CHEMISTRY 233/3 marking scheme

1.

Final temperature (°C)	29.0
Initial temperature (°C)	26.0

CT √ ½

DP √ ½ (Accept whole numbers)

A√ ½ (Teachers initial temperature)±2

a) ΔT = Final Temperature – initial Temperature
       = 29.0 – 26.0 = 3.0 √ ½

b) $\frac{0.04}{24}$ = 0.001667 moles
          computation √ ½
             Answer √ ½

c) m= 100cm³ x 1g/cm³ = 100g √ ½
     Q = $\frac{100 \times 4.2 \times Ans(a)}{1000}$ √ ½

       = Ans KJmol⁻¹ √ 1

NB: Penalise 1mk for wrong units.

TABLE II

	I	II	III
Final burette reading (cm³)	22.0	22.0	22.0
Initial burette reading (cm³)	0.0	0.0	0.0
Volume of solution F (cm³)	22.0	22.0	22.0

Complete table - 1mk

Conditions

3 readings (consistent) – 1

1 or 2 consistent readings – 0

2 in consistent readings – 0

Penalties

- Wrong Anthrmetic
- Inverted table.
- Un realistic readings.

NB: For each penalize ½ mk up to a maximum of ½ mk

Decimal point – 1 mk
- Accept either 1 or 2 d.p used consistently otherwise penalize fully.
- If two d.p used the 2ⁿᵈ d.p must be either be 'o' or '5'
- Accept inconsistency of 0 i.e   0.0 or 0.00 or 0.000

   Accuracy   1mk
- Compare any one of students readings with the school titre value
- If at least 1 reading with ± 0.1 √ 1
- If within ± 0.2   √ ½
- If not within ± 0.2   √ 0

Principles of averaging

a) $\frac{22.0 + 22.0 + 22.00}{3}$ = √ 22.0 cm³ √

Conditions

If within   1mk

If none within   0 mk

If inconsistent values overage -   0mk

Correct working, wrong answer – ½ mk

No working, correct answer – ½ mk

If wrong arithmetic, penalize ½ mk

Final Answer   1mk

Compare the average value with the teachers average value.

- If within ± 0.1 – 1mk
- If not within ± 0.1 – 0mk

Total marks 5 mks

b) i) the no. of moles of B

$\dfrac{25 \times 0.5}{1000}$ = 0.0125 moles √ computation ½ mk
√ Ans ½

ii) the no. of moles of acid in F

mole ratio = 1:1 √ mole ration ½ mk
= 0.0125 moles √ ½ mk

iii) moles of acid in 100 cm^3 of F

$\dfrac{100 \times 0.0125}{22}$ = 0.05682 moles √ computation ½ mk
√ Ans ½

iv) Initial no. of moles = moles reacted with solid C + moles reacted with NaOH
= (0.00167 x 2) √ + 0.05682 √ computation ½ mk
= (0.00333 + 0.05682) moles per 1000 cm3 √ Ans ½
= 0.06015 moles √ Ans ½ mk

v) Morality of A.

$\dfrac{1000 \times 0.06015}{100}$ = 0.6015 √ computation ½ mk
= 0.602 M √ Ans ½

2. TABLE III

	1	2	3	4	5
Volume of D (cm^3)	40	20	20	20	20
Volume of E(cm^3)	20	17.5	15.0	12.5	10
Volume of water (cm^3)	0	2.5	5	7.5	10
Time taken for x to disappear (sec)	17	25	32	39	46
$\dfrac{1}{t}$ (sec -1)	0.0588	0.040	0.0312	0.0256	0.0217

√ **compete table   1mk**
- Reject readings in mins.
- Filled table and correct computation – 1

√ **Decimal points   1mk**
- Accept $\underline{1}$ to 4th d.p moles divided fully
t
- Reject $\underline{1}$ in fraction.
t

√ **Accuracy   1mk**
- Tied to school values 1st reading at 0 cm^3 of water ± 2 sec.

√ **Trend   1mk**
- Increase in time continuously.

a) GRAPH (See the graph paper)

√ Plotting   1mk
- 5 correct plots   1mks
5 plotted, 4 correct plots – ½ mk.
5 plotted, 1-3 wrong plots – 0mk
√ Scale   ½ mk
√ Labelling   ½
√ Straight line (Line of best fit) 1mk

b) i) $^1/_T$ = 3.75 x 10-2 sec
= t = 26.67secs   Accept   ± -2

ii) $C_1 V_1 = C_2 V_2$
2x 16.5 = C_2 x 20
$C_2 = \dfrac{2 \times 16.5}{20}$ √ = 1.65 M √ computation √ ½
Ans √ ½

