but, if drawn out as a structure, then • must be on C Mark independently **ALLOW** $\bullet CH_2Cl + \bullet CCl_3 \rightarrow C_2H_2Cl_4$ **IGNORE** state symbols throughout
3b) i.	$CClF_3 \rightarrow \bullet CF_3 + Cl\bullet$	1	**ALLOW** • anywhere on $\bullet CF_3$ unless displayed
3b) ii.	$Cl\bullet + O_3 \rightarrow ClO\bullet + O_2$ $ClO\bullet + O_3 \rightarrow 2O_2 + Cl\bullet$	1 1	Equations can be in either order Penalise absence of • once only **ALLOW** • anywhere on $\bullet ClO$ **NOT** $\bullet O_3$
Total		**9**	

Question	Answers	Mark	Additional Comments/Guidance
4a)	OH AND alcohol	1	**IGNORE** hydroxy(l)
4b)	**A** = butan-2-ol / $CH_3CH(OH)CH_2CH_3$ **B** = butan-1-ol / $CH_3CH_2CH_2CH_2OH$ product from **A** / **P** is a ketone **AND** product from **B** / **Q** is an aldehyde	1 1 1	If formulae given then must be unambiguous If both formula and name given then formula must match name for mark to be awarded Penalise reference to incorrect class of alcohol
4c)	Type of Bond: C=C  Reagent: conc. H_2SO_4 / conc. H_3PO_4 Conditions: 180 °C / High temp / Hot / Reflux /	1 1 1 1	 Must show all bonds in Isomer **C** including O–H bond If incorrect attempt at correct reagent, mark on Apply list principle for reagents and conditions marks conc required - may appear on conditions line **NOT** (aq) For M3 even if seen on conditions line **ALLOW** Reagent = Al_2O_3 Condition = 'passing vapour over hot solid' owtte **ALLOW** stated temp in range 100-300 °C/373-573 K **IGNORE** 'heat' M4 dependent on correct reagent in M3

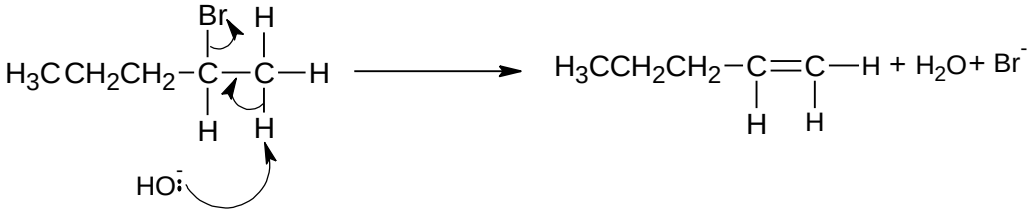
4d) i)	S = aldehyde/CHO **AND** T = carboxylic/COOH/CO_2H T forms hydrogen bonds (which are) stronger than / need more energy to break than forces between molecules/IMFs in S ora (or reverse argument)	1 1 1	 If implication of breaking covalent bonds max M1 only
4d) ii	(No oxidation has occurred as..) (Still) contains peak at 3230−3550 cm-1 due to O−H/alcohol Does not contain peak at 2500−3000 cm-1 due to O−H/carboxylic acid Does not contain peak at 1680−1750 cm-1 due to C=O	Any 2	Must have wavenumber range (or value within range) and bond or functional group to score each mark.
Total		**13**	

