2011 Chemistry

Intermediate 1

Finalised Marking Instructions

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 It should be noted that these are general marking principles and may be superseded by decisions made at the Markers' Meeting.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 "polyethene", and the candidate's answer is "polyethane", 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. However, if selecting information from the Data Booklet is required, the information selected must be relevant and correct, as this would negate.

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 transcription errors.

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. A symbol or correct formula should be accepted in place of a name **unless stated otherwise in the Marking Instructions.**

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

    Example: Propane burns to give out energy.

    Name the type of chemical reaction taking place.

    No marks should be given for "burning" since the word "burns" appears in the text.

14. 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.

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

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

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Marking scheme

Section A

1	D	11	C
2	B	12	A
3	D	13	C
4	C	14	B
5	C	15	B
6	A	16	D
7	C	17	A
8	A	18	D
9	D	19	C
10	B	20	A

Section B

Question	Acceptable Answer	Mark	Worth ½	Worth 0
1 (a)	non-metals	**1 or 0**		
(b)	helium/He neon/Ne xenon/Xe radon/Rn krypton/Kr	**1 or 0**	Incorrect symbol HE/he/hE NE/ne/nE XE/xe/xE RN/rn/rN KR/kr/kR	
(c)	To prevent tooth decay Strengthen teeth Keep teeth healthy Provides toothcare Helps teeth Any suggestion of protecting teeth	**1 or 0**		kill bacteria (cancelling) keep teeth clean make it clean makes water safe to drink makes water fizzy

Question	Acceptable Answer	Mark	Worth ½	Worth 0
2 (a)	To speed up a reaction/breakdown chemicals faster/ hurry up a chemical reaction/faster	**1 or 0**		change/cause a reaction not used up
(b) (i)	Manganese dioxide/manganese oxide/manganese/ magnesium oxide 3rd cylinder/90 cm^3 of lather/the last one	**1 or 0**		
(ii)	Any 2 of the following – ½ mark each (same) mass of catalyst (same) volume of hydrogen peroxide (+ detergent) (same) concentration of hydrogen peroxide (same) temperature of hydrogen peroxide (same) time for lather to form/rise up measuring cylinder (same) volume of detergent (same) size particles catalyst used same size same amount of chemicals/solution/liquid stopped at the same time 2 g catalyst used 20 cm^3 of hydrogen peroxide + detergent 30 secs each time time (same) type of detergent accept amount	**1 or 0**	Only 1 out of 2 ways correct	Only 1 out of 3 or more ways given same size test-tube/ measuring cylinder/ same volume of catalyst always using catalyst/ level of water/ same amount of ingredients/ 20 cm^3 of every element put in any mention of water

Question	Acceptable Answer	Mark	Worth ½	Worth 0
(iii)	Relights a glowing/smouldering splint	**1 or 0**		Burning splint relights/ Burning splint pops/relights splint/relights taper put glowing splint in test-tube ignore 'pop'

Question	Acceptable Answer	Mark	Worth ½	Worth 0
3 (a)	Change of colour/ New substance forms New product formed/change of appearance Copper turned green/cannot see any copper Copper disappears (green) copper ethanoate forms/is made Any suggestion that something new is made	**1 or 0**		energy change heats up bubbles of gas produced grape skins changes colour/ growing changes from solid to liquid/ colour
(b)	Oxygen/O/O_2	**1 or 0**	O2/O^2	
(c)	Prevents disease/bacteria/fungi/infections/mould Stops disease Kills/removes disease	**1 or 0**		controls or kills weeds/pests/insects/plants/ crops fertiliser (all of above cancel) helps plants grow (not cancelling)

Question	Acceptable Answer	Mark	Worth ½	Worth 0
4 (a)	Dip pH paper in solution or Add (universal) indicator ½ mark Compare (colour) to chart ½ mark	**1**		Use universal indicator Use/using pH paper + chart using colour chart check what colour the pH paper goes
(b) (i)	(Garden) E/one with pH 9·5/the last one/the bottom one	**1 or 0**		
(ii)	Alkali circled	**1 or 0**		

Question	Acceptable Answer	Mark	Worth ½	Worth 0
5 (a)	To complete the circuit To finish the circuit	**1 or 0**		allow electrons to flow (not cancelling) allow reactions or conduction etc chemicals don't mix to complete the current
(b)	increase/ rise/ get higher/ get larger/ metals further apart on reactivity series have a bigger voltage number value > 1·1 V	**1 or 0**		work better it would react more Mg is more reactive stronger
(c)	chemicals get used (up)/ zinc/copper/silver oxide/magnesium gets used (up) solution/ions get used up/run out acid runs out chemicals/substances used up/run out all chemical reactions have taken place/finished	**1 or 0**	solution/paper dries up liquid inside disappears (due to chemical reactions) (lemon) juice runs out	runs out of charge/ energy they are used up electrons stop flowing/ substances have deteriorated/chemicals have stopped reacting/ no conductors left lemon goes off battery runs out wears out any mention of charges

