



Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY

5070/42

Paper 4 Alternative to Practical

October/November 2016

MARK SCHEME

Maximum Mark: 60

Published

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This document consists of **7** printed pages.

Page 2	Mark Scheme	Syllabus	Paper
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Question	Answer	Marks
1(a)(i)	Condenser	1
1(a)(ii)	Return liquid (to the flask) / falls back (into flask)	1
1(b)	1. Bung should not be present (1) 2. Water in and out are reversed / wrong way round (1)	2
1(c)(i)	Flammable (liquid or ethanol or mixture)	1
1(c)(ii)	Hot plate / water bath / electrical heater	1
1(d)	Distillation / fractional distillation	1
1(e)	Ethyl ethanoate	1

Question	Answer	Marks												
2(a)	Oxygen (1) <u>Glowing</u> splint (re)lights / rekindles (1)	2												
2(b)	Hydrogen (1) Pops in a flame /lighted splint pops /burning splint pops (1)	2												
2(c)	<table border="1"><tr><td>iodine(1)*</td><td></td><td>hydrogen (1)*</td><td></td></tr><tr><td>oxygen(1)*</td><td></td><td>copper(1)*</td><td></td></tr><tr><td></td><td>green /yellow gas /bubbles (1)**</td><td></td><td>colourless gas / bubbles (1)**</td></tr></table> *Ignore physical states if they are given as well as the names **gas / bubbles / fizz / effervescence is required for observations and green /yellow (for chlorine) and colourless (for hydrogen)	iodine(1)*		hydrogen (1)*		oxygen(1)*		copper(1)*			green /yellow gas /bubbles (1)**		colourless gas / bubbles (1)**	6
iodine(1)*		hydrogen (1)*												
oxygen(1)*		copper(1)*												
	green /yellow gas /bubbles (1)**		colourless gas / bubbles (1)**											

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Question	Answer	Marks
3	A	1

Question	Answer	Marks
4	C	1

Question	Answer	Marks
5	D	1

Question	Answer	Marks
6	C	1

Question	Answer	Marks
7	EITHER <u>TITRATION METHOD</u> Max 5 from: M1 Titration/description of titration method (1) M2 Alkali/base (1) M3 Name of suitable alkali (1) M4 Equal volumes of acid/equal volumes of alkali (in conical flask) (1) M5 Named suitable indicator/thermometer (1) M6 Most conc needs highest volume of alkali/biggest temperature rise if thermometric method, or reverse argument (ORA)/if acid is in burette volume of least concentrated acid is largest, ORA (1)	5

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Question	Answer	Marks
	OR <u>METAL</u> M1 Add any metal(1) M2 Named suitable metal e.g. iron, magnesium, zinc (1) M3 Equal amounts of vinegar + equal amount of metal or Equal amounts of vinegar + excess of metal or excess vinegar + equal amounts of metal (1) M4 Measurement of time /use of watch or clock/unit of time (1) or M4 measure mass change /measure volume of gas collected / number of bubbles / amount of gas / apparatus to measure gas volume (without mentioning volume) e.g. gas syringe (1) M5 More conc acid: dissolves metal faster /takes less time /reaction stops first /bubbles faster /more bubbles produced per unit time /more gas produced per unit time /steeper graph or larger gradient or graph levels off first, ORA (1) Can score from sketch graph.	
	OR <u>CARBONATE</u> M1 Carbonate /hydrogencarbonate (1) M2 Named carbonate /hydrogencarbonate (1) M3 Equal amounts of vinegar + equal amounts of carbonate or equal amounts of vinegar + excess of carbonate or excess vinegar + equal amounts of carbonate (1) M4 Measurement of time /use of watch or clock/unit of time(1) or M4 measure mass change /measure volume of gas collected / number of bubbles / amount of gas / apparatus to measure gas volume (without mentioning volume) e.g. gas syringe (1) M5 More conc acid: dissolves carbonate faster /takes less time /reaction stops first /bubbles faster /more bubbles produced per unit time /more gas produced per unit time /steeper graph or larger gradient or graph levels off first, ORA (1) Can score from sketch graph.	

