

Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCSE in Chemistry
(5CH2F/01) Paper 01
Unit C2: Discovering Chemistry

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Publications Code 5CH2F_01_1606_MS

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Acceptable answers	Mark
1 (a) (i)	D		(1)

Question Number	Answer	Acceptable answers	Mark
1 (a) (ii)	B		(1)

Question Number	Answer	Acceptable answers	Mark
1 (a) (iii)	a description including three of the following <ul style="list-style-type: none"> • draw on start line (in pencil) • stated distance up from bottom • put spots of {drink/sample} on paper (in positions shown) • allow spots to dry and repeat • solvent level below start line OWTTE 		(3)

Question Number	Answer	Acceptable answers	Mark
1 (b)	A description including <ul style="list-style-type: none"> • allow layers to {form / separate} / liquids to separate (1) • operate tap / OWTTE (1) • run out {liquid X/most dense liquid} from the bottom OWTTE(1) • pour liquid Y from the top (1) 	ignore liquid Y through tap	(2)

Question Number	Answer	Acceptable answers	Mark
1 (c)	fractional (1) distillation (1)	allow max 1 for fractionation	(2)

Question Number	Answer	Acceptable answers	Mark
2(a)	+1	positive / +ve / 1+ / + / one plus	(1)

Question Number	Answer	Acceptable answers	Mark
2(b)	A 11		(1)

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	2.8.1	allow description giving numbers	(1)

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	An explanation linking <ul style="list-style-type: none"> • 1 electron (1) • (in the) {outer/last/final/end} {shell/energy level} (1) 	allow the group number is the same as the number of electrons on the outer shell (1)	(2)

Question Number	Answer	Acceptable answers	Mark
2(d)(i)	C selenium, Se		(1)

Question Number	Answer	Acceptable answers	Mark
2(d)(ii)	same number of shells (contain electrons) (1)	with each successive element, one electron is added to same shell	(1)

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	C lead iodide		(1)

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	<p>lead + potassium → lead + potassium nitrate iodide iodide nitrate</p> <p>LHS 1 mark RHS 1 mark</p>	<p>ignore state symbols</p> <p>allow reactants in any order allow products in any order</p> <p>allow = instead of arrow</p> <p>if formula used they must be correct</p> <p>ignore formula if word and formulae are given for any substance</p> <p>do not allow a mixture of formula for both marks. e.g. lead nitrate + potassium iodide → PbI_2 + KNO_3 scores 1 mark.</p> <p>iodine for iodide = 1mark max</p>	(2)

Question Number	Answer	Acceptable answer	Mark
3(a)(iii)	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px;">B</div> <div style="border: 1px solid black; padding: 2px 5px;">E</div> <div style="border: 1px solid black; padding: 2px 5px;">A</div> <div style="border: 1px solid black; padding: 2px 5px;">D</div> <div style="border: 1px solid black; padding: 2px 5px;">C</div> </div> <p>all correct = 2 marks any three steps (ignoring B) in the correct order = 1 mark</p>		(2)

Question Number	Answer	Acceptable answers	Mark
3(b)	<p>one single line from sodium to yellow (1)</p> <p>One single line from potassium to lilac (1)</p> <p>Do not accept multiple lines</p>		(2)

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	KCl	ClK reject KCL/kcL/Kcl ignore charges unless incorrect 'correct' charges would be K^+Cl^-	(1)

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	an explanation linking <ul style="list-style-type: none"> gain (of electrons) (1) {one/an} electron (1) 	reference to sharing electrons/covalent bonding = 0 marks	(2)

Question Number	Answer	Acceptable answers	Mark
4(a)	40 + 12 + (16x3) (1) (= 100)	100 (1) with {no/incorrect} working 40 + 12 + (16x3) with {no/wrong} answer (1)	(1)

Question Number	Answer	Acceptable answers	Mark
4(b)	A 1 : 1		(1)

Question Number	Answer	Acceptable answers	Mark
4(c)	Al ₂ O ₃	Ignore al ₂ O ₃ / Al ² O ³ / AL ₂ O ₃ / Al2O3 etc	(1)

Question Number	Answer	Acceptable answers	Mark
4(d)	C C ₂ H ₄		(1)

Question Number	Answer	Acceptable answers	Mark
4(e)(i)	<u>7.2</u> (1) 9.0 their fraction x 100 (1) (= 80%)	0.8 (1) 80 (%) with {no/incorrect} working (2) correct working with {no/wrong} answer (2)	(2)

Question Number	Answer	Acceptable answers	Mark
4(e)(ii)	An explanation linking two of the following <ul style="list-style-type: none"> • incomplete reaction (1) • practical losses during experiment (1) • side reactions taking place (1) 	allow inaccurate measurements (1)	(2)

Question Number	Answer	Acceptable answers	Mark
4(e)(iii)	$\frac{65}{81}$ (1) their fraction x 100 (1) (=80.2%)	0.802 or 0.8 (1) 80 / 80.2 with {no/incorrect} working (2) correct working with {no/wrong} answer (2)	(2)

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	A description including two of the following <ul style="list-style-type: none"> • fizzes /bubbles • moves around surface of water • floats/on surface of water • disappears 	dissolves	(2)