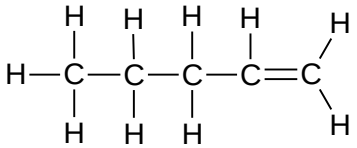
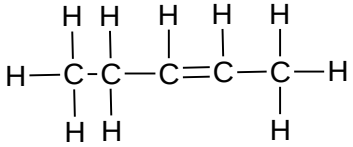
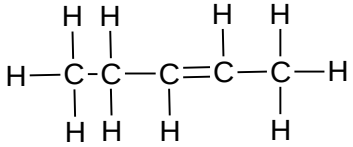
Question	Answers	Mark	Additional Comments/Guidance
5(a)(i)	curve drawn from origin with peak clearly lower and to right.	1	new curve crosses original once only, finishes above original and does **not** clearly curve up **IGNORE** relative areas
5(a)(ii)	(Relative areas under curves indicate) <u>many</u> (owtte) more molecules with E greater than or equal to Ea (at higher T) or reverse argument (large) increase in (number of) <u>successful</u> (owtte) <u>collisions per unit time</u>	1 1	**ALLOW** 'particles' **IGNORE** 'atoms' OR '<u>frequency</u> of successful <u>collisions</u>'
5(b)(i)	Yield increases more moles/molecules (of gas) on left/fewer on right/3 on left 1 on right <u>equilibrium shifts/moves</u> (to right) to reduce pressure/oppose higher pressure	1 1 1	Yield decreases/stays the same CE = 0 If not answered mark on No M3 if 'more moles on right' in M2 **IGNORE** 'favours' **NOT** just 'oppose the change' QoL means that M3 is only awarded if these ideas are clearly linked in one statement
5(b)(ii)	Higher T would increase rate but decrease yield/make less methanol **OR** Lower T decreases rate but increases yield; Chosen T is a compromise/balance (between rate and yield) owtte	1 1	If no mention of both rate **AND** (idea of) yield max 1
Total		**8**	

Question	Answers	Mark	Additional Comments/Guidance
6(a)	increasing atomic radius / shielding / number of shells / size (down group) or reverse argument decreasing attraction of nucleus/protons for shared (electron) pair / bond electrons	1 1	**NOT** 'molecules' **NOT** if attraction for single electron implied
6(b)(i)	electron acceptor / species that accepts electrons / species that gains electrons	1	**NOT** electron pair **NOT** just 'gain of electrons'
6(b)(ii)	chlorine 0 to –1 / oxidation state/number of chlorine decreases **AND** bromine –1 to 0 / oxidation state/number of bromine increases	1	penalise if oxidised for chlorine and/or reduced for bromine credit oxidation states if labelled on equation
6(c)(i)	$H_2SO_4 + 8H^+ + 8e^{(-)} \rightarrow H_2S + 4H_2O$	1	**ALLOW** $SO_4^{2-} + 10H^+ + 8e^{(-)} \rightarrow H_2S + 4H_2O$ **ALLOW** fractions/multiples **IGNORE** state symbols
6(c)(ii)	$2I^- \rightarrow I_2 + 2e^{(-)}$	1	**ALLOW** fractions/multiples **IGNORE** state symbols **ALLOW** $2I^- - 2e^{(-)} \rightarrow I_2$

6(c)(iii)	$H_2SO_4 + 8H^+ + 8I^- \rightarrow H_2S + 4H_2O + 4I_2$	1	**ALLOW** $H_2SO_4 + 8HI \rightarrow H_2S + 4H_2O + 4I_2$ $SO_4^{2-} + 2H^+ + 8HI \rightarrow H_2S + 4H_2O + 4I_2$ $SO_4^{2-} + 10H^+ + 8I^- \rightarrow H_2S + 4H_2O + 4I_2$ $9H_2SO_4 + 8I^- \rightarrow H_2S + 4H_2O + 4I_2 + 8HSO_4^-$ $9H_2SO_4 + 8NaI \rightarrow H_2S + 4H_2O + 4I_2 + 8NaHSO_4$ $H_2SO_4 + 8H^+ + 8NaI \rightarrow H_2S + 4H_2O + 4I_2 + 8Na^+$ $5H_2SO_4 + 8I^- \rightarrow H_2S + 4H_2O + 4I_2 + 4SO_4^{2-}$ $5H_2SO_4 + 8NaI \rightarrow H_2S + 4H_2O + 4I_2 + 4Na_2SO_4$
6(c)(iv)	'oxidising agent' box ticked	1	
6(c)(v)	$H_2SO_4 + 2NaF \rightarrow Na_2SO_4 + 2HF$ **OR** $H_2SO_4 + NaF \rightarrow NaHSO_4 + HF$	1	
6(c)(vi)	fluoride less powerful reducing agent (than iodide) OR fluoride less easily oxidised than iodide or reverse argument in either case	1	NOT general group VII trend statement NOT fluorine/F or iodine/I Must be comparative
6(d)(i)	$Cl_2 + H_2O \rightleftharpoons 2H^+ + Cl^- + ClO^-/HCl + HOCl$	1	**ALLOW** → for ⇌
6(d)(ii)	equilibrium <u>shifts/moves</u> left (producing) chlorine (which) is toxic/poisonous	1 1	Mark independently
Total		**13**	

