2010 Chemistry

Standard Grade Credit

Finalised Marking Instructions

Standard Grade Chemistry Credit

General information for markers

The general comments given below should be considered during all marking. It should be noted that these are general marking principles and may be superseded by decisions made at the Markers' Meeting.

1. Markers are reminded to read candidate responses **in their entirety**. If the candidate shows a clear understanding of the chemistry but does not use the exact words of the Marking Instructions they should still be given credit.

2. Markers are reminded that **no** comments are to be written on scripts. Comments such as 'ARITH', 'ERROR' and 'BOD' (Benefit of doubt) are **not** acceptable.

3. A guiding principle in marking is to give credit for (partially) correct chemistry rather than to look for reasons not to give marks.

   Example: A student measured the pH of four carboxylic acids to find out how the strength is related to the number of chlorine atoms in the molecule. The results are shown.

Structural Formula	pH
CH_3COOH	1.65
$CH_2ClCOOH$	1.27
$CHCl_2COOH$	0.90
CCl_3COOH	0.51

   How is the strength of the acids related to the number of chlorine atoms in the molecule?

   Although not completely correct, an answer such as "the more Cl_2, the stronger the acid" should gain the full mark.

4. Marks should **not** be deducted for incorrect spelling or loose language as long as the meaning of the word(s) is conveyed.

   Example: Answers like "hydrolic acid" (for "hydrochloric acid") and "it gets hotter" (for "the temperature rises") should be accepted.

   However the example below would not be acceptable, as an incorrect chemical term, which the candidate should know, has been given.

   Example: If the correct answer is "ethene", and the candidate's answer is "ethane", this should not be accepted.

5. A right answer followed by a wrong answer should be treated as a cancelling error and no marks should be given.

   Example: What is the colour of universal indicator in acid solution?

   The answer "red, blue" gains no marks.

6. If a right answer is followed by additional information which does not conflict, the additional information should be ignored, whether correct or not.

   Example: Why can the tube not be made of copper?

   If the correct answer is "It has a low melting point", and the candidate's answer is "It has a low melting point and is coloured grey" this would **not** be treated as a cancelling error.

7. Full marks should be awarded for the correct answer to a calculation on its own; the part marks shown in the Marking Instructions are for use when working is given.

8. A half mark should be deducted in a calculation for each arithmetic slip.

9. A half mark should be deducted for incorrect or missing units **only when stated in the Marking Instructions.**

10. A half mark should be deducted for a transcription error.

11. Where a wrong numerical answer (already penalised) is carried forward to another step, no further penalty is incurred provided the end result is used correctly.

12. Ignore the omission of one H atom from a full structural formula provided the bond is shown.

13. A symbol or correct formula should be accepted in place of a name.

14. If an answer comes directly from the text of the question, no marks should be given.

   Example: Why do ionic compounds, like copper chloride, conduct electricity when in solution?

   No marks for "because they are ionic" since the word "ionic" appears in the text.

15. Unless the question is clearly about a non-chemistry issue, eg costs in industrial chemistry, a non-chemical answer gains no marks.

   Example: Why does the (catalytic) converter have a honeycomb structure?

   A response such as "to make it work" may be correct but it is not a chemical answer and the mark should not be given.

16. When formulae of ionic compounds are given as answers it will only be necessary to show ion charges if these have been specifically asked for. However, if ion charges are shown, they must be correct. If incorrect charges are shown, no marks should be awarded.

17. When it is very difficult to make a decision about a partially correct answer, a half mark can be awarded.

18. When marks have been totalled, a half mark should be rounded up.

2010 Standard Grade Chemistry
Credit Level

Marking Instructions

Part 1 – 20 marks

1	(a)	E	1 or 0
	(b)	A	1 or 0
2	(a)	E	1 or 0
	(b)	A and C	1 or 0
	(c)	D and F	1 or 0
3	(a)	A and D	1 or 0
	(b)	D	1 or 0
4	(a)	E	1 or 0
	(b)	A and B	1 or 0
5	(a)	B	1 or 0
	(b)	D	1 or 0
6	(a)	B and F	1 or 0
	(b)	B	1 or 0
	(c)	E and F	1 or 0
7	(a)	D	1 or 0
	(b)	C	1 or 0
8		B and E	2 or 1 or 0
9		A and F	2 or 1 or 0

Please note that **NO HALF MARKS** are awarded in Part 1.