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c) The graph is a straight line. This indicates that the rate of reaction is directly proportional to the concentration of the acid solution E √   (1mk)
OR (words to the relationship of diluting, decrease in the time, increase in reciprocal)
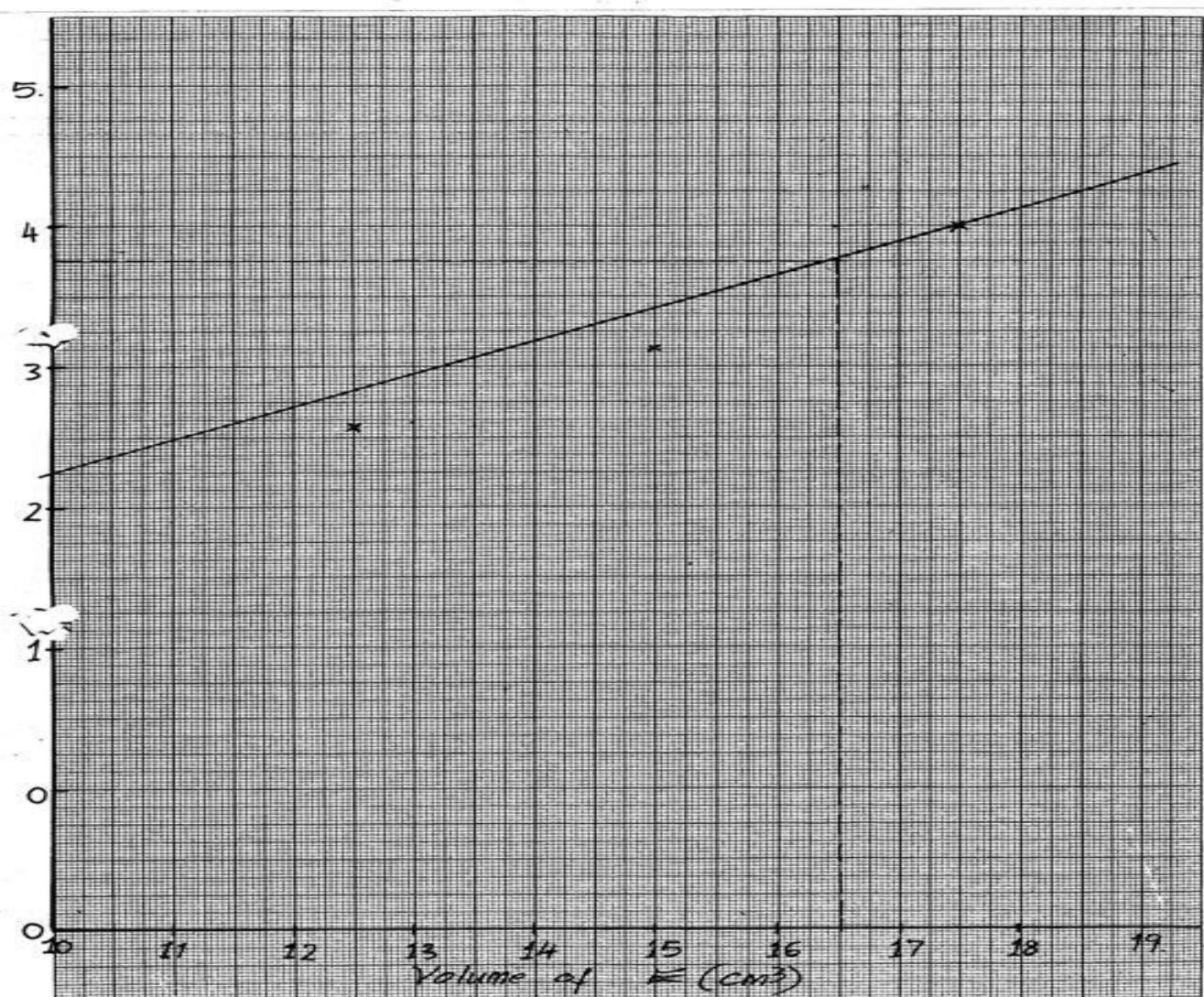
3.

Observation	Inference.
a) Solid dissolves to form a colourless√ 1 solution.	Soluble salt √ 1mk
i) White precipitate √ ½ soluble in excess √ ½	Al^{3+}, Pb^{2+} , Zn^{2+} √
	(3 ions – 1mk, 2 ions - ½ mk, 1 ion – Omk
	Penalize full for contradictory ion)
	Al^{3+}, Pb^{2+} √ (2 ions - 1mk, 1 ion - ½ mk)
ii) White precipitate √ ½ insoluble in excess √ ½	Al^{3+} confirmed √ Or Pb^{2+} absent.
	Reject if not mentioned in a(i) and (ii) above.
	SO_4^{2-} , Cl- √ Two mentioned – 1mk
iii) No white precipitate √ ½	One mentioned – ½ mk
iv) White precipitate, √ ½ insoluble in dilute nitric acid.	C = C , C≡C- 2 group – 1
	√ 1 group – ½
b)i) solid melts. ½ √ burns with yellow smoky/sooty/luminous flame √ ½	R – COOH/H^+ √ ½
	C = C , C ≡ C √ 2 group – 1

II i) PH = 4-6 √ ½
  ii) Purple KMnO4 decolourises √
  iii) Effervescence /hissing sound. √ ½
	1 group – ½
	Acidic substance/R- COOH/H⁺ √ ½