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Cambridge Ordinary Level

MARK SCHEME for the May/June 2015 series

5070 CHEMISTRY

5070/42 Paper 4 (Alternative to Practical), maximum raw mark 60

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1 (a) (i) silver / silvery / grey (1) [1]

(ii) $2Mg + O_2 \rightarrow 2MgO$ (1) [1]

(b) hydrogen / H_2 (1)
pops in flame / burning splint pops / lighted splint pops (1) [2]

(c) (i) MgO / magnesium oxide / solid / it disappears / dissolves
or a colourless solution / colourless liquid (is formed) (1) [1]

(ii) $MgO + H_2SO_4 \rightarrow MgSO_4 + H_2O$ (1) [1]

[Total: 6]

2 (a) (i)

32	38	44	all correct (1)
(20)	(20)	(20)	
12	18	24	all correct (1)

[2]

(ii) exothermic (1) [1]

(b) (i) (60 / 12 = 5 13.3 / 1 = 13.3 26.7 / 16 = 1.67)
3 : 8 : 1
Empirical Formula = C_3H_8O (1) **Reject** C_3H_7OH

Molecular formula = C_3H_8O (1) [2]

(ii) **X** = C_2H_5OH or CH_3OH (1) **Z** = C_4H_9OH or $C_5H_{11}OH$ (1)

Reasons: e.g. the more carbon atoms in the molecule /
the more carbon-carbon bonds / bigger M_r (reject A_r) / larger molecules
the more the temperature (rise) / more heat given out or reverse argument / more exothermic (1) [3]

(c) (i) propanoic (acid) /propionic (acid)
C_2H_5COOH / CH_3CH_2COOH / $C_2H_5CO_2H$ / $CH_3CH_2CO_2H$
(both name and structure required) (1) [1]

(ii) (acidified) potassium manganate(VII) or $KMnO_4$ or potassium permanganate (1)
purple / pink to colourless / decolourised (1)
OR
(acidified) potassium dichromate or $K_2Cr_2O_7$ (1)
orange to green (1)
(in both cases, award of second mark is conditional on first mark being obtained)
[2]

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(d) propyl propanoate (1)

$C_2H_5COOC_3H_7$/ $C_2H_5COOC_2H_5$ CH_3/ $C_2H_5COOCH_2CH_2CH_3$
$CH_3CH_2COOC_3H_7$/$CH_3CH_2COOC_3H_7$/
C_2H_5COO $C_2H_5CH_3$ (1) [2]

[Total: 13]

3 **(d)** (1) **[Total: 1]**

4 **(d)** (1) **[Total: 1]**

5 **(c)** (1) **[Total: 1]**

6 **(b)** (1) **[Total: 1]**

7 **(b)** (1) **[Total: 1]**

8 **(a)** 16.11 g (1) [1]

(b) filtration / decant(ation) / centrifugation (1) [1]

(c) colourless / green to purple / pink (1) [1]

(d)

32.3	39.4	47(.0)	1 mark for each correct row or column
6.9	13.6	21.8	to the benefit of the candidate (3)
25.4	25.8	25.2	

Mean value = 25.3 (1) cm^3 [4]

(e) 0.000506 (1) **OR** ecf titre × 0.0200 / 1000 [1]

(f) 0.00253 (1) **OR** ecf **(e)** × 5 [1]

(g) **(i)** 0.0253 (1) **OR** ecf **(f)** × 10 [1]

(ii) 1.42 (1) g **OR** ecf **(g)(i)** × 56 [1]

(h) 8.79 (1) **OR** ecf **(g)(ii)** / **(a)** × 100 [1]

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(i) **(i)** $(NH_4)_2SO_4$: 28 / 132 × 100 (1) = 21.2% (1) [2]

(ii) ammonium nitrate / urea / ammonia / ammonium phosphate / potassium nitrate etc. (1) [1]

[Total: 15]

9 **(a)** transition metal / element (ion or compound) absent (1) [1]

(b) **(i)** white ppt (1)

(ii) soluble (in excess) / dissolves / (colourless)solution (1) [2]

(c) **(i)** white ppt **AND (ii)** soluble (in excess) / dissolves / (colourless) solution (1) [1]

(d) M1 (aq) NaOH / sodium hydroxide / (1)
M2 A*l* / aluminium (foil) / Devarda's alloy (1)
M3 warm / heat / boil (1) may appear in observations
M4 ammonia / NH_3 **OR** **gas** turns litmus blue (1)

ALLOW
Brown ring test: conc. (1) sulfuric acid / H_2SO_4 (1) iron(II) sulfate / $FeSO_4$ (1) brown ring (1) [4]

[Total: 8]

10 **(a)** 0.63, 0.73, 0.81, 0.81 (1) [2]
0.76, 0.81, 0.81, 0.81 (1)

(b) $CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$ (1) [1]

(c) carbon dioxide / gas (evolved which)
escapes (from the apparatus) / leaves (the apparatus) / is lost (from the apparatus) /
removed (from the apparatus) / is released into the air / is liberated to the outside (1) [1]

(d) all points plotted correctly (1)

two smooth curves through the points (within one small square)
one mark for each curve (2) [3]

(e) **(i)** 0.56 (1) g [1]

(ii) 87.50 – 0.60 (value from candidates graph to ± half a small square) = 86.9(0) (1) g [1]

(f) increase rate / increase speed / faster (1)
increased surface area / increased area of contact / more contact
between marble and acid (1) [2]

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(g) Answers must be consequential on equation in **(b)** (unless equation is given as part of answer)

For a 1:2 mole ratio
0.036 / 2 = 0.018 mol $CaCO_3$
0.018 × 100 = 1.8 (g) (1)
10 – 1.8 = 8.2 (g) $CaCO_3$ (1)

E.c.f for a 1:1 mole ratio
0.036 × 100 = 3.6 (g) (1)
10 – 3.6 = 6.4 (g) (1) [2]

[Total: 13]

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