

**CHEMISTRY 233/3**

**(PRACTICAL)**

**TERM 2 2022 OPENER EXAM FORM 4**

**MARKING SCHEME**

**QUESTION1**

**TABLE 1**

<b>VOLUME OF WATER IN THE BOILING TUBE</b>	<b>TEMPERATURE AT WHICH CRYSTALS OF A APPEAR</b>	<b>SOLUBILITY OF SOLID A g/100g of water</b>
4	70.0	125.0
6	59.0	83.3
8	54.0	62.5
10	47.0	50.0
12	40.0	41.7

AWARD a total of 7 MKS Distributed as follows.

**1. Complete table - 4mks**

**Condition and penalties**

- A table with 8-10 values award 4
- A table with 6-7 values a ward 3
- A table with 4- 5 values award 2
- A table with 2-3 values award 1
- A table with 1 value award ½
- A table with no value a ward 0

**Penalties**

- a) Penalize ½ mk for each wrong value of solubility
- b) Penalize ½ one for unrealistic temperature readings ½ above 90°C and below 10°C

**2. DECIMALS TIED TO TEMPARATURE -1Mk**

Accept;



- i) Whole numbers
- ii. Idecimal place where the decimal should be 0 or 5 i.e 70.0 or 70.5
- iii. Accept 2 decimal places where it should be .00, .25,.50 or .75

**NB: If no consistence penalize fully.**

- 3. TREND – Tied to temperature i.e it should be decreasing (1mk)
- 4. Accuracy – tied to temperature when  $4\text{cm}^3$  of water was added

Accept  $\pm 2^{\circ}\text{C}$  of the school value.

1a) **GRAPH** – award a total of 3mks distributed as follows.

i. Labeling ( $\frac{1}{2}$ mks)

- Both axis should be labeled if one is not or wrongly labeled award 0
- Ignore units but if indicated they should be right otherwise penalize fully

ii. Scale – ( $\frac{1}{2}$ mks)

- The actual plotting should be half of the page
- Paralyze fully if scale changes on the way both axis must be correct.

iii. Plots (1mk)

4-5 correct plots award (1mk)

3 correct plots award ( $\frac{1}{2}$ mks)

Less than 3 correct plots award 0

iv. Line – a smooth curve passing through 3 or more correct plots award 1mk  
Otherwise award 0

b) – award  $\frac{1}{2}$  mk for sloping or the graph

- award  $\frac{1}{2}$  mk for calculating

**NB:**

- i. Award fully for calculation from correct graph even if not shown on the graph
- ii. Reject any value from a wrong graph.





**TABLE 2**

	<b>1</b>	<b>11</b>	<b>111</b>
FINAL BURET READING	12.5	12.5	12.5
INITIAL BURET READING	0.0	0.0	0.0
VOLUME OF SOLUTION B USED	12.5	12.5	12.5

Award a total of 5mks distributed as follows

**a) Complete table**

**(1mk)**



- Complete table with 3 titration 1mk
- Incomplete table with 2 titrations  $\frac{1}{2}$  mk
- Incomplete table with 1 titration 0 mks

### Penalties

- i. Wrong arithmetic
- ii. Invented table
- iii. Unrealistic values i.e burette reading with more than  $50\text{cm}^3$  and less than  $1\text{cm}^3$  without explanation.
- iv. Unrealistic titre values

**NB: PENETICE  $\frac{1}{2}$  once**

### b) Use of decimals (1mk) (Tied to the 1<sup>st</sup> and 2<sup>nd</sup> row only)

Accept 1 or 2 decimal places used consistently otherwise penalize fully

- If 2 dp are used the 2<sup>nd</sup> should be a "0" OR "5" e.g 20.10 or 20.15 otherwise penalize fully
- Accept the use of Zero as the initial burette reading i.e 0,0.0 or 0.0

### C) Accuracy (1mk)

Complete the candidate value with the school value (S.V)

- i. If within  $\pm 0.1$  of the school value award 1mk
- ii. If within  $\pm 0.2$  of S.V award  $\frac{1}{2}$ mk otherwise award 0

NB: Tick the candidate value that deserves a credit

### D) PRINCIPLE OF AVERAGING -----1MK

#### Conditions

- i. If 3 titration done but only two are consistent and averaged award 1mk
- ii. If 3 titration are done and consistency and averaged award 1mk
- iii. If two titration are done and are consistency and averaged award 1mk
- iv. If three consistency titration one done but 2 are averaged award 0
- v. If three 3 titration are done and are inconsistent and are done averaged award zero



vi. If two titration are done and are inconsistency and are averaged award 0

### PERALTIES

- i. Penalize  $\frac{1}{2}$  for wrong arithmetic
- ii. penalize  $\frac{1}{2}$ mk if no working is shown and answer is correct
- iii. penalize fully if no working is shown and answer given is wrong
- iv. Accept rounding off or truncation to the 2<sup>nd</sup> d.p  
e.g 12.666    12.67  
or  
12.66        12.66

### NB:

- The working of average must be marked before the mark for averaging is award in table 2.
- Accept the average volume if it work out exactly to a whole number.

### FINAL ACCURACY -----(1MK) Tiled to correct average time.

Compare the candidate average time to the school value.