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	B flammable		(1)

Question Number	Answer	Acceptable answers	Mark
5(b)(i)	An explanation linking <ul style="list-style-type: none"> • (delocalised/free) electrons (1) • (electrons) move/flow (to carry the current) (1) 	reject ions moving	(2)

Question Number	Answer	Acceptable answers	Mark
5(b)(ii)	magnesium salts colourless / iron salts coloured	magnesium salts are white any correct colour of iron salt allow colour	(1)

Question Number	Indicative Content	Mark
QWC	<p>*5(c)</p> <p>A explanation including some of the following points</p> <p>Reaction of chlorine with potassium bromide</p> <ul style="list-style-type: none"> • colour change seen • bromide ions are displaced • yellow-orange colour of bromine appears in solution • chlorine is more reactive than bromine • chlorine + potassium bromide → bromine + potassium chloride <p>Reaction of chlorine with potassium iodide</p> <ul style="list-style-type: none"> • colour change seen • iodide ions are displaced • brown colour of iodine appears in solution (allow any colour from yellow to dark red) • chlorine is more reactive than iodine • chlorine + potassium iodide → iodine + potassium chloride <p>Reaction of bromine with potassium iodide</p> <ul style="list-style-type: none"> • colour change seen • iodide ions are displaced • solution darkens/orange-brown colour seen (allow any colour from yellow to dark red) • bromine is more reactive than iodine • bromine + potassium iodide → iodine + potassium bromide <p>Conclusions</p> <ul style="list-style-type: none"> • more reactive halogens displace less reactive halogens • order of reactivity is that chlorine is the most reactive of the three, followed by bromine and then iodine. 	(6)
Level	0	No rewardable content
1	1 - 2	a limited description e.g. There is a colour change where there is a reaction, chlorine displaces bromide ions. Spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	a simple description e.g. iodine is the least reactive as iodide ions are displaced by both bromine and chlorine, a colour change is seen in each of these reactions. Showing some evidence of clarity and organisation and uses scientific terminology appropriately spelling, punctuation and grammar are used with some accuracy
3	5 - 6	a detailed description e.g. chlorine is most reactive as it displaces bromide and iodide ions causing a colour change in each case, bromine is more reactive than iodine as bromine displace iodide ions. The answer communicates ideas clearly and coherently uses a range of scientific terminology accurately. Spelling, punctuation and grammar are used with few errors.

Question Number	Answer	Acceptable answers	Mark
6(a)	An explanation linking two of the following <ul style="list-style-type: none"> • (reaction) Q (1) • temperature increase (of 19 °C) (1) • heat (energy) {released /given out} (1) 	ignore incorrect temperature rise do not allow just 'heat increases' If reaction P or R is identified as the exothermic reaction max 1 mark for heat (energy) released	(2)

Question Number	Answer	Acceptable answers	Mark
6(b)(i)	A cross in the circle furthest to the left		(1)

Question Number	Answer	Acceptable answers	Mark
6(b)(ii)	similar curve to original but lower starting at origin (1)		(1)

Question Number	Answer	Acceptable answers	Mark
6(c)	An description including <ul style="list-style-type: none"> • (powder has) a higher surface area (1) • more (frequent particle) collisions (1) 		(2)

Question Number	Indicative Content	Mark
QWC	<p data-bbox="297 310 391 342">*6(d)</p> <p data-bbox="423 310 1138 342">A description including some of the following points</p> <p data-bbox="423 373 943 405">Practical detail for increased rate</p> <ul data-bbox="423 411 1328 667" style="list-style-type: none"> • measure volume of hydrogen peroxide solution / stated volume • collect the gas in a {gas syringe / measuring cylinder over water / tube over water} • time for the reaction to be completed / fixed volume of gas to be collected • measure {amount/volume} of oxygen produced • no catalyst present <p data-bbox="423 674 971 705">Practical detail for mass of catalyst</p> <ul data-bbox="423 711 1192 936" style="list-style-type: none"> • repeat experiment but keeping everything the same • but with addition of manganese(IV) oxide / catalyst • take known mass of manganese(IV) oxide • after reaction filter (catalyst off) • wash (catalyst) • dry (catalyst) • find mass of catalyst <p data-bbox="423 942 537 974">Results</p> <ul data-bbox="423 980 1312 1136" style="list-style-type: none"> • small volume of {gas / oxygen} produced before addition of catalyst • larger volume of gas produced with catalyst in specified time • this shows that the rate has increased on adding catalyst • this shows that the mass of catalyst is unchanged 	(6)
Level	0	No rewardable content
1	1 – 2	<ul data-bbox="467 1178 1433 1339" style="list-style-type: none"> • a limited description of rate or mass effect e.g. repeat experiment again but add catalyst to the hydrogen peroxide solution • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 – 4	<ul data-bbox="467 1350 1425 1476" style="list-style-type: none"> • a description of the rate experiments or mass effect experiments. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 – 6	<ul data-bbox="467 1486 1442 1707" style="list-style-type: none"> • a detailed description of the rate experiments or mass effect experiments and a discussion of the results of the experiment with regards to either mass or rate OR a simple description of the rate and mass effect experiments • The answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

