**BUTULA SUB – COUNTY JOINT EXAM.**

**CHEMISTRY – 233/3**

**MARKING SCHEME- PAPER 3.**

1. **PROCEDURE 1**

Table 1

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading (cm³) | 16.7 | 16.8 | 16.6 |
| Initial burette reading (cm³) | 0.0 | 0.0 | 0.0 |
| Volume of solution A used (cm³) | 16.7 | 16.8 | 16.6 |

Award a total of 5 marks distributed as follows.

A. **COMPLETE TABLE ……………………………………………………** (1 mark)

i) Complete table with 3 titrations done award. (1 mark)

ii) Incomplete table with 2 titrations done award. (½ mark)

iii) Incomplete table with 1 titration done. (0 mark)

**Penalties**

1. Wrong arithmetic / subtraction.
2. Inverted table.
3. Burette reading beyond 50cm² unless / explained.
4. Unrealistic value is less than 1cm or > 100cm³

Note

Penalise ½ mk each to a maximum of ½mark

B. **USE OF DECIMALS** ………………………………………………… 1 mark

[Tied to 1st and 2nd rows only]

1. Accept 1 or 2d.p used consistency otherwise penalise FULLY
2. If 2d.p are used the 2nd d.p digits should be 0.5 otherwise penalise FULLY.
3. Accept inconsistently in teh use of zero is initial burette reading i.e. 0, 0.0, 0.00

C. **ACCURACY.**

Compare the candidates correct titre value with the S.V.

Conditions.

1. If at least the value is within ± 0.1 cm³ of S.V award.
2. If no value is within ± 0.1cm³ of S.V but within ± 0.2cm³ of S.V. award . . . (½ mark)
3. If none is within ± 0.2cm³ award zero. (0 mark)

 d) **PRINCIPLES OF AVERAGING** . . . . . (1 mark)

Conditions.

i) If 3 consistent titration done and averaged award (1 mark)

ii) If 3 titrations are done but ONLY 2 are consistent and averaged award . . . . (1 mark)

iii) If only 2 titrations are done, are consistent and averaged . . . . . (1 mark)

iv) 3 titrations are done are consistent but only are averaged award . . . . . (0 marks)

v) 3 titrations done, inconsistent and averaged award. . . . (0 marks)

Penalties

i) Penalise ½mk for wrong arithmetic in the answer if error is outside ± 2 units in the 2nd d.p.

ii) Penalise ½ mk if no working is shown and answer given is correct.

iii) Penalise FULLY if no working is shown and answer given is wrong.

iv) Accept rounding off of answer to the 2nd d.p and truncation to 2dp but not to 1dp or whole number. Otherwise penalise ½mk for rounding off to 1dp or to a whole number.

NB

Accept the average volume if it works out exactly to a whole number or to 1d.p.

E. **FINAL ACCURACY**…………………………………………… (1 mark)

(Tied to average titre)

Compare the candidates correct average titre to the S.V.

Condition.

i) If within ± 0.1cm³ of S.V award (1 mark)

ii) If not within ± 0.1cm³ of S.V but within ± 0.2cm³ award . . . . (½ mark)

iii) If beyond ± 0.2 cm³ of S.V award (0 mark)

**B. I.**

II. Number of moles of solution A used.



III. Concentration of solution B in moles / litre.

250cm³ = 5.88g

1000cm³ = ?



Concentration of solution B



C.

I. Number of moles of B in 25.0cm³



II. Number of moles of B which react with

1 mole of solution A



**PROCEDURE 2**

Table 2 . . . . . . . 6 marks

DISTRIBUTION OF THE MARKS.