- i. If within  $\pm 0.1$  award 1mks
- ii. If with n  $\pm 0.2$  award  $\frac{1}{2}$  mk  
Otherwise award 0

### NB:

- If there are 2 possible correct average titre, use the one the one close to the school value and award accordingly.
- If wrong value are averaged, pick the correct values average for the candidate and award accordingly.
- Record the marks as follows besides the table to the right.

CT - 1mk  
D - 1mk  
A - 1mk  
PA - 1mk  
FA - 1mk

### Total 05 mks

b) Calculate the number of moles of B used





$$1000 \cdot 0.13$$

$$12.5 ?$$

$$= \frac{12.5 \times 0.13}{1000} \quad \sqrt{\quad} \quad \frac{1}{2}$$

$$0.001625 \text{ moles} \quad \sqrt{\quad} \quad \frac{1}{2}$$

$$= 0.0040625 \quad \sqrt{\quad} \quad \frac{1}{2}$$

c) Ans  $\frac{b \times 5}{2}$

$$= 0.0040625 \quad \sqrt{\quad} \quad \frac{1}{2}$$

d) Ans  $\frac{c \times 1000}{25}$

$$\sqrt{\quad} \quad \frac{1}{2}$$

$$= 0.1626 \text{m} \quad \sqrt{\quad} \quad \frac{1}{2}$$

e) 5g 250cm<sup>3</sup>

$$20\text{g} - 1000$$

$$\frac{1 \times 20}{0.1625}$$

$$0.1625$$

$$= 123.07 \quad \sqrt{\quad} \quad \frac{1}{2}$$

f)  $90 + 18x = 123$

$$18x = 33$$

$$x = \frac{33}{18}$$

$$x = 1.83$$

$$= 2$$



## QUESTION 2

A) OBSERVATION	INFERENCES
No white precipitate Formed (1mk)	Ba <sup>2+</sup> Ca <sup>2+</sup> and Pb <sup>2+</sup> Absent Each $\frac{1}{2}$ mks Penalize $\frac{1}{2}$ mk to a maximum of 1 $\frac{1}{2}$ mks for any contradictory ion

B) OBSERVATION	INFERENCES
No white precipitate insoluble in excess NB: White precipitate $\frac{1}{2}$ mk - Insoluble in excess $\frac{1}{2}$ mk	Zn <sup>2+</sup> absent (1mk) Penalize 1mk for each contradicting ion to a maximum of (1mk)



C) OBSERVATION	INFERENCES
A white precipitate $\frac{1}{2}$ Insoluble in excess $\frac{1}{2}$	Mg <sup>2+</sup> present (1mk) - Accept Al <sup>3+</sup> absent for $\frac{1}{2}$ mk - Penalize 1mks for any contracting ion to a Maximum of 1mks

D) OBSERVATION	INFERENCES
A white precipitate is formed $\frac{1}{2}$ mks -	Cl <sup>-</sup> , SO <sub>3</sub> <sup>2-</sup> , SO <sub>4</sub> <sup>2-</sup> and CO <sub>3</sub> <sup>2-</sup> present - $\frac{1}{2}$ mk each Penalize $\frac{1}{2}$ mk for any contradictory ion to a maximum of (2mks)

E) OBSERVATION	INFERENCES
No white precipitate formed -	Cl <sup>-</sup> Present (1mks) -accept SO <sub>4</sub> <sup>2-</sup> AND SO <sub>3</sub> <sup>2-</sup> OR CO <sub>3</sub> <sup>2-</sup> absent for fully marks penalize 1mks for any contradictory ion to a maximum of 1mks - Three anions given – 1mk - Two anions given - $\frac{1}{2}$ mk - One anion given – 0mk

### QUESTION 3

a) OBSERVATION	INFERENCES
No fizzing/bubbling /hissing (1mk) Reject -fissiling -Sizzling	R- COOH Absent (1mk) NB: Ignore H <sub>3</sub> O <sup>+</sup> & H <sup>+</sup>

b) OBSERVATION	INFERENCES
KMnO <sub>4</sub> get decolorized Or KMnO <sub>4</sub> turns from purple to colorless (1mk) <b>Reject</b> - The solution turns colourless	C= C OR -C= C- ( $\frac{1}{2}$ mk) Present R- OH Present ( $\frac{1}{2}$ mks)



<ul style="list-style-type: none"> <li>- It turns colourless</li> <li>-</li> </ul>	NB: Penalize ½mk for any contradictory group to a maximum of 1mks
<p style="text-align: center;"><b>c) OBSERVATION</b></p> <p>Yellow /orange bromine water does not get decolonized</p> <p><b>Accept</b> It remains yellow or orange</p>	<p style="text-align: center;"><b>INFERENCEs</b></p> <p style="text-align: center;"> <math>\begin{array}{c}   \quad   \\ \text{C} = \text{C} \end{array}</math>       or <math>-\text{C} \equiv \text{C}-</math> </p> <p><b>Absent</b> Penalize 1mk for any contradictory group to a maximum of 1mk</p>
<p style="text-align: center;"><b>d) OBSERVATION</b></p> <p>K<sub>2</sub>CrO<sub>7</sub> turns from orange to green(1mk)</p>	<p style="text-align: center;"><b>INFERENCEs</b></p> <p>R-OH Present (1mk) Penalize 1mk for any contradictory group to a maximum of 1mk</p>