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Question	Answer	Marks
	OR <u>pH METHOD</u> M1 Measure pH (1) M2 pH meter/universal indicator/pH indicator/pH paper (1) M3 any reference to pH number less than 7 (or statement that pH is below 7)/reference to colour chart/reference to red, orange or yellow (1) M4 reference to 2 feasible pH values or ranges for acids of different concentrations/reference to 2 suitable colours i.e. red, orange, yellow, for different acids (1) M5 more conc acid has lower pH ORA/colours linked to relative concentrations for both acids e.g. red more conc than orange (1) OR <u>CONDUCTIVITY</u> M1 Conductivity/description of conductivity method/circuit diagram (1) M2 bulb or ammeter in circuit (1) M3 bulb lights/reference to brightness or current (1) M4 compare brightness/current (1) M5 more concentrated acid = brighter bulb or greater current (1)	

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Question	Answer	Marks												
8(a)	1.73	1												
8(b)	Volumetric flask	1												
8(c)	<table border="1"> <tr> <td>22.4</td><td>48.2</td><td>32.8</td></tr> <tr> <td>0.0</td><td>24.7</td><td>10.2</td></tr> <tr> <td>22.4</td><td>23.5</td><td>22.6</td></tr> <tr> <td>✓</td><td></td><td>✓</td></tr> </table> (3) Titre = 22.5 (1)	22.4	48.2	32.8	0.0	24.7	10.2	22.4	23.5	22.6	✓		✓	4
22.4	48.2	32.8												
0.0	24.7	10.2												
22.4	23.5	22.6												
✓		✓												
8(d)	$(c) \times 0.100 / 1000 = 0.00225$ or 2.25×10^{-3}	1												
8(e)	$(d) / 2 = 0.001125$ or 1.125×10^{-3} or 0.00113 or 1.13×10^{-3}	1												
8(f)	$(e) \times 10 = 0.01125$ or 0.0113	1												
8(g)	$(f) \times 2 = 0.0225$	1												
8(h)	$(g) = 0.0225$	1												
8(i)	$(h) \times 63.5 = 1.42875 / 1.43$	1												
8(j)	$(i) / (a) \times 100 = 82.6 / 82.7$	1												

Question	Answer	Marks
9(a)	(L) does not contain <u>ions</u> of a <u>transition metal</u> / (L) does not contain <u>ions</u> of a <u>transition element</u> / (L) does not contain a <u>compound</u> of a <u>transition metal</u> / (L) does not contain a <u>compound</u> of a <u>transition element</u>	1
9(b)(i)	White precipitate (1)	4
9(b)(ii)	Soluble / solution / dissolves (1)	
9(b)(iii)	Gas or ammonia / NH_3 turns (damp red) litmus blue (1) Ammonia / NH_3 (1)	

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Question	Answer	Marks
9(c)(i)(ii)	Al^{3+}	1
9(d)	M1 Aqueous barium chloride / $BaCl_2$ or aqueous barium nitrate / $Ba(NO_3)_2$ (1) M2 Dilute hydrochloric acid / HCl or nitric acid / HNO_3 (1) M3 White precipitate (1)	3
9(e)	$Al_2(SO_4)_3$ (1) $(NH_4)_2SO_4$ (1)	2

Question	Answer	Marks
10(a)	exothermic	1
10(b)	M1 all points plotted correctly (to within half a small square) (1) M2 and M3 2 ruled intersecting straight lines (1 for each) Left hand line must go through the origin (within half a small square)	3
10(c)(i)	0.92 (g) (answer must be based on candidate's graph)	1
10(c)(ii)	8.2 ($^{\circ}C$) (answer must be based on candidate's graph)	1
10(d)(i)	0.0675	1
10(d)(ii)	1.6 (g) (answer must be based on candidate's graph)	1
10(d)(iii)	23.7	1