

# Mark Scheme (Results)

June 2014

Pearson Edexcel International GCSE  
in Chemistry (4CH0) Paper 2CR

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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.
- 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	cross in box <b>D</b> (neutrons and protons)		1
b	electrons protons AND electrons electrons	Accept in either order	1 1 1
c	cross in box <b>A</b> (2.8)		1
d i	same number of protons different numbers of neutrons	Reference to atoms or elements not essential  Do not award M2 if incorrect statement about electrons  Max 1 if reference to molecules/compounds/ions	1 1
ii	20.2/A <sub>r</sub> closer to 20 (than 22)	OWTTE	1
e i	unreactive	OWTTE  Accept does not react	1
ii	(atoms) do not (readily) lose/gain electrons  OR  contain 8 electrons in outer shell/energy level	Accept outer shell complete  Accept orbit  Ignore references to Group number Ignore stable	1

(Total for Question 1 = 10 marks)

Question number	Answer	Notes	Marks
2 a i	amount (in moles)	Accept mass/weight	1
	state of (sub)division / (total) surface area / particle size	OWTTE  Accept temperature in place of either of above  Ignore references to water or acid	1
ii	cross in box <b>C</b> (metal T)		1
iii	cross in box <b>B</b> (hydrogen)		1
b	solution of barium chloride		1
	white precipitate		1
c	cross in box <b>C</b> (potassium)		1

(Total for Question 2 = 7 marks)

Question number	Answer	Notes	Marks
3 a	(it/iron is) less reactive (than aluminium)	Accept aluminium is more reactive (than iron)  Reject references to ions and oxides	1
b	aluminium replaces iron (from a compound)	OWTTE, eg takes the place of  Accept aluminium displaces iron from iron oxide/from its oxide/from a compound	1
c	gain/addition of oxygen    loss of (three) electron(s)  increase in oxidation number/state	Any two for 1 mark each  Accept oxygen atom/molecule  Accept combines with oxygen / forms aluminium oxide  Accept actual oxidation numbers if correct (0 to +3)	2
d	burning magnesium / magnesium reacting with <u>air/oxygen</u>		1

(Total for Question 3 = 5 marks)

Question number	Answer	Notes	Marks
4 a i	sugar(s)	Accept carbohydrate(s)	1
ii	fermentation		1
iii	zymase	Accept enzyme(s) / yeast	1
iv	hydration	Accept addition	1
b i	$\begin{array}{c} \text{H} \\   \\ \text{H}-\text{C}-\text{O}-\text{H} \\   \\ \text{H} \end{array}$	Accept O–H in any position  All atoms and bonds must be shown	1
ii	propanol/propan-2-ol/2-propanol	Reject propan-1-ol / 1-propanol	1
c	phosphoric acid / phosphoric(V) acid / H <sub>3</sub> PO <sub>4</sub>	Accept sulfuric acid / H <sub>2</sub> SO <sub>4</sub>  Ignore references to dilute  Reject phosphoric(III) acid/phosphorous acid  If both name and formula given, both must be correct	1
	300 (°C)	Accept a value, or any range, within the range 250-350 (°C)  Accept equivalent value in other units, but unit must be given	1

4 d i		needs more oxygen (to react)	Accept needs 3 instead of 2.5 O <sub>2</sub>  Accept reverse argument  Ignore references to flammability	1
ii	M1	carbon monoxide / CO	If both name and formula given, both must be correct	1
	M2	poisonous / toxic / causes death IGNORE dangerous/harmful		1
	M3	reduces capacity of blood to carry oxygen	Accept correct reference to haemoglobin  IGNORE references to suffocation/cannot breathe IGNORE blood carries no oxygen  M2 & M3 can be awarded if M1 is missing or is a near miss (eg carbon dioxide)	1
4 e i		may explode / gas may leak / cylinder might break / pipe might burst / may catch fire (if gas leaks)		1
ii		$\text{C}_2\text{H}_5\text{OH} \rightarrow \text{C}_2\text{H}_4 + \text{H}_2\text{O}$	Accept CH <sub>3</sub> CH <sub>2</sub> OH or displayed formula  Ignore state symbols  Reject C <sub>2</sub> H <sub>6</sub> O	1

(Total for Question 4 = 14 marks)



Question number	Answer	Notes	Marks
5 a i	no more precipitate forms OR no more lead(II) sulfate forms	Accept usual alternatives for precipitate  Ignore references to fizzing / temperature / change in colour	1
ii	cross in box <b>D</b> (sulfuric acid)		1
iii	they would obtain sodium nitrate instead OR the filtrate does not contain lead(II) sulfate/the insoluble salt OR the lead(II) sulfate/insoluble salt has already been obtained in step 3 OR they should have used the residue (not the filtrate)	Accept the soluble salt in place of sodium nitrate	1
iv	wash/pour water over the solid/residue  warm / heat / place in oven / leave (to dry)	Accept on filter paper/kitchen towel/tissue paper/desiccator	1  1
v	cross in box <b>C</b> (is insoluble in water)		1
b i	0.15(0) mol for <u>BOTH</u> substances		1
ii	$0.15(0) \div 0.5(00)$		1
	$0.3(00) \text{ dm}^3 / 300 \text{ cm}^3$	Unit needed for mark  Correct final answer with no working scores 2	1

(Total for Question 5 = 9 marks)

Question number	Answer	Notes	Marks
6 a	18.7	Give 1 mark for 18.7 and 27.2 wrong way around	1
	27.2		1
	M2–M1 / (+)8.5		1
b i	1450 ÷ 24000	Accept minimum of 2 dp  Award 1 mark for a correct answer using a volume from either experiment 2 or 3	1
	0.0604(16)		1
ii	29.2 ÷ M2 from (b)(i) / 29.2 ÷ 0.0604(16)	Accept 29200 ÷ 0.0604	1
	(–)483(.315678)	Final answer in joules scores 1/2	1
iii	200 × 4.2 × 41.2	Accept minimum of 2 sf  Award 1 mark for a correct calculation using 1875 for the volume of water.	1
	(–)34608		1
iv	cross in box <b>B</b> (not all of the heat energy is transferred to the water)		1

6 c i	$(4 \times \text{C-H}) + (2 \times \text{O=O})$	Accept $(4 \times 412) + (2 \times 496) / 1648 + 992$	1
	2640	Deduct 1 mark for each mistake Ignore sign	1
ii	$(2 \times \text{C=O}) + (4 \times \text{H-O})$	Accept $(2 \times 743) + (4 \times 463) / 1486 + 1852$	1
	3338	Deduct 1 mark for each mistake Ignore sign	1
iii	- 698 (kJ/mol)	CSQ on answers given to (c)(i) and (c)(ii)	1

(Total for Question 6 = 15 marks)