edexcel

Mark Scheme (Results)

Summer 2015

Pearson Edexcel Certificate Chemistry (KCH0) Paper 2C

Pearson Edexcel International GCSE Chemistry (4CH0) Paper 2C

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Summer 2015
Publications Code UG041072

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.
- 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.

Question number			Answer	Notes	Marks
1	a	i	C (neutrons and protons)		1
		ii	A (6)		1
		iii	D (11)		1
	b		4		1
	c	i	P AND T		1
		ii	S		1
	d		(one) more electron than protons **OR** (one) fewer proton than electrons	Accept more electrons than protons Accept fewer protons than electrons Accept 2 electrons and 1 proton Ignore references to electron gained	1
					Total 7 marks

Question number			Answer	Notes	Marks
2	a		gas escapes / gas is lost (from the crucible)	Accept gas is given off / gas is evolved / gas is released / gas is given off Allow carbon dioxide/CO_2 for gas Ignore copper(II) carbonate decomposes Reject incorrect name of gas	1
	b		($CuCO_3$(s)) green	Ignore qualifiers such as pale / dark Reject any other colours	1
			(CuO(s)) black	Ignore qualifiers such as pale / dark Reject any other colours Allow 1/2 for two correct colours in wrong order	1
	c	i	1		1
		ii	the last two masses are not the same OR no two masses are the same	Part (ii) DEP on correct or missing answer to part (i) Accept mass still changing / mass not constant / mass is still decreasing Accept results / readings in place of mass Accept reverse argument eg the others are to constant mass	1
		iii	D (…spirit burner instead of Bunsen burner)		1

	d		$\frac{3.4 \times 100}{3.7}$		1
			92 %	Accept 3 or more sf, eg 91.9 / 91.89 / 91.892 Correct answer with no working scores 2 Allow 1 mark for 0.92	1
				Total 8 marks	

Question number			Answer	Notes	Marks
3	a		B (red-brown liquid)		1
	b		2 (1) 2	Accept multiples and fractions	1
	c	i	a halogen/an element cannot displace itself **OR** no reaction / no displacement (would occur)	Accept a halogen does not react with its own (halide) ions Accept correct reference to a specific halogen/halide ion Accept nothing happens Reject any references to a halogen having the same reactivity as a halide (ion)	1
		ii	a halogen cannot displace a more reactive halogen **OR** a halogen cannot react with the (halide) ions of a more reactive halogen	Reject any references to a halogen having a different reactivity to a halide (ion) Accept correct reference to a specific halogen/halide ion	1
		iii	potassium bromide	Ignore any formula Reject any other species with corrected name	1

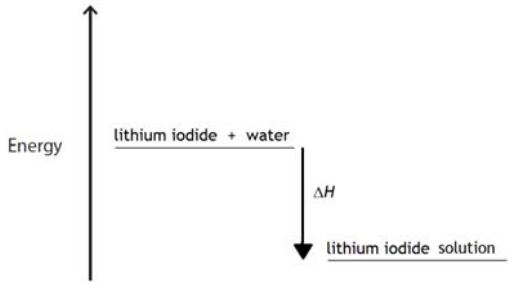
Question number				Answer	Notes	Marks
3		iv	**M1** **M2**	(correct products) KCl AND I_2 2 2	Accept in either order M2 DEP on M1	
	c	v		(both) reduction AND oxidation occur (in the same reaction)	Accept (both) gain AND loss of electrons occurs (in the same reaction) Accept (both) gain AND loss of oxygen occurs (in the same reaction) Accept (both) increase AND decrease of oxidation states/oxidation numbers (in the same reaction) Ignore incorrect species being oxidised and reduced / losing and gaining electrons	1

		vi	**M1**	(species) I^- / iodide (ion)		1
			M2	(reason) loss of electron(s)	Accept increase in oxidation number **OR** oxidation number changes from −1 to 0 Ignore number of electrons lost **M2** DEP on **M1** correct, or near miss e.g. iodine	1
						Total 10 marks

