**CHEMISTRY 233/3**

**(PRACTICAL)**

**TERM 2 2022 OPENER EXAM FORM 4**

**MARKING SCHEME**

**QUESTION1**

**TABLE 1**

|  |  |  |
| --- | --- | --- |
| **VOLUME OF WATER IN THE BOILING TUBE**  | **TEMPERATURE AT WHICH CRYSTALS OF A APPEAR**  | **SOLUBILITY OF SOLID A g/100g of water** |
| 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**

1. Penalize ½ mk for each wrong value of solubility
2. Penalize ½ one for unrealistic temperature readings ½ above 900C and below 100C
3. **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.**

1. TREND – Tied to temperature i.e it should be decreasing (1mk)
2. Accuracy – tied to temperature when 4cm3 of water was added

Accept$\pm $20C of the school value.

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

1. Labeling (½mks)
* Both axis should be labeled if one is not or wrongly labeled award O
* Ignore units but if indicated they should be right otherwise penalize fully
1. Scale – (½mks)
* The actual plotting should be half of the page
* Paralyze fully if scale changes on the way both axis must be correct.
1. Plots (1mk)

4-5 correct plots award (1mk)

3 correct plots award (½mks)

Less than 3 correct plots award 0

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

Otherwise award 0

b) – award ½ mk for sloping or the graph

- award ½ mk for calculating

NB:

1. Award fully for calculation from correct graph even if not shown on the graph
2. Reject any value from a wrong graph.



**TABLE 2**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **1** | **11** | **111** |
| 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

1. **Complete table (1mk)**
* Complete table with 3 titration 1mk
* Incomplete table with 2 titrations ½ mk
* Incomplete table with 1 titration 0 mks

**Penalties**

1. Wrong arithmetic
2. Invented table
3. Unrealistic values i.e burette reading with more than 50cm3 and less than 1cm3withoutexplanation.
4. Unrealistic titre values

**NB: PENETICE ½ once**

**b) Use of decimals (1mk) (Tied to the 1st and 2nd row only)**

Accept 1 or 2 decimal places used consistently otherwise penalize fully

* If 2 dp are used the 2nd should be a “O” 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)

1. If within $\pm $0.1 of the school value award 1mk
2. If within$\pm $ 0.2 of S.V ward ½mk otherwise award 0

NB: Tick the candidate value that deserves a credit

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

**Conditions**

1. If 3 titration done but only two are consistence and averaged award 1mk
2. If 3 titration are done and consistency and averaged award 1mk
3. If two titration are done and are consistency and averaged award 1mk
4. If three consistency titration one done but 2 are averaged award 0
5. If three 3 titration are done and are inconsistence and are done averaged award zero
6. If two titration are done and are inconsistence and are averaged award 0

**PERALTIES**

1. Penalize ½ for wrong arithmetic
2. penalize ½mk if no working is shown and answer is correct
3. penalize fully if no working is shown and answer given is wrong
4. Accept rounding off or truncation to the 2nd 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.

1. If within$\pm $0.1 award 1mks
2. If with n $\pm $0.2 award ½ 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**

1. Calculate the number of moles of B used

1000-0.13

12.5 ?

= $\frac{12.5×0.13}{1000}$ $√$ ½

0.001625 moles $√$ ½

= 0.0040625 $√$ ½

1. Ans $\frac{b×5}{2}$

= 0.0040625 $√$ ½

1. Ans $\frac{c×1000}{25}$ $√$ ½

= 0.1626m $√$ ½

1. 5g 250cm3

20g – 1000

$$\frac{1×20}{0.1625}$$

= 123.07 $√$ ½

1. 90 + 18$x$ =123

 18$x$ = 33

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

 $x$= 1.83

 = 2

**QUESTION 2**

|  |  |
| --- | --- |
| 1. **OBSERVATION**
 | **INFERENCES** |
| No white precipitateFormed (1mk) | Ba2+ Ca2+ and Pb2+Absent Each ½ mks Penalize ½mk to a maximum of 1 ½ mks for any contradictory ion  |
|  |  |

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| 1. **OBSERVATION**
 | **INFERENCES**  |
| No white precipitate insoluble in excess NB: White precipitate ½ mk* Insoluble in excess ½ mk
 | Zn2+ absent (1mk) Penalize 1mk for each contradicting ion to a maximum of (1mk) |

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| 1. **OBSERVATION**
 | **INFERENCES**  |
| A white precipitate ½ Insoluble in excess ½  | Mg2+ present (1mk) * Accept Al3+ absent for ½mk
* Panelize 1mks for any contracting ion to a Maximum of 1mks
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| 1. **OBSERVATION**
 | **INFERENCES**  |
| A white precipitate is formed ½ mks  | C1-, So32- , SO4 2- and CO32- present – ½ mk each Penalize ½mk for any contradictory ion to a maximum of (2mks) |

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| 1. **OBSERVATION**
 | **INFERENCES**  |
| No white precipitate formed  | CI- Present (1mks)-accept SO42- AND SO32- OR CO32- absent for fully marks penalize 1mks for any contradictory ion to a maximum of 1mks* Three anions given – 1mk
* Two anions given -½mk
* One onion given – 0mk
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**QUESTION 3**

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| --- | --- |
| 1. **OBSERVATION**
 | **INFERENCES**  |
| No fizzing/bubbling /hissing (1mk) Reject -fissiling -Sizzling  | R- CooH Absent (1mk)NB: Ignore H3O+ & H+ |

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| 1. **OBSERVATION**
 | **INFERENCES**  |
| KMno4 get decolorizedOr KMno4 turns from purple to colorless (1mk)**Reject** * The solution turns colourless
* It turns colourless
 | C= C OR –C= C- (½mk)PresentR- OH Present (½mks) NB: Penalize ½mk for any contradictory group to a maximum of 1mks  |

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| 1. **OBSERVATION**
 | **INFERENCES**  |
| Yellow /orange bromine water does not get decolonized**Accept** It remains yellow or orange  | C= C or –C$≡$ C-**Absent** Penalize 1mk for any contradictory group to a maximum of 1mk  |

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| --- | --- |
| 1. **OBSERVATION**
 | **INFERENCES**  |
| K2CrO7 turns from orange to green(1mk)  | R-OH Present (1mk)Penalize 1mk for any contradictory group to a maximum of 1mk |