CAMBRIDGE INTERNATIONAL EXAMINATIONS

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) $2\,Mg\ +\ O_2\ \rightarrow\ 2\,MgO$ (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)	
<u>12</u>	<u>18</u>	<u>24</u>	all correct (1)

                                                                                     [2]

    (ii) exothermic (1) [1]

  (b) (i) $(60/12 = 5\quad 13.3/1 = 13.3\quad 26.7/16 = 1.67)$
                  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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Page 3	Mark Scheme	Syllabus	Paper
	Cambridge O Level – May/June 2015	5070	42

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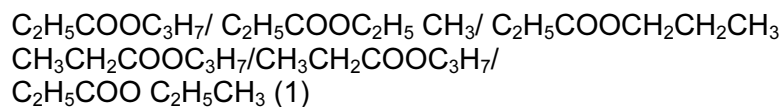
$C_2H_5COOC_3H_7$/ $C_2H_5COOC_2H_5$ CH_3/ $C_2H_5COOCH_2CH_2CH_3$
$CH_3CH_2COOC_3H_7$/$CH_3CH_2COOC_3H_7$/
C_2H_5COO $C_2H_5CH_3$ (1)   [2]

[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 $\times$ 0.0200 / 1000   [1]

(f) 0.00253 (1) **OR** ecf **(e)** $\times$ 5   [1]

(g) (i) 0.0253 (1) **OR** ecf **(f)** $\times$ 10   [1]

(ii) 1.42 (1) g **OR** ecf **(g)(i)** $\times$ 56   [1]

(h) 8.79 (1) **OR** ecf **(g)(ii)** / **(a)** $\times$ 100   [1]

(i) (i) $(NH_4)_2SO_4$: $28/132 \times 100$ (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 Al/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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Page 5	Mark Scheme	Syllabus	Paper
	Cambridge O Level – May/June 2015	5070	42

(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 $CaCO_3$
$0.018 \times 100 = 1.8$ (g) (1)
$10 - 1.8 = 8.2$ (g) $CaCO_3$ (1)

E.c.f for a 1:1 mole ratio
$0.036 \times 100 = 3.6$ (g) (1)
$10 - 3.6 = 6.4$ (g) (1)   [2]

[Total: 13]