Question	Acceptable Answer	Mark	Worth ½	Worth 0
6 (a)	hydrogen + oxygen → water (hydrogen oxide) OR oxygen + hydrogen → water OR $H_2 + O_2 \rightarrow H_2O$ mixture of words and formula order of reactants irrelevant	**1 or 0**	$H + O \rightarrow H_2O$ (any incorrect formula)	
(b)	It is (very) flammable/ It can explode/ It can burst into flames Implication of flammable Don't let it near flame Burns with a pop Doesn't go up in flames (candidate language/reading)	**1 or 0**		keep goggles on not able to see it breathing problems dangerous gases made could start burning in oxygen sourcing of gas pollution
(c)	2·5 × 50 ½ mark (ignore order) = 125 ½ mark	**1**	working only correct working but arithmetic mistake	

Question	Acceptable Answer	Mark	Worth ½	Worth 0
7 (a) (i)	Alloy (ignore spelling), aloud	**1 or 0**		compound substances
(ii)	All 3 for 1 mark LHS = copper/Cu/60 Top RHS = zinc/Zn/25 Bottom RHS = nickel/Ni/15 If names and % used ALL must be correct Ignore incorrect symbols	**1 or 0**		
(b)	Thermoplastic/thermalplastic	**1 or 0**		biodegradable thermol setting plastic thermosetting thermoheating plastic

Question	Acceptable Answer	Mark	Worth ½	Worth 0
8 (a) (i)	Plant (remains)/trees/vegetation/wood	**1 or 0**		any mention of animals (cancels) compost, stone, fossils grass + mud, soil, dirt (not cancelling)
(ii)	Limited supply/runs out/is running out/cannot be replaced/not renewable/won't last forever/once used up there is no more/will become extinct/only so much	**1 or 0**		not a lot left scarce/hard to find cannot be used again
(b) (i)	increases/goes up/rises/gets higher/greater/more kJ	**1 or 0**		gets better/more powerful number range or value
(ii)	Ethane/ C_2H_6 (formula must be correct) second fuel in the table	**1 or 0**	same size numbers as letters or superscript	

Question	Acceptable Answer	Mark	Worth ½	Worth 0
9 (a)	Greenhouse effect/greenhouse process/greenhouse (gas) Global warming	**1 or 0**		photosynthesis respiration
(b)	(Increased) burning of fuels/fossil fuels Cutting down of forests/deforestation Too much fuel burnt (more) cars/more people driving/vehicles	**1 or 0**	from power stations respiration/(more) people/population	pollution smoke/fumes from factories (all non cancelling)
(c)	Glucose (made) ½ mark Oxygen (made) ½ mark order irrelevant	**1**		starch sugars food air
10 (a) (i)	Energy/calories/kJ	**1 or 0**		warmth/insulation power keeps us healthy growth
(ii)	increases/rises up/goes up/gets higher	**1 or 0**		Heart attack/ High blood pressure/ Obesity/ Get fat/ Clogged arteries bad effect
(b)	Iodine/I/I_2 (colour change not required) ignore colour change if given	**1 or 0**		

Question	Acceptable Answer	Mark	Worth ½	Worth 0
(c) (i)	Speed increases/ Gets faster/ Gets quicker	**1 or 0**		decreases time takes less time
(ii)	Any value above 37 but lower than 64	**1 or 0**		
(iii)	Blue to red/orange/brown/yellow/green (starting colour and final colour both required)	**1 or 0**		blue to black

Question	Acceptable Answer	Mark	Worth ½	Worth 0
11 (a)	175 x 12/1000 ½ mark = 2·1 units 2·0 with working	**1**		2·0 no working
(b)	3 hours	**1 or 0**		
(c)	Alcohol (by volume) (%) label units must be included ½ mark Scale on alcohol by volume axis ½ mark Bars labelled (words or abbreviation) ½ mark Correct height of bars ½ mark -½ no sides on bars -½ mark for using less than ½ graph paper (allow ½ box tolerance) allow one plotting error 1 mark max for line graph y-axis does not need to start at 0	**2**		
(d)	Any 1 of the following Supply/enhance nutritional value of food, enhance vitamin content Any suggestion of changing the appearance of food eg colour Any suggestion of changing the flavour of food, food colouring	**1 or 0**		preserve it make it last longer

[END OF MARKING INSTRUCTIONS]