

END TERM 2 2025
MARKING SCHEME
CHEMISTRY PAPER 3

1. (a)

Time (min)	0	½	1	1 ½	2	2 ½	3	3 ½	4
Temperature (°C)	19.0	19.0	19.0	19.0	X	16.0	15.0	15.0	15.0

Complete – 1mk

- 8 readings – 1mk- penalize – ½ of space not filled
- ½ for unrealistic values T 100 or 40
- ½ all constant t = 0 to t = 4
- ½ if T(T(2 ½)

C.T = 1

D.C = 1

A.C = 1

Tr = 1

4mks

Decimal place – 1mk

- Accept whole number or to 1d.p of 0.5 or 0.0

Accuracy – 1mk S.V ± 2units

Trend – 1mk

Award ½ - where t = 0 – t – 1 ½ min = all constant

t = ½ - t ½ min – constant

Award ½ - t – 2 ½ to 4min –show a drop

(b) Graph

Ans – ½ - both axis correctly labelled

Scale = ½ - use more than ¾ big squares in both axis

Plotting -1

Labeling -1

3 mks

Penalize ½ inverted and scale to accommodate all plots

Plotting – all 8 points award 1mk

- 6pts & 7 award

- ≤ 5 award 0mk

Labelling – Award ½ for two straight lines.

- ½ for extrapolation

(b) (i) T = correct reading

(ii) Heat of solution = MCΔT

$$= 50\text{g} \times 4.2\text{Jg}^{-1}\text{K}^{-1} \times 4.5\text{K}$$

$$= -50 \times 4.2 \times 45\text{J}$$

$$= \frac{-50 \times 4.2 \times 4.5}{1000} \text{ KJ}$$

$$1000$$

ΔHsoln = ?

$$0.0238\text{moles} = \frac{-50 \times 4.2 \times 4.5}{1000} \text{ KJ}$$

$$1000$$

$$1\text{mole} = ?$$

$$= \frac{-50 \times 4.2 \times 4.5}{1000 \times 0.0238} \text{ KJ/mol}^{-1}$$

$$1000 \times 0.0238$$

= -Ans

Penalized if ΔH – sign is + and not –ve (total 3mks)

TABLE 2

Titre	I	II	III
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Final burette reading	24.4	24.5	24.3
Initial burette reading	0.0	0.0	0.0
Volume of solution H used (cm ³)	24.4	24.5	24.3

Conditions:- A complete table ...

3 consistent titrations 1ms

2 titrations done and are consistent...1mk

3 inconsistent titrations done and averaged 0mk

only 1 titration done.....0mk

C.T = 1

D.C = 1

AC = 1

PA = 1

GFA = 1

5mks

Penalty:

(i) Penalize ½mk for inverted table.

(ii) Penalize ½mk to unrealistic titre values e.g. volume cm³ unless explained.

(iii) Penalize ½mk for wrong arithmetic.

B- Use of decimals1mk

(Tied to 1st and 2nd rows)

Conditions

(i) Accept 1 decimal place / point if used consistently.

(ii) Accept 2 decimal points, however the 2nd decimal point must be either 0.0 or 0.5

Penalty

(i) Penalize fully if decimals are not used consistently

(C) Accuracy1mk

(i) Conditions (i) If any of the volume used is within $\pm 0.1\text{cm}^3$ of the school value (S.V)...

(ii) If there is one value within $\pm 0.2\text{cm}^3$ of the school value (S.V)... (½mk)

(D) Principles of averaging.....1mk

Conditions

(i) If 3 titrations done are consistent and averaged....

(ii) If 3 titrations done and 2 are consistent and averaged1mk

(iii) If 2 titrations done and are consistent and averaged....1mk

(iv) If titration done ...1mk

(v) If 3 titrations done and are inconsistent and averaged0mk

(vi) If 2 consistent titrations averaged...0mk

(vii) If 3 titrations are done and are consistent but are averaged0mk

(E) Final answer1mk

Conditions

(i) If the answer of the titre value is within $\pm 0.1\text{cm}^3$ of the school value (S.V) award....1mk

(ii) If the answer of the titre value is within $\pm 0.2\text{cm}^3$ of the school value ½mk

(iii) If the answer is not within $\pm 0.2\text{cm}^3$ of the school value (S.V) award....0mk

(e) Average volume of solution H used

$$\frac{24.5 + 24.4 + 24.3}{3} = 24.4 \quad \checkmark \frac{1}{2}$$

3

$\checkmark \frac{1}{2}$

$$\text{II. } \frac{24.4 \times 0.04}{1000} = 0.000976 \quad \checkmark \frac{1}{2}$$

1000

$$\text{III. } \frac{5}{2} \times 0.000976 = 0.00244 \quad (\text{penalize } \frac{1}{2} \text{ for wrong units})$$

IV. $\frac{3}{250 \times 0.00244} \sqrt{\frac{1}{2}}$
 $\frac{25}{0.0244} = 122.95$
 $= 123$ (no units) penalize for units

(f) $123 - 90 = 33 \sqrt{\frac{1}{2}}$
 $16 + (2 \times 1) = 18x = 33$
 $x = \frac{33}{18} = 1.833$
 $x = 2 \sqrt{\frac{1}{2}}$

2. (a) (i)

Observation	Inference
- Solid dissolves, yellowish solution. - Colourless fumes/vapour are produced. - boiling tube becomes warm. (1 mk)	- Soluble compound. - Mix with water is exothermal heat is produced. (1 mk)

(ii)

Observation	Inference
- Blue litmus turns red. - No effect on litmus paper. (1mk)	- Presence of H^+ / H_3O^+ in the solution. - Solution is acid (1 mk)

(iii)

Observation	Inference
- White ppt. soluble in excess. (1 mk)	- Pb^{2+} , Zn^{2+} , Pb^{3+} present. (1 mk)

(iv)

Observation	Inference
- White ppt. persisted insoluble in excess	- Al^{3+} or Pb^{2+} probably present

(v)

Observation	Inference
- Mixture remains colourless/ No yellow ppt. seen. (1 mk)	- Pb^{2+} absent (1glim). - Al^{3+} present

(vi)

Observation	Inference
- White ppt. seen. (1 mk)	- SO_4^{2-} , CO_3^{2-} , SO_3^{2-} absent - Cl^- is present (probably present)

3. a)

Observation	Inference
- Solid effervesces/ fizzling/bubbles of a colourless gas. (1 mk) - No effect on litmus paper.	- Inorganic compound organic compound/presence Presence of $-COOH$ / H^+ / H_3O^+ ions. Solution is acid. (1 mk)
- The solution remained orange.	- Accept absence of saturated organic - Absence of $-OH$ (1 mk)

b) i)

(ii)

