

MOMALICHE 3 CYCLE 8 MAARKING SCHEME

CHEMISTRY 233/3 marking scheme

SEPTEMBER 2021

1.

Final temperature ($^{\circ}\text{C}$)	20.0
Initial temperature ($^{\circ}\text{C}$)	17.0

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

DP \checkmark $\frac{1}{2}$ (Accept whole numbers)

A \checkmark $\frac{1}{2}$ (Teachers initial temperature) ± 2

a) $\Delta T = \text{Final Temperature} - \text{initial Temperature}$
 $= 20.0 - 17.0 = 3.0 \checkmark \frac{1}{2}$

b) $\frac{0.1}{24} = 0.004167$ moles
computation $\checkmark \frac{1}{2}$
Answer $\checkmark \frac{1}{2}$

c) i) $m = 100\text{cm}^3 \times 1\text{g/cm}^3 = 100\text{g}$
 $Q = \frac{100 \times 4.2 \times \text{Ans(a)}}{1000} \checkmark \frac{1}{2}$
 $= \text{Ans kJ} \checkmark \frac{1}{2}$

ii) $\text{Ans in c)i)}/\text{Ans in b) } \times 1 \checkmark 1$

NB: Penalise 1mk for wrong units.

TABLE II

	I	II	III
Final burette reading (cm^3)	20.4	20.6	21.0
Initial burette reading (cm^3)	0.0	0.0	0.0
Volume of solution F (cm^3)	20.4	20.6	21.0

Complete table - 1mk

Conditions

3 readings (at least 2 consistent readings) – 1

2 readings and all consistent $\frac{1}{2}$

1 reading – 0

2 in consistent readings – 0

Penalties

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

NB: For each penalize $\frac{1}{2}$ mk up to a maximum of $\frac{1}{2}$ 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 '0' or '5'
- Accept inconsistency of 0 i.e 0.0 or 0.00 for initial reading

Accuracy 1mk

- Compare any one of students readings with the school titre value
- If at least 1 reading with $\pm 0.1 \checkmark 1$
- If within $\pm 0.2 \checkmark \frac{1}{2}$
- If not within $\pm 0.2 \checkmark 0$

Principles of averaging

a) $\frac{20.4 + 20.6}{2} = \checkmark$

Final Answer 1mk

Final average accuracy if within ± 0.1 of sch. Average 1 mk, if within ± 0.2 of sch value $\frac{1}{2}$ mk
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

$\frac{25 \times 0.4}{25} = 0.01$ moles \checkmark computation $\frac{1}{2}$ mk

- 1000 \checkmark Ans $\frac{1}{2}$
- ii) the no. of moles of acid in F
mole ratio = 1:1 \checkmark mole ratio $\frac{1}{2}$ mk
= 0.01 moles \checkmark $\frac{1}{2}$ mk
- iii) moles of acid in 100 cm³ of F
 $\frac{100 \times 0.01}{20.5} = 0.04878$ moles \checkmark computation $\frac{1}{2}$ mk
 \checkmark Ans $\frac{1}{2}$
- iv) Initial no. of moles = moles reacted with solid C + moles reacted with NaOH

- v) Molarity of A.
 $\frac{1000 \times \text{ans iv}}{100} = \checkmark$ computation $\frac{1}{2}$ mk

2. TABLE III 5mk

	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)	20	27	34	43	50
$\frac{1}{t}$ (sec -1)					

\checkmark complete table 1mk

- Reject readings in mins.
- Filled table and correct computation – 1

\checkmark Decimal points consistency 1mk

- for time taken NO dp

\checkmark Accuracy 1mk

- Tied to school values 1st reading at 0 cm³ of water \pm 5 sec.

\checkmark Trend 1mk

- Increase in time continuously.

- Calculations of $\frac{1}{t}$

- Accept $\frac{1}{t}$ to 4th d.p divided fully

- Reject $\frac{1}{t}$ in fraction.

- All correctly done 1mk, 4 correctly done $\frac{1}{2}$ mk, otherwise zero

a) GRAPH (See the graph paper)

\checkmark Plotting 1mk

- 5 correct plots 1mks
- 5 plotted, 4 correct plots – $\frac{1}{2}$ mk.
- 5 plotted, 1-3 wrong plots – 0mk

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

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

\checkmark Straight line (Line of best fit) 1mk

b) i) $\frac{1}{T} = 3.75 \times 10^{-2}$ sec

= $t = 26.67$ secs Accept \pm 2

Showing on graph $\frac{1}{2}$ mk, correct answer $\frac{1}{2}$ mk

ii) $C_1 V_1 = C_2 V_2$

$2 \times 16.5 = C_2 \times 20$

$C_2 = \frac{2 \times 16.5}{20} = 1.65$ M \checkmark computation \checkmark $\frac{1}{2}$
Ans \checkmark $\frac{1}{2}$

Graph: Appropriateness of scale $\frac{1}{2}$ mk: Labeling both axes $\frac{1}{2}$ mk: Plotting ,all 5 points correctil 1mk, 4 pionts $\frac{1}{2}$ mk, otherwise zero. Alowed deviation 1mm vertical and horizontal

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 \checkmark (1mk)

OR (words to the relationship of diluting, decrease in the time, increase in reciprocal)

NB: Any values given here as readings are only examples, learners work is marked as per his/her reading.

3.

Observation	Inference.
a) .i) White precipitate \checkmark $\frac{1}{2}$ soluble in excess \checkmark $\frac{1}{2}$	Al ³⁺ , Pb ²⁺ , Zn ²⁺ \checkmark (3 ions - 1mk, 2 ions - $\frac{1}{2}$ mk, 1 ion - 0mk <i>Penalize full for contradictory ion)</i>
ii) White precipitate \checkmark $\frac{1}{2}$ insoluble in excess \checkmark $\frac{1}{2}$	Al ³⁺ , Pb ²⁺ \checkmark (2 ions - 1mk, 1 ion - $\frac{1}{2}$ mk)
iii) No white precipitate \checkmark $\frac{1}{2}$	Al ³⁺ confirmed \checkmark Or Pb ²⁺ absent. <i>Reject if not mentioned in a(i) and (ii) above.</i>
iv) White precipitate, \checkmark $\frac{1}{2}$ insoluble in dilute nitric acid.	SO ₄ ²⁻ , Cl ⁻ \checkmark Two mentioned - 1mk One mentioned - $\frac{1}{2}$ mk
b)i) solid melts. $\frac{1}{2}$ \checkmark burns with yellow smoky/sooty/luminous flame \checkmark $\frac{1}{2}$	C = C, C \equiv C- 2 group - 1 \checkmark 1 group - $\frac{1}{2}$
II i) PH = 1 or 2 \checkmark $\frac{1}{2}$ ONLY ONE VALUE	R - COOH/H ⁺ \checkmark $\frac{1}{2}$
ii) Purple KMnO ₄ decolourises \checkmark	C = C, C \equiv C \checkmark 2 group - 1
iii) Effervescence /hissing sound. \checkmark $\frac{1}{2}$	1 group - $\frac{1}{2}$
	Acidic substance/R- COOH/H ⁺ \checkmark $\frac{1}{2}$