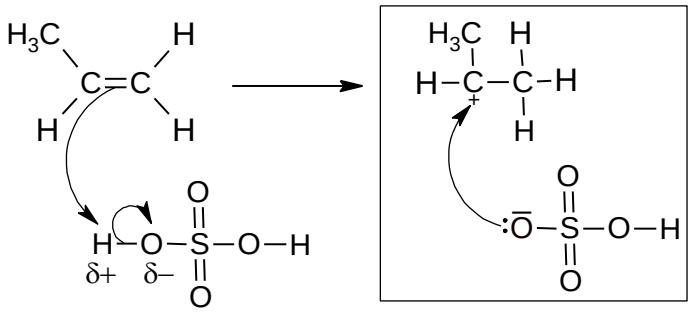
Question	Answers	Mark	Additional Comments/Guidance
7(a)(i)	$2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$	1	**ALLOW** multiples/fractions
7(a)(ii)	sulfuric acid/H_2SO_4	1	**ALLOW** $CaSO_4$ **ALLOW** SO_3 **IGNORE** gypsum/plaster/$CaSO_3$
7(b)(i)	$2CH_4 + 3O_2 \rightarrow 2CO + 4H_2O$	1	**ALLOW** multiples/fractions **ALLOW** $2CH_4 + 3½O_2 \rightarrow CO + CO_2 + 4H_2O$
7(b)(ii)	$ZnO + CO \rightarrow Zn + CO_2$	1	**ALLOW** multiples/fractions **IGNORE** state symbols
7(c)(i)	$Cu^{2+}(aq) + Fe(s) \rightarrow Cu(s) + Fe^{2+}(aq)$	1	state symbols required
7(c)(ii)	***environmental* (2 from)** no/less CO_2/greenhouse gases produced/reduced effect on global warming conserves resources/fossil fuels no/less SO_2/acid rain produced no/less global dimming/particulates no/less land scarring/mining/habitat damage/noise pollution ***economic* (1 from)** less energy/lower temp hence cheaper less labour hence cheaper	 1 1 1	 **IGNORE** CO **IGNORE** scrap iron is cheap 'cheaper' must be qualified **NOT** just less energy/labour
7(d)(i)	$TiO_2 + C + 2Cl_2 \rightarrow TiCl_4 + CO_2$ **OR** $TiO_2 + 2C + 2Cl_2 \rightarrow TiCl_4 + 2CO$ $TiCl_4 + 2Mg \rightarrow 2MgCl_2 + Ti$	1 1	**ALLOW** multiples/fractions
7(d)(ii)	forms (titanium) carbide		**ALLOW** makes product/Ti brittle
Total		**11**	

Question	Answers	Mark	Additional Comments/Guidance
8(a)	NaOH/KOH	1	**IGNORE** OH^- **NOT** M1 if any mention of acidified/H^+ in reagents or conditions
	reaction 1 = ethanolic/alcoholic **AND** *reaction 2* = aqueous	1	**IGNORE** temp **NOT** ethanoic
	rxn 1 = base/proton acceptor	1	
	rxn 2 = nucleophile/lone pair donor/electron pair donor	1	
	(Base) Elimination	1	**NOT** nucleophilic
		1 1 1	**ALLOW** correct E1 mechanism
	M6 must show an arrow from the lone pair on the oxygen of a negatively charged hydroxide ion to a correct H atom **M7** must show an arrow from a correct C–H bond on C adjacent to the C of the C–Br bond to a correct C–C bond. Only award if an arrow is shown attacking the H atom of a correct adjacent C–H bond in **M6** **M8** is independent provided it is from their original molecule and shows curly arrow from C-Br to Br		**IGNORE** incorrect inorganic products If forming pent-2-ene can award M8 only even if arrows in mechanism correct If C chain length or halogen wrong in reactant or product max 2/3

