Cambridge
O Level

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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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) Glowing 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><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)	6

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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 METAL 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 CARBONATE 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 pH METHOD 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 CONDUCTIVITY 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><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)	4
8(d)	(c) × 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) × 10 = 0.01125 or 0.0113	1
8(g)	(f) × 2 = 0.0225	1
8(h)	(g) = 0.0225	1
8(i)	(h) × 63.5 = 1.42875 / 1.43	1
8(j)	(i) / (a) × 100 = 82.6 / 82.7	1

Question	Answer	Marks
9(a)	(**L**) does not contain ions of a transition metal / (**L**) does not contain ions of a transition element / (**L**) does not contain a compound of a transition metal / (**L**) does not contain a compound of a transition element	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 (°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

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