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

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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

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**

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.	

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)	

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)	

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