8(b)		1	
		1	
	Z-pent-2-ene		If no M2 and M3 **ALLOW** 1 mark if both structures **OR** both names correct
		1	**NOT** cis and trans
	E-pent-2-ene		
	no free rotation around C=C	1	**ALLOW** no rotation of C=C
	2 different atoms/groups on each of the C=C Cs owtte	1	**IGNORE** 'functional'

8(c)	Same volume/amount of $AgNO_3$(aq) added to same volume/amount/no. of drops of haloalkane (in beaker/flask) in each experiment	1	both volume references needed **IGNORE** inappropriate volumes
	same temp **OR** same [$AgNO_3$] each time	1	
	record time to measure sensible observation about the amount of AgCl ppt	1	e.g. first appearance of ppt / ppt obscures mark / reading on a colorimeter **IGNORE** colour of ppt **ALLOW** silver mirror **NOT** reference to same time if describing method based on timing how long (for ppt to form) **ALLOW** gravimetric method based on same time for each experiment
	Rate = amount/time **OR** proportional to 1/time **OR** reference to shorter time = higher rate/longer time = lower rate	1	**ALLOW** greater mass = higher rate if gravimetric method

Total		**17**	

Question	Answers	Mark	Additional Comments/Guidance
9(a)	electrophilic addition  Major product/propan-2-ol formed via most stable <u>carbocation/carbonium ion</u> <u>secondary</u> <u>carbocation/carbonium ion</u> more stable (than primary) or reverse argument	1 1 1 1 1 1 1	 M2 = curly arrow from C=C towards H of H−O on 'their' sulfuric acid M3 = curly arrow to break H−O Penalise incorrect dipole/full charges M4 = intermediate M5 = correct anion, lone pair on correct O and curly arrow from that lone pair to C+ on their carbocation **IGNORE** position of minus sign unless displayed structure **IGNORE** product M6 for idea of carbocation stability This statement gets M6 and M7 **NOT** stability of alcohols
9(b)	Hot/High T (and High P) (SiO_2 coated in) <u>phosphoric</u> acid (catalyst) *advantages of fermentation* • Low(er) T and P / lower energy use • less use of non-renewable fossil fuels/renewable/sustainable (resources) • low(er) equipment/plant/capital costs *disadvantages of fermentation* • slow(er) reaction • low atom economy • impure product/extra purification/distillation required • Batch process/labour intensive/difficult to automate • Land used for sugar crops (so not available for food crops)	1 1 1 1 1 1	**ALLOW** 200-450 C/473-723 K (Quoted **NOT** (aq) **IGNORE** carbon neutral max 2 **IGNORE** low yield max 2
Total		**13**	

General principles applied to marking CHEM2 papers by CMI+ (June 2016)

It is important to note that the guidance given here is generic and specific variations may be made at individual standardising meetings in the context of particular questions and papers.

Basic principles

- **Examiners should note that throughout the mark scheme, items that are underlined are <u>required information</u> to gain credit.**
- **Occasionally an answer involves incorrect chemistry and the mark scheme records CE = 0, which means a chemical error has occurred and no credit is given for that section of the clip or for the whole clip.**

A. <u>The "List principle" and the use of "ignore" in the mark scheme</u>

If a question requires **one** answer and a candidate gives two answers, no mark is scored if one answer is correct and one answer is incorrect. There is no penalty if both answers are correct.

N.B. Certain answers are designated in the mark scheme as those which the examiner should "Ignore". These answers are not counted as part of the list and should be ignored and will not be penalised.

