Question 2 (c)

Question	Candidate	Max Mark	Mark awarded	Commentary
2 (c)	A	2	1	The candidate was awarded 1 mark for the correct use of the relationship concept with the GFM for hydrogen given as 1.
	B	2	1	The candidate was awarded 1 mark for the correct use of the relationship concept with the GFM for hydrogen given as 1.
	C	2	0	The candidate was awarded zero marks as the GFM for an incorrect substance was used.
	D	2	2	The correct answer with correct working is given.
	E	2	0	The candidate used an incorrect concept.
	F	2	0	The candidate has not shown the mass of hydrogen being divided by the GFM of hydrogen, resulting in the wrong final answer.

Question 3 (a)

Question	Candidate	Max Mark	Mark awarded	Commentary
3 (a)	A	1	0	An incorrect diagram has been drawn.
	B	1	1	A correct ‘dot-cross’ diagram has been drawn.
	C	1	0	An incorrect diagram has been drawn.
	D	1	1	A correct outer electron diagram has been drawn.
	E	1	1	A correct ‘petal’ diagram has been drawn.

Question 3 (c)

Question	Candidate	Max Mark	Mark awarded	Commentary
3 (c)	**A**	**1**	**1**	The candidate has correctly stated that 'chlorine needs one more electron … (and) gains sodiums electron'.
	B	**1**	**0**	The candidate has incorrectly stated 'sodium loses an electron and gives it to the chloride **ion**'**.**
	C	**1**	**1**	The candidate has correctly stated the 'chlorine atom receives one electron from the sodium atom'.
	D	**1**	**1**	The candidate has correctly stated that the 'sodium loses its outer electron … (and) this electron …completes chlorines outer shell'.

Question 4 (a) (ii)

Question	Candidate	Max Mark	Mark awarded	Commentary
4 (a) (ii)	**A**	**1**	**1**	The candidate has correctly stated that the 'iron will be solid'.
	B	**1**	**1**	The candidate has correctly stated the 'iron would form a solid'.
	C	**1**	**0**	The candidate has incorrectly stated the direction of the state change at 1538^{o} C.
	D	**1**	**1**	The candidate has correctly stated that 'below 1538^{o}C the iron would not be able to flow'.
	E	**1**	**0**	The candidate has given an incorrect explanation.

Question 4 (b)

Question	Candidate	Max Mark	Mark awarded	Commentary
4 (b)	**A**	**1**	**1**	An accepted form of the ion-electron equation is given.
	B	**1**	**0**	An incorrect ion-electron equation is given.
	C	**1**	**1**	A correct ion electron equation has been given.
	D	**1**	**0**	An incorrect ion-electron equation is given.
	E	**1**	**0**	An incorrect ion-electron equation is given.

Question 5 (a) (ii)

Question	Candidate	Max Mark	Mark awarded	Commentary
5 (a) (ii)	**A**	**2**	**2**	The candidate has shown three half-lives and correctly calculated the time taken.
	B	**2**	**2**	The candidate has shown three half-lives and correctly calculated the time taken.
	C	**2**	**1**	The candidate has shown three half-lives but has not used this number to correctly calculate the time taken.
	D	**2**	**2**	The candidate has shown three half-lives and correctly calculated the time taken using the answer from 5 (a) (i).
	E	**2**	**2**	The candidate has shown three half-lives and correctly calculated the time taken.

Question 7 (b) (i)

Question	Candidate	Max Mark	Mark awarded	Commentary
7 (b) (i)	**A**	**1**	**1**	A correct structural formula has been drawn for butanoic acid.
	B	**1**	**0**	An incorrect structural formula has been drawn for butanoic acid.
	C	**1**	**0**	An incorrect structural formula has been drawn for butanoic acid.
	D	**1**	**0**	An incorrect structural formula has been drawn for butanoic acid.

Question 7 (b) (ii)

Question	Candidate	Max Mark	Mark awarded	Commentary
7 (b) (ii)	**A**	**2**	**0**	The candidate has not correctly explained why butanoic acid has a higher melting point. The term 'bond' is not identified as being between molecules. The candidate has not clearly stated that butanoic is bigger.
	B	**2**	**1**	The candidate has indicated that butanoic acid has more carbons and hydrogens.
	C	**2**	**0**	The candidate has not correctly explained why butanoic acid has a higher melting point. The term 'bond' is not identified as being between molecules. The candidate has not clearly stated that butanoic is bigger.
	D	**2**	**0**	The candidate has incorrectly implied butanoic acid has **carbon chains** between molecules.
	E	**2**	**2**	The candidate has used the correct term 'intermolecular forces' and explained their effect as greater in butanoic acid (implied by 'it').

Question 9 (a)

Question	Candidate	Max Mark	Mark awarded	Commentary
9 (a)	A	1	0	The candidate has given an incorrect definition for homologous series.
	B	1	0	The candidate has not mentioned the need for a general formula.
	C	1	1	The candidate has given a correct definition for homologous series.

