



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2024**

Chemistry

Assessment Unit AS 3

assessing

**Module 3: Practical Examination
Practical Booklet B (Theory)**

[SCH32]

THURSDAY 30 MAY, MORNING

**MARK
SCHEME**

| | | | AVAILABLE MARKS | |
|---|---------|--|-----------------|----|
| 1 | (a) | spirit burner [1] beaker/copper can/calorimeter [1] thermometer [1] | [3] | |
| | (b) | any one from: heat loss to surroundings loss of water by evaporation incomplete combustion heat used to heat container | [1] | |
| | (c) (i) | enthalpy change when one mole of a substance [1] is completely burnt in oxygen under standard conditions [1] | [2] | |
| | (ii) | $q = mc\Delta T$ $q = 200 \times 4.2 \times 35 = 29400 \text{ J}$ moles of ethanol = $\frac{1}{46} = 0.02174$ $\Delta H = \frac{29400}{0.02174 \times 1000} = -1350 \text{ (kJ mol}^{-1}\text{)}$ | [4] | |
| | (d) | they are gases/cannot use a spirit burner | [1] | 11 |
| 2 | (a) | 19.3 (cm ³) | [1] | |
| | (b) | MHCO ₃ is a weak base | [1] | |
| | (c) | yellow to red | [1] | |
| | (d) | easier to swirl/contents will not leave flask | [1] | |
| | (e) (i) | moles of H ₂ SO ₄ = $\frac{19.3 \times 0.0145}{1000} = 2.7985 \times 10^{-4}$ | [1] | |
| | (ii) | moles MHCO ₃ in 100 cm ³ = $2.7985 \times 10^{-4} \times 2 \times 4 = 2.2388 \times 10^{-3}$ $M_r = \frac{0.224}{2.2388 \times 10^{-3}} = 100$ | [2] | |
| | (iii) | 100 – 61 = 39 | [1] | |
| | (iv) | potassium/K | [1] | |
| | (f) | moles of CsHCO ₃ = $\frac{0.224}{194} = 1.1546 \times 10^{-3}$ moles of CsHCO ₃ in 25 cm ³ = $\frac{1.1546 \times 10^{-3}}{4} = 2.8865 \times 10^{-4}$ moles of H ₂ SO ₄ required = $\frac{2.8865 \times 10^{-4}}{2} = 1.4433 \times 10^{-4}$ volume of H ₂ SO ₄ = $\frac{1.443 \times 10^{-4} \times 1000}{0.0145} = 9.95 = 10.0 \text{ (cm}^3\text{)}$ | [3] | 12 |

- 3 (a) (i) any **two** from:
solid disappears
steamy fumes/misty fumes
heat released/mixture warms up
hissing/vigorous reaction
colourless solution
fizzing [2]
- (ii) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH} + \text{PCl}_5 \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl} + \text{POCl}_3 + \text{HCl}$ [1]
- (b) (i) hex-1-ene is non-polar and water in bromine water is polar/immiscible [1]
- (ii) bromine water layer colour will fade/change to colourless [1]
- (iii) 1,2-dibromohexane [1]
- (c) (i) yellow [1]
- (ii) $\text{Ag}^+ + \text{I}^- \rightarrow \text{AgI}$ [1]
- (iii) slower formation of precipitate [1]
white precipitate [1] [2]
- (d) (i) orange to green [1]
- (ii) butanone [1]

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- 4 (a) (i) can see when gas jar is full [1]
- (ii) propane [1]
- (b) (i) $8\text{NH}_3 + 3\text{Cl}_2 \rightarrow 6\text{NH}_4\text{Cl} + \text{N}_2$ [2]
- (ii) stopper from bottle/glass rod dipped in concentrated hydrochloric acid [1]
white smoke/solid/fumes [1] [2]
- (iii)

| Gas | Colour | Observations when gas tested with damp universal indicator paper |
|----------|-------------------------------------|--|
| Ammonia | | blue |
| Chlorine | yellow-green/green/ green-yellow | white/bleaches |

[1] per row [2]

- (c) (i) $\text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{NaHSO}_4 + \text{HCl}$ [1]
- (ii) prevent gas escaping through thistle funnel [1]
- (iii) any **two** from:
hydrogen iodide/iodine/sulfur dioxide/hydrogen sulfide [2]

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| | | | | |
|---|--------------|---|-----|----------------------------|
| 5 | (a) (i) | remove acidic impurities | [1] | AVAILABLE MARKS |
| | (ii) | invert and open the tap | [1] | |
| | (b) (i) | stopper would prevent layers flowing from funnel/closed system | [1] | |
| | (ii) | add water [1] aqueous layer increases in volume [1] | [2] | |
| | (c) (i) | cloudy | [1] | |
| | (ii) | anhydrous calcium chloride/anhydrous magnesium sulfate/ anhydrous sodium sulfate | [1] | |
| | (iii) | filter/decant | [1] | |
| | Total | | | |
| | | | | 55 |