B. <u>Incorrect case for element symbol</u>

The use of an incorrect case for the symbol of an element should be penalised **once only** within a clip.
For example, penalise the use of "h" for hydrogen, "CL" for chlorine or "br" for bromine.

C. <u>Spelling</u>

In general

- The names of chemical compounds and functional groups **must be spelled correctly** to gain credit.
- Phonetic spelling may be acceptable for some chemical terminology.

N.B. Some terms may be required to be spelled correctly or an idea needs to be articulated with clarity, as part of the "Quality of Language" (**QoL**) marking. These will be identified in the mark scheme and marks are awarded only if the QoL criterion is satisfied.

D. Equations

In general

- Equations **must** be balanced.
- When an equation is worth two marks, one of the marks in the mark scheme will be allocated to one or more of the reactants or products. This is independent of the equation balancing.
- State symbols are generally ignored, unless specifically required in the mark scheme.

E. Reagents

The command word "Identify", allows the candidate to choose to use **either** the name or the formula of a reagent in their answer. In some circumstances, the list principle may apply when both the name and the formula are used. Specific details will be given in mark schemes.

The guiding principle is that a reagent is a chemical which can be taken out of a bottle or container. Failure to identify complete reagents **will be penalised**, but follow-on marks (e.g. for a subsequent equation or observation) can be scored from an incorrect attempt (possibly an incomplete reagent) at the correct reagent. Specific details will be given in mark schemes.
For example, **no credit** would be given for

- the cyanide ion or CN^- when the reagent should be potassium cyanide or KCN;
- the hydroxide ion or OH^- when the reagent should be sodium hydroxide or NaOH;
- the $Ag(NH_3)_2^+$ ion when the reagent should be Tollens' reagent (or ammoniacal silver nitrate). In this example, no credit is given for the ion, but credit could be given for a correct observation following on from the use of the ion. Specific details will be given in mark schemes.

In the event that a candidate provides, for example, **both** KCN and cyanide ion, it would be usual to ignore the reference to the cyanide ion (because this is not contradictory) and credit the KCN. Specific details will be given in mark schemes.

F. Oxidation states

In general, the sign for an oxidation state will be assumed to be positive unless specifically shown to be negative.

G. Marking calculations, such as those involving enthalpy changes

In general

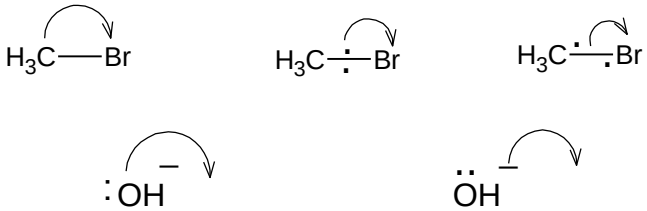
- The sign for an enthalpy change will be assumed to be positive unless specifically shown to be negative.
- A correct answer alone will score **full marks** unless the necessity to show working is specifically required in the question.
- A correct numerical value with the **wrong sign** will usually score **only one mark**.

All other values **gain no credit** except

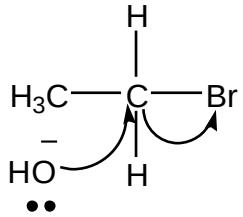
- Two marks can be awarded for correct chemistry with an arithmetic error.
- One mark can be awarded for a correct mathematical statement (or cycle) for the method.

H. Organic reaction mechanisms

Curly arrows should originate either from a lone pair of electrons or from a bond.
The following representations should not gain credit **and will be penalised each time** within a clip.



For example, the following would score zero marks



When the curly arrow is showing the formation of a bond to an atom, the arrow can go directly to the relevant atom, alongside the relevant atom or **more than half-way** towards the relevant atom.
In free-radical substitution

- The absence of a radical dot should be penalised **once only** within a clip.