Question number				Answer	Notes	Marks
4	a	i		zymase	Accept yeast	1
		ii		$2CO_2$		1
	b			any value in range 250 – 350 (°C)	If range given, it must lie inside 250-350 Accept equivalent answers in other units, if the unit is given	1
	c		**M1** **M2**	(reaction 1) fermentation (reaction 3) hydration	Accept decomposition Ignore anaerobic respiration Accept addition Ignore references to continuous process	2
	d			Any two of: • product is pure(r) / product is (more) concentrated • reaction is fast(er) • continuous process is more efficient • greater atom economy	Accept does not need separating from impurities	2

Question number			Answer	Notes	Marks
4	e		sugar cane (is readily) available **OR** no crude oil (to obtain ethene from) **OR** sugar cane is renewable /sugar cane is sustainable / crude oil is finite	Accept (large area of) land on which to grow sugar cane Ignore references to glucose Accept have a suitable climate for growing sugar cane Accept crude oil is (too) expensive Accept maize in place of sugar cane	1
	f	i	$C_2H_5OH \rightarrow C_2H_4 + H_2O$	Accept displayed/structural formulae) Accept word equation If both word and chemical equation given both must be correct	1
		ii	dehydration / elimination		1
				Total 10 marks	

Question number				Answer	Notes	Marks
5	a		**M1** **M2** **M3**	(after) 22.3 (before) 16.7 (change) (+)5.6	All answers must be to 0.1 °C Penalise addition of trailing zero once only Award 1 mark for two correct readings in the wrong order **M3** CQ on temperature readings Ignore units	3
	b	i	**M1** **M2**	100 × 4.2 × 4.9 2058	Accept answer to 2 or 3 sf eg 2060 / 2100 Accept answer in kJ if unit given Ignore signs Allow 1 mark for correct calculation based on incorrect temperature change	2
		ii	**M1** **M2**	$\frac{6.3}{134}$ 0.047	 Accept 1 or more sig figs, eg 0.05 Correct answer with no working scores 2	2

Question number				Answer	Notes	Marks
	c	i	**M1** **M2**	$\frac{2400}{0.048 \times 1000}$ 50	Accept 50.0 and 50.00 Award 1 mark for 50 000 Award 2 marks for 50 000 if units changed to J/mol on answer line Ignore signs Correct answer with no working scores 2	2
	c	ii			Mark M1 and M2 independently **M1** for horizontal line drawn below (labelled or unlabelled) **M2** for (vertical) line connecting the two horizontal lines AND labelled Δ*H* (ignore sign) Ignore all arrow heads Ignore curves for energy profiles including activation energy	2
						Total 11 marks

Question number			Answer	Notes	Marks
6	a		too reactive / very reactive **OR** high in the reactivity series	Accept words with equivalent meaning eg highly	1
	b	i	B (stage 2)		1
		ii	calcium chloride / $CaCl_2$	If both name and formula given, mark name only	1
		iii	(they / the ions) are mobile	Accept free to move Accept move to electrodes (allow even if incorrect electrodes) Accept ions break free from lattice/crystal Not just free Allow they/ions are delocalised Ignore references to conduction	1
		iv	$2Cl^- \rightarrow Cl_2 + 2e^{(-)}$	Accept $2Cl^- - 2e^{(-)} \rightarrow Cl_2$	1

Question number				Answer	Notes	Marks
6	c	i	**M1** **M2**	Correct calculation of M_r ($MgCl_2$) M1 x 2	Sample calculation: M1 = 95 M2 = 190 (kg) Accept 190 000 g **M2** CQ on **M1** when **M1** is a genuine attempt to calculate M_r ($MgCl_2$) Correct answer with no working scores 2	2
	c		Award 2 marks for 4 000 Award 1 mark if one error		2 000 (wrong ratio for Mg and electrons) 4 (working in grams instead of kilograms)	2

Question number				Answer	Notes	Marks
6	d		**M1**	Mix magnesium oxide and sulfuric acid (and heat)		5
			M2	Use excess MgO		
			M3	Filter (before heating to remove some water)		
			M4	Heat (the solution) to remove some water / for a short period of time	If heated to dryness, no M4 or M5	
			M5	Leave to crystallise	Allow place in a warm oven (to evaporate the excess water) to form crystals	

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