

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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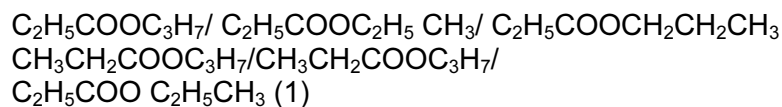
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- 1 (a) (i) silver/silvery/grey (1) [1]
- (ii) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$ (1) [1]
- (b) hydrogen/ H_2 (1)
pops in flame/burning splint pops/lighted splint pops (1) [2]
- (c) (i) MgO/magnesium oxide/solid/it disappears/dissolves
or a colourless solution/colourless liquid (is formed) (1) [1]
- (ii) $\text{MgO} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2\text{O}$ (1) [1]
- [Total: 6]**
- 2 (a) (i) $\begin{matrix} 32 & 38 & 44 \\ \underline{(20)} & \underline{(20)} & \underline{(20)} \\ \underline{12} & \underline{18} & \underline{24} \end{matrix}$ all correct (1)
- $\begin{matrix} 32 & 38 & 44 \\ \underline{12} & \underline{18} & \underline{24} \end{matrix}$ all correct (1) [2]
- (ii) exothermic (1) [1]
- (b) (i) $\begin{matrix} 60/12 = 5 & 13.3/1 = 13.3 & 26.7/16 = 1.67 \\ 3 & : & 8 & : & 1 \end{matrix}$
Empirical Formula = $\text{C}_3\text{H}_8\text{O}$ (1) **Reject** $\text{C}_3\text{H}_7\text{OH}$
- Molecular formula = $\text{C}_3\text{H}_8\text{O}$ (1) [2]
- (ii) **X** = $\text{C}_2\text{H}_5\text{OH}$ or CH_3OH (1) **Z** = $\text{C}_4\text{H}_9\text{OH}$ or $\text{C}_5\text{H}_{11}\text{OH}$ (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)
 $\text{C}_2\text{H}_5\text{COOH}$ / $\text{CH}_3\text{CH}_2\text{COOH}$ / $\text{C}_2\text{H}_5\text{CO}_2\text{H}$ / $\text{CH}_3\text{CH}_2\text{CO}_2\text{H}$
(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 $\text{K}_2\text{Cr}_2\text{O}_7$ (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)



[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)
<u>6.9</u>	<u>13.6</u>	<u>21.8</u>
<u>25.4</u>	<u>25.8</u>	<u>25.2</u>

 1 mark for each correct row or column
to the benefit of the candidate (3)

Mean value = 25.3 (1) cm³

[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]

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(i) (i) $(\text{NH}_4)_2\text{SO}_4 : 28/132 \times 100 (1) = 21.2\% (1)$ [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) $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2 (1)$ [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 \pm 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

$$0.036 / 2 = 0.018 \text{ mol CaCO}_3$$

$$0.018 \times 100 = 1.8 \text{ (g) (1)}$$

$$10 - 1.8 = 8.2 \text{ (g) CaCO}_3 \text{ (1)}$$

E.c.f for a 1:1 mole ratio

$$0.036 \times 100 = 3.6 \text{ (g) (1)}$$

$$10 - 3.6 = 6.4 \text{ (g) (1)}$$

[2]

[Total: 13]