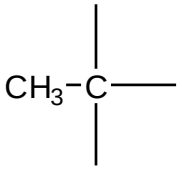
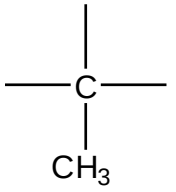
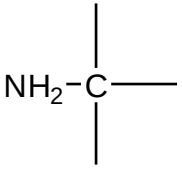
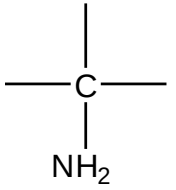
- The use of double-headed arrows or the incorrect use of half-headed arrows in free-radical mechanisms should be penalised **once only** within a clip

In mass spectrometry fragmentation equations, the absence of a radical dot on the molecular ion and on the free-radical fragment would be considered to be two independent errors and both would be penalised if they occurred within the same clip.

I. Organic structures

In general

- Displayed formulae must show all of the bonds and all of the atoms in the molecule, but need not show correct bond angles.
- Bonds should be drawn correctly between the relevant atoms.
  For example, if candidates show the alcohol functional group as C ─ HO, they should be penalised **on every occasion**.
- Latitude should be given to the representation of C ─ C bonds in structures, given that CH_3─ is considered to be interchangeable with H_3C─ even though the latter would be preferred.
- Poor presentation of vertical C ─ CH_3 bonds or C ─ NH_2 bonds should **not** be penalised. For the other functional groups, such as ─ OH and ─ CN, the limit of tolerance is the half-way position between the vertical bond and the relevant atoms in the attached group.
  By way of illustration, the following would apply

(a)  allowed	(b)  allowed
(c)  allowed	(d)  allowed

- In most cases, the use of "sticks" to represent C ─ H bonds in a structure should **not** be penalised. The exceptions will include structures in mechanisms when the C ─ H bond is essential (e.g. elimination reactions in haloalkanes) and when a displayed formula is required.
- Some examples are given here of **structures** for specific compounds that should **not** gain credit

CH_3COH	for	ethanal
CH_3CH_2HO	for	ethanol
$OHCH_2CH_3$	for	ethanol
C_2H_6O	for	ethanol
CH_2CH_2	for	ethene
$CH_2.CH_2$	for	ethene
$CH_2:CH_2$	for	ethene

N.B. Exceptions <u>may</u> be made in the context of balancing equations

- Each of the following **should gain credit** as alternatives to correct representations of the structures.

$CH_2 = CH_2$	for	ethene, $H_2C=CH_2$
$CH_3CHOHCH_3$	for	propan-2-ol, $CH_3CH(OH)CH_3$

J. <u>Organic names</u>

As a general principle, non-IUPAC names or incorrect spelling or incomplete names should **not** gain credit.
Some illustrations are given here.

but-2-ol	should be **butan-2-ol**
2-hydroxybutane	should be **butan-2-ol**
butane-2-ol	should be **butan-2-ol**
2-butanol	should be **butan-2-ol**

ethan-1,2-diol	should be **ethane-1,2-diol**
2-methpropan-2-ol	should be **2-methylpropan-2-ol**
2-methylbutan-3-ol	should be **3-methylbutan-2-ol**
3-methylpentan	should be **3-methylpentane**
3-mythylpentane	should be **3-methylpentane**
3-methypentane	should be **3-methylpentane**
propanitrile	should be **propanenitrile**
aminethane	should be **ethylamine** (although aminoethane can gain credit)
2-methyl-3-bromobutane	should be **2-bromo-3-methylbutane**
3-bromo-2-methylbutane	should be **2-bromo-3-methylbutane**
3-methyl-2-bromobutane	should be **2-bromo-3-methylbutane**
2-methylbut-3-ene	should be **3-methylbut-1-ene**
difluorodichloromethane	should be **dichlorodifluoromethane**

K. <u>Additional sheets and blank clips</u>

- Markers should **mark all that is seen** and carry on marking as normal. Clips which refer to the use of additional sheets should **not** be referred to the senior team. Clips which refer to other parts of the script must be referred to the senior team.
- When considering crossed out work, **mark it** as if it were not crossed out **unless** it has been replaced by a later version; this later version then takes priority.
- Mark a blank section with a dash (—) and **not with a score of zero**.