**MINCKS GROUP OF SCHOOLS**

**FORM FOUR**

**CHEMISTRY PAPER 3**

**TERM 2 SEPTEMBER 2022**

**MARKING SCHEME**

Table 1

|  |  |  |
| --- | --- | --- |
| **Volume of distilled water** | **Temp 0C** | **Salability of R in Y/100g of water** |
| 4 | 76 | 125.00 |
| 6 | 70 | 83.33 |
| 8 | 59 | 62.50 |
| 10 | 51 | 50.00 |
| 12 | 40 | 41.66 |

Table 1 attracts 6marks distributed as follows.

(a)Complete table 1mrk

* Award 1mrk for 5 – 4 correctly filled.
* Award ½Mrk For 3 Correct Readings.
* Award 0Mrk for less 3 readings.

(b)Accuracy ½mrk

* Tied to the 1st temperature.
* Accept if within +12.00 C of school value.

(c) Decimal 1mrk

* Accept whole number for temperature readings.
* Accept one decimal places of .5 or .0 for temperature readings.
* Penalize fully for decimal if not consistent.

(d) Trend 1mrk

* Accent temperature readings drops continuously.
* Award ½ mrk if temperature reading all remain constant or rises
* Penalize fully if temperature readings all remain constant 2 ½ mk

(e) Solubility calculations 1mrk

* Award 2 ½ marks for calculations of solubility.
* Award ½ mark for each correct calculation done.

Graph

Graph attracts three marks awarded as follows:

7(a) Labeling of axes ½ mrk

* Award ½mk for all axes correctly labeled with correct units.
* Units may be given on both or not.
* If units given, they must be correct.

1. Scale ½mrk

* Graph should cover at least ½ of the space provided (area covered by plots)
* Scale should accommodate all plots whether plotted or not.

1. Plotting 1mrk

* Award 1mrk for 4 – 5 plots are correctly plotted.
* Award ½mrk for 3 plots.
* Award 0mrk for less than 3 plots.

1. Curve (1mrk)

Award 1mrk for smooth curve drawn passing through correctly plotted plots.

Summary

Solubility of 100g of water

Temperature 00 C

(b) i) Should be shown from the graph ½ correct reading from correctly drawn graph ½ (both should apply)

E.g. 550C = 60g/100g water

ii) 40g 50g

? 100g 40 x 100

50= 80g/100g of water

Reading correctly at 80g/100g water = 660C

**Table II**

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading (cm3) | 19.8 | 19.7 | 19.9 |
| Initial burette reading | 0.0 | 0.0 | 0.0 |
| Volume of solution P used | 19.8 | 19.7 | 19.9 |

Total of 5mks awarded as follows:

1. Complete table 1mk

Awarded as;

* Complete table with three titration done 1mk
* Complete table with two titration done ½mk
* Complete table with one titration done 0mk
* Penalize 1/2mk for wrong arithmetic’s on complete table incomplete table or unrealistic burette readings

1. Decimals (1mk)

* Award 1mk if decimals are used consistently tied to 1st row and second row readings.
* Accept use of 0, 0.0, 0.00 on the initial burette reading. Incase of 2 decimals place the second decimal should be 0 or 5
* Penalize fully if decimals are used inconsistently.

1. Accuracy (1mk)

* Award 1mk if at least one of the readings is within -+0.2 of school value.

1. Principle of averaging (1mk)

* Award 1mk if two or three consistent values are correctly chosen averaging that is within -+0.1 or -+0.2
* If all three values are with the range and only two are averaged then Penalize fully and award (0mk)
* If none of the values are within the range penalize fully, if averaged.

1. Final Accuracy (1mk)

* Award 1mk if within -+0.1 0f the school value
* Award ½mk if within -+0.2 of the school value

Calculations

1. Average volume of P 19.8 + 19.9 +19.7 =19.8cm3

3

1. Moles of Q

0.25 x 25 ½ = 0.00625Moles (½mk)

1000

1. Moles of P

Ans in (b) above divided by 2 = ans ½

E.g. 0.00625 ½ = 0.003125Moles

2

NB answer in (b) above Mn of be transferred wholly otherwise penalize fully.

1. Answer in (c) above x 1000 ½ = ans ½

Average volume

e.g. 0.003125 x 1000 = 0.157Moles

19.8

NB answer should should be to 4 decimals otherwise penalize ½mk

1. Value of n

5g 250cm3 5 x 1000 = 20

1000cm3 250

20

ans in d above = Molar mass

n= Molar mass – 90

18 = (ans in whole Number)

e.g. 127 – 90

18 =2.055

=2.0

2 (a)

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| White residue ½  Colorless filtrate | Mixture of soluble and insoluble compounds 1mk |

|  |  |
| --- | --- |
| 1. **Observation** | **Inference** |
| White precipitate | CO32- SO42- SO32-, Cl-  Present |

(ii)

**Observation Inference**

White precipitate SO42-

Ignore – No effervescence present

Penalize – No white if mentioned SO42- should be mentioned in (i) above

(iii)

**Observation Inference**

White precipitate ½ Zn2+ Present 1mk

Dissolve in excess ½ Penalize fully for any contradictory ion

(b)

**Observation Inference**

Effervescence / bubbles CO32- , SO32- 1mk

of colorless gas 1mk 2 – ions mentioned – 1mk Present

1 – ion mentioned – 1/2mk

**Observation** **Inference**

White Precipitate Zn2+, Pb2+, Al3+

Dissolve in excess Present

(ii)

**Observation Inference**

Yellow precipitate Pb2+  present

Penalize – yellow only Penalize fully for any contradicting

Yellow solution ion mentioned

3 (a) White ½ crystals/ solid ½

**Observation Inference**

Dissolve ½ to form Polar compound ½mk

Colorless solution ½ Penalize fully for polar salt

1. **Observation Inference**

Purple color of acidified potassium 1mk C=C , or C=C , ½ ROH ½

Manganate changes to colorless Present

Accept for 1mk

KMnO4 is delocalized

**Observation Inference**

Effervescence of colorless gas 1mk H, 3O+ R – COOH

Present 1mk

H+, H30+, R - COOH

C) (i) Add/ put universal indicator to portion of e ½ mk

Match the color formed with the PH chart scale. ½

(ii)

**Observation Inference**

PH 1.0 ½ mk Strongly Acidic ½

Award ½ mk for PH=1 or

PH=2 or PH=3

Penalize fully for given in range penalize fully for strong acid