A. **Completing table . …………………………………………………………….. (3 marks)**

Conditions

i) Complete table with 12 correct entries .. . 3 marks)

ii) Incomplete table with 6 times with 4.5 correct rates. . . . . . . . . . . . . . . . . (2½ marks)

iii) Incomplete table with 6 times with 3 correct rates. . . . . . . . . . . . . . . . . . (2 marks)

iv) Incomplete table with 6 time with less than 3 correct rates . . . . . . . . . . . . . . . . (1½ marks)

v) Incomplete table with 4.5 times with 4 second correct rates. (1 mark)

vi) Incomplete table with 4.5 time with 3 correct rates. . . . . . . . . . . . . . . . . . . (½ mark)

vii) Incomplete table with 4.5 time with less than 3 correct rates . . . . . . . . . . . . . . (½ mark)

viii) Incomplete table with 3 time with 3 correct rates. . . . . . . . . . . . . . . . . . . . . . . (½ mark)

ix) Incomplete table with 3 times with less than 3 correct rates . . . . . . . . . . . . . . . . . (0 mark)

x) Where values are constant in time column award a maximum of ½ mark for complete table.

**B. Use of decimals………………………………………………………………………. (1 mark)**

Tied to time subject to at least 2 reading of time in each case.

2. Accept whole numbers or 1 or 2 decimal places used consistently for time column otherwise penalise FULLY (award 0 mark)

**C. Accuracy ……………………………………………………………………………… ( 1 mark)**

[Tied to time column only]

Compare the candidates time readings.

When temperature = 40°C with the school value.

i) If within ± 2.0 seconds of S.V award . . . . (1 mark)

otherwise penalise FULLY . . . . award. (0 mark)

D. **Trend………………………………………………………………………………… (1 mark)**

[Tied to time column only]

- Decrease in time from temp = 400C to temp =80°C.

Otherwise penalise FULLY..award. (0 marks)

**PROCEDURE 2**

b) GRAPH. . . . . . . . . (3 marks)

Awards as follows:

A. Labelling

Award ½ if both axes are correctly labelled

[1/Time sec -1 on vertical axis and temperature in °C on the horizontal axis.

Penalties.

i) Penalise FULLY for inverted axes.

ii) Penalise FULLY if wrong units are used otherwise ignore if units are omitted.

B. Scale

Conditions.

i) Area covered by the actual plots must be ½ of the grid provided for each axis.

ii) Scale intervals must be consistent.

iii) Scale chosen must accommodate ALL plots.

Note

Penalise fully if any of the above condition not met.

c) Plotting . . . . . . . . . (1 mark)

i) If 6 to 5 plots are correctly plotted. (1 mark)

ii) If only 3 - 4 are correctly plotted. (½ mark)

d) Lines / . . . . . . . . . . (1 mark)

Accept a curve passing through atleast 3 correctly plotted points as shown award.

(1 mark)



1(f) 2 marks awarded as follows

- For showing 1/T currently on the graph (½ mark)

- For stating the correct reading . . . .½ mark

- for using it (correct reading . . . . . .½ mark

- Correct answer.

g) Rate of reaction is directly proportional to increase in temperature.

NB- Correct answer MUST be tied to the correct trend otherwise penalise fully. (0 mark)

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| a)   * White residue🗸½ * Colourless filtrate🗸½ | * Solid P contains a soluble and insoluble salt.🗸½ * Coloured ions (Fe2+, Fe3+, Cu2+) absent🗸½ |
| b) i) No white ppt formed🗸I | absent  Atleast 4 correctly inferred – 1mark  2 -3 correctly inferred – ½ mark  0 – 1 0mark  Penalize ½ mark for any contradictory ion to a maximium of 1mark |
| ii) Burns with yellow flame🗸I | Na+ confirmed🗸I |
| iii) White ppt |  |
| iv) Purple acidified potassium manganate (VI) decolourised.🗸I   * Penalise if the purple colour of acidified potassium manganate(VII) is not mentioned | *confirmed*🗸½ |
| c) i) Effervescence//production of gas bubbles//fizzing🗸½  - colourless solution formed🗸½ | 🗸½   * Coloured ions (Fe2+, Fe3+, Cu2+) absent🗸½ |
| ii) white ppt🗸½; soluble🗸½ | Zn2+🗸½ |

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| 1. Burns with a yellow sooty flame//smoky//luminous🗸I |  |
| 1. i) *PH of 1,2,3*🗸½ | Strongly acidic🗸½ |
| ii) ) Effervescence//production of gas bubbles//fizzing🗸I | Acidic 🗸I |
| iii) Purple acidified potassium manganate (VI) decolourised.🗸I   * Penalise if the purple colour of acidified potassium manganate(VII) is not mentioned |  |