Part 2

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
10 (a)	Human made Man made/unnatural/not natural Made in lab/factory/chemical industry Made by scientists Made not found Made by men/women	**1**	Artificial Made from chemicals Manufactured Made	
(b) (i)	Allow one end bond to be missing without penalty Both end bonds missing – deduct (½) mark Ignore brackets, ignore bond to wrong element in group	**1**	2 monomers shown − 0 marks If hydrogen on both ends – 0 marks C-C missing – 0 marks	
(ii)	Addition/Additional	**1**		
(c)	Carbon monoxide/CO	**1**	Carbon oxide	Correct name Wrong formula

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
11 (a) (i)	Fermentation/anaerobic respiration	**1**	Respiration	
(ii)	Carbon dioxide/CO_2	**1**		
(b)	The balloon does not inflate/inflates less/not as much	**1**	Answer relating to time. Would not work Heat expands the air	Enzyme killed as reason

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
12 (a)	Burns with a pop/burns with squeaky pop Lighted splint – pop Lit splint goes out with a pop Lit splint + pop in answer	**1**	Smouldering splint Glowing splint Pop test Lit paper gives a sound Lit splint goes out	
(b)	Both scales correct (½) mark Both labels correct including units (½) mark Plots correct (½) mark Joining plots (½) mark (point to point) (accept best fit lines) Allow ½ box tolerance, allow one plotting error Axes either way Deduct a maximum of (½) mark for using less than half of the graph paper Bar graph maximum 1 mark If both scales have numbers taken directly from the table (-1) mark (If not 0/0 not in/go through origin deduct ½)	**2**	1 scale from table (-½)	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
(c)	If graph drawn answer should be in ½ box tolerance of figure from graph ie +/-1 – look at pupil graph ½ box tolerance If no graph accept 41 +/-1	**1**		
(d)	53	**1**		

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
(e)	1 mol 1 mol (½) 24·5 2 (½) 24·5 2 (1) 4·9 0·4 (1) **OR** n = m/gfm = 4·9/24·5 = 0·2 (½) 1 mol → 1 mol (½) 0·2 mol → 0·2 mol (½) 0·2→0·2 (1) m = n × gfm = 0·2 × 2 = 0·4 g (½) 0.398 if go by 1g method 0·4 on its own (2) marks Use of atomic numbers max 1 mark Deduct (½) mark for arithmetic error Chemical error – 1 (follow through)	**2**		

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
13 (a)	To allow the products to be identified/separated/only one product/colour is collected at an electrode To allow colours to be separated/identified	**1**	To separate the two To cause the chromate to split To keep 1 +ve and 1 -ve To keep the current constant Not an explanation of DC supply AC wouldn't work To make the current flow in 1 direction	
(b)	Green	**1**	Yellow/red/any other colour	
(c)	Ni^{2+} CrO_4^{2-}	**1**	Must have the 2 charges (correct) Ni^{II} CrO_4^{2-} - any Roman numerals Ni^{2+} + CrO_4^{2-} Several answers Symbol size must be correct	

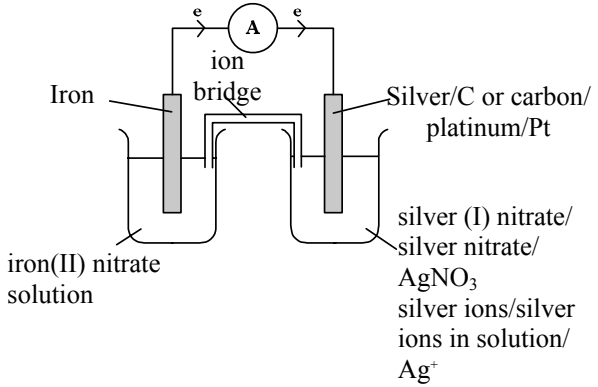
Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
14 (a)	Covalent (network) Single covalent Double covalent Covalent molecular Polar	**1**	Ionic molecular	Ionic
(b) (i)	$TiCl_4 + 4Na \rightarrow Ti + 4NaCl$ Or correct multiples	**1**		
(ii)	Titanium is less reactive It is less reactive It is unreactive Very unreactive Reactivity is poor Sodium is more reactive (Ti) It is/Titanium is lower in ECS/reactivity series (than Na) Sodium is better	**1**	It is more reactive	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
15 (a)	As the distance from the surface {*increases* / decreases} the concentration {*increases* / decreases}. **OR** The concentration {*increases* / decreases} as the distance {*increases* / decreases}. Alternative terms, such as deeper, higher, etc are acceptable.	**1**	As the concentration increases the distance increases Incorrect cause and effect	
(b)	80·5	**1**		
(c)	(protons) (electrons) Both must be correct	**1**		

