

MARK SCHEME for the October/November 2015 series

5070 CHEMISTRY

5070/41

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

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- 1 (a) (i) propanol (1) [1]
- (ii) catalyst/ speeds up reaction (1) [1]
- (iii) displayed formula of propene (1) [1]
- (b) (aqueous) bromine (1)
(turns) colourless/ decolourises (1) [2]
- (c) (i) carbon dioxide (1)
limewater turns milky/ limewater forms a white precipitate (1) [2]
- (ii) $2\text{C}_3\text{H}_6 + 9\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$
species (1) balancing (1) [2]
- [Total: 9]**
- 2 (a) hydrogen (1)
lighted splint pops/ pops in a flame (1) [2]
- (b) (i) chlorine (1) [1]
- (ii) $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$ or $2\text{Cl}^- - 2\text{e}^- \rightarrow \text{Cl}_2$ (1) [1]
- (c) (i) oxygen (1)
glowing splint relights (1) [2]
- (ii) $4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$ or $4\text{OH}^- - 4\text{e}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ (1) [1]
- [Total: 7]**
- 3 (b) [Total: 1]
- 4 (b) [Total: 1]
- 5 (d) [Total: 1]

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- 6 (a) 3.43(g) (1) [1]
- (b) volumetric flask / standard flask / graduated flask (1) [1]
- (c) (i) pipette (1) [1]
- (ii) purple / pink (1) [1]
- (d) 27.3 37.9 42.7 one mark for each correct row **or** column
0.0 10.0 15.6 to the benefit of the candidate (3)
27.3 27.9 27.1
average volume = $27.2 \text{ (cm}^3\text{)}$ (1) [4]
- (e) 0.000544 (mol) (1) [1]
- (f) 0.00136 (mol) (1) [1]
- (g) 0.0272 (mol) (1) [1]
- (h) 126 (1) [1]
- (i) M_r of $\text{H}_2\text{C}_2\text{O}_4 = 90$
 $126 - 90 = 36$ (1)
 $36 / 126 \times 100 = 28.6\%$ (1) [2]
- [Total: 14]**
- 7 (a) transition metal present / transition element present /
Z is a compound of a transition metal / Z is a compound of a transition element (1) [1]
- (b) (i) blue precipitate (1)
(ii) insoluble in excess (1) [2]
- (c) (i) blue precipitate (1)
(ii) deep / dark blue solution formed (1) [2]
- (d) (dilute / aqueous) nitric acid (1)
(aqueous) silver nitrate (1)
white precipitate (1) [3]

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(e) CuCl_2 (1) [1]

[Total: 9]

8 (a) to reach room temperature/steady temperature (1) [1]

(b) exothermic (1) [1]

(c) all sodium hydroxide has reacted/reaction is complete (1) [1]

(d) all points plotted correctly (1)
one mark each for two intersecting straight lines (2) [3]

(e) (i) $26.0(\text{cm}^3)$ (1) [1]

(ii) $31.8(^{\circ}\text{C})$ (1) [1]

(f) (i) $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$ (1) [1]

(ii) 0.05 moles of NaOH react with 0.025 moles of H_2SO_4 (1)
concentration of $\text{H}_2\text{SO}_4 = 0.96(\text{mol}/\text{dm}^3)$ (1) [2]

(g) (i) $7.6(^{\circ}\text{C})$ (1) [1]

(ii) $76(\text{cm}^3)$ (1) [1]

(iii) moles of NaOH = 0.05 (1)
 $\Delta H = 48.5(\text{kJ}/\text{mol})$ (1) [2]

(h) heat **or** evaporate/warm **or** boil/leave in sun (1)
to crystallisation point/saturation point/leave some of water/leave (solution) to
cool/leave (solution) to crystallise/leave a concentrated solution (1)
wash and dry crystals (1) [3]

[Total: 18]