Question 9 (c) (i)

Question	Candidate	Max Mark	Mark awarded	Commentary
9 (c) (i)	A	1	1	The candidate has correctly identified the relationship between the length of carbon chain and the time taken to pass through the column.
	B	1	0	The candidate has made an incorrect statement about the relationship between the number of branches and the time taken to pass through the column.
	C	1	1	The candidate has correctly identified the relationship between the number of carbons and the time taken to pass through the column.
	D	1	1	The candidate has correctly identified the relationship between the number of (hydrogens and) carbons and the time taken to pass through the column.

Question 10 (a) (i)

Question	Candidate	Max Mark	Mark awarded	Commentary
10 (a) (i)	**A**	**1**	**0**	The candidate has incompletely labelled the solutions in the diagram.
	B	**1**	**0**	The candidate has incorrectly matched the electrodes and the solutions.

Question 10 (a) (ii)

Question	Candidate	Max Mark	Mark awarded	Commentary
10 (a) (ii)	**A**	**1**	**1**	The candidate has written the correct equation and included correct subscript state symbols.
	B	**1**	**0**	The candidate has written the wrong charge on the aluminium ions and the equation is not balanced.
	C	**1**	**0**	The candidate has incorrectly balanced the equation.
	D	**1**	**0**	The candidate has not balanced the equation.

Question 11 (a)

Question	Candidate	Max Mark	Mark awarded	Commentary
11 (a)	**A**	**2**	**0**	The candidate has given the wrong direction of change for the pH and an incorrect statement regarding the H^+ ion concentration.
	B	**2**	**1**	The candidate was awarded 1 mark for giving the correct direction of change in pH with no mention of the change in hydrogen ion concentration.
	C	**2**	**0**	The candidate has made two incorrect statements.
	D	**2**	**1**	The candidate was awarded 1 mark for correctly identifying the pH has changed to below 7. No mention of H^+ ions is made.
	E	**2**	**2**	The candidate has correctly identified the direction of change in pH and explained the role of the H^+ ions.
	F	**2**	**1**	The candidate was awarded 1 mark for correctly identifying the direction of change in pH. The second mark is not awarded as the role of Hydrogen **atoms** is mentioned.

Question 12 (a)

Question	Candidate	Max Mark	Mark awarded	Commentary
12 (a)	**A**	**1**	**1**	The candidate has correctly circled only the -OH functional group.
	B	**1**	**0**	The candidate has circled more than the -OH functional group.
	C	**1**	**0**	The candidate has circled more than the -OH functional group.

Question 12 (c)

Question	Candidate	Max Mark	Mark awarded	Commentary
12 (c)	**A**	**3**	**3**	The candidate has correctly calculated the mass of ester.
	B	**3**	**1**	The candidate can be awarded 1 mark for **either** calculating the correct GFM for the alcohol and the ester **or** for the correct calculation of 0.1 mol of geraniol.
	C	**3**	**2**	The candidate was awarded 1 mark for correctly calculating the number of moles of geraniol used. The second mark was awarded for using the correct process but basing the calculation on the incorrectly calculated GFM for 1 mole of ester.
	D	**3**	**1**	The candidate was awarded 1 mark for showing the correct number of moles of geraniol used.

Question 13 (a)

Question	Candidate	Max Mark	Mark awarded	Commentary
13 (a)	**A**	**1**	**0**	The candidate has given an incorrect general formula.
	B	**1**	**0**	The candidate has given an incorrect general formula.
	C	**1**	**0**	The candidate has given an incorrect general formula.
	D	**1**	**0**	The candidate has given an incorrect general formula.
	E	**1**	**0**	The candidate has given an incorrect general formula.

Question 13 (c) (i)

Question	Candidate	Max Mark	Mark awarded	Commentary
13 (c) (i)	**A**	**1**	**0**	The candidate has drawn an incorrect structural formula.
	B	**1**	**1**	The candidate has drawn a correct structural formula.
	C	**1**	**0**	The candidate has drawn an incorrect structural formula.

Question 14 (a) (i)

Question	Candidate	Max Mark	Mark awarded	Commentary
14 (a) (i)	**A**	**1**	**0**	The candidate has drawn an incorrect structural formula.
	B	**1**	**0**	The candidate has drawn an incorrect structural formula.
	C	**1**	**0**	The candidate has drawn an incorrect structural formula.
	D	**1**	**0**	The candidate has drawn an incorrect structural formula.

Question 14 (b)

Question	Candidate	Max Mark	Mark awarded	Commentary
14 (b)	**A**	**3**	**3**	The candidate has shown working and calculated the correct answer in the correct units.
	B	**3**	**0**	The candidate has not re-arranged the equation or correctly substituted the values, resulting in an incorrect answer being calculated.
	C	**3**	**3**	The candidate has shown working and calculated the correct answer in the correct units.
	D	**3**	**3**	The candidate has shown working and calculated the correct answer in the correct units.
	E	**3**	**2**	The candidate has been awarded 1 mark for correctly substituting 13.3 into the correctly rearranged equation. Although the incorrect mass for water has been used, a further mark has been awarded for the candidate's calculated answer. The answer given is correct for the values used.