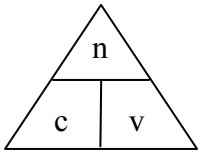
Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
16 (a) (i)	2^+ two positive +2 positive 2	**1**	Positive	
(ii)	gfm = 239 (1) mark 207/239 × 100 = 86·6 (1) mark (86 with working 1½) Allow follow through error 86·6% (87%) on its own (2) marks Deduct (½) mark for arithmetic error Max 1 mark if atomic numbers used 83.7/84% but nothing if on its own. Sulphur 13·39/13·4 = 1 mark Chemical error -1	**2**	If <u>sulphur</u> max 1 mark gfm 86 – with no working 13·39% 13·4% - chemical error 1 mark 13·4% on its own = zero 86% on its own = zero but with working – use scheme	
(b) (i)	Iron/Fe	**1**	Iron ore Steel	

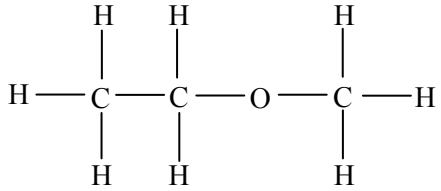
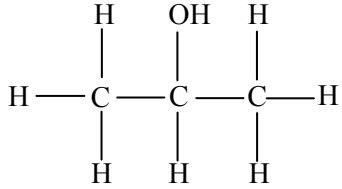
Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
(ii)	Mercury Hg Aluminium Al Copper Cu or correct symbols **All** correct for 1 mark	**1**		

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
17 (a)	NO_3^- Either one circled, both not needed	**1**		
(b)	Ferroxyl indicator turns blue Ferrox indicator turns blue	**1**	Ignore initial colour of ferroxyl Wrong reagent – correct colour change Benedict's solution turns blue – zero marks Ferroxyl on its own Ferroxyl – wrong colour change	
(c)	$Ag^+ + e^- \rightarrow Ag$ $2Ag^+ + 2e^- \rightarrow 2Ag$ State symbols not needed	**1**	Equation must be correct	2 reduction equations

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
(d)	**All** three for 1 mark  Ignore any signs on electrode	**1**	Any named insoluble silver compound "Silver solution" Iron (II) Silver (I)	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
18 (a)	Ethoxypropane	**1**		
(b)	(approximately) 36 °C Accept within range 32 – 40 °C	**1**		

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
19 (a)	25 cm^3	**1**	25.4	
(b)	n = c × v = 0·1 × 0·025 = 0·0025 mol HCI (½) 1 : 1 (½) 0·0025 : 0·0025 mol NaOH (½) follow through c = n/v = $\frac{0 \cdot 0025}{0 \cdot 01}$ = 0·25 mol/l NaOH (½) $c = \frac{n/m}{v}$ = zero **OR** $OH^- \times v \times c = H^+ \times v \times c$ (½) 1 × 10 × conc = 1 × 25 × 0·1 (½) conc = $\frac{1 \times 25 \times 0 \cdot 1}{1 \times 10}$ (½) = 0·25 mol/l (½) 0·25 on its own (2) marks No need for units Allow for follow through	**2**	 nothing for this	

Question	Acceptable Answer	Mark	Unacceptable Answer	Negates
20 (a) (i)	Propanol or propan-l-ol Propaneol or propane-l-ol	**1**		
(ii)	 **OR**  Accept shortened structural formula Allow 1 H to be missing if bond is there except OH	**1**	Any bond missing other than C-H Any H missing other than OH	
(b)	Carbon dioxide/CO_2 Water/H_2O/hydrogen oxide 2 × (½) marks	**1**	Carbon oxide (-½) each additional wrong answer Oxygen	Wrong formula

[END OF MARKING INSTRUCTIONS]