

1. Procedure 1: Table 1

1. Complete table……………………………………………………… (1mk)

(Tied to 1st column of temperature readings only)

**Conditions**

* Complete table with 4 readings (1mk)
* Incomplete table with 2 – 3 readings ( ½ mk)
* Incomplete table with less than 2 readings ( 0 mks)

**Penalties**

* Penalise ½ mk once for unrealistic temperature readings i.e. below 200C as initial reading.
* Penalize ½ mk if temperature readings are all the same.

b) Use of decimals ………………………………………………… (1mk)

(tied to 1st column only)

**Conditions**

* Award 1mk for temperature readings given as whole numbers consistently.
* Award 1mk for temperature readings given to 1 d.p of .0 or .5 consistently.
* Award 1mk for temperature readings given to 2 d.p of .00, .25, .50 or .75 consistently

***NB: Penalise fully if none of the above conditions are met.***

c) Accuracy - (tied to 1st reading only)………………………. (1mk)

Award 1mk if within + 20C to S.V otherwise penalize fully

d) Trend …………………………………… …………………….………..(1mk)

Award 1mk if continuous drop otherwise penalize fully

e) Solubility …………………………………………………………….. (2mks)

( tied to 2nd column)

Award ½ mk for each reading

Condition/penalties

Penalise 1/2mk once for value given to less than 1 dp unless it works out exactly

ii) **Graph …………………………………….** (3mks)

* labeling of axes …………………………………………..½ mk

penalize fully for inverted axes

* scale ……………………………………………………( ½ mk)

Award ½ mk if plots occupy atleast half of the grid

* Plotting ………………………………………………..(1mk)

3 or 4 points correctly plotted - (1mk)

2 points correctly plotted - ( ½ mk)

Less than 2 points - ( 0mks)

* Curve…………………………………………….. ……….(1mk)

Smooth curve of best fit otherwise penalize fully

iii) Correct showing on graph - ( ½ mk)

correct reading - ( ½ mk)

**Procedure II: Table II**

1. Complete table ……………………………………………………………….(1mk)

Complete table with 3 titrations done – 1mk

In Complete table with 2 titrations done - 1mk

incomplete table with 1 titration done – 0mks

Penalize ½ mk once for

* Inverted table
* Wrong anthmetic
* Unrealistic titre values ( below 1 or above 50 unless explained)

1. Use of decimals………………………………………………………………..1mk

* Accept 1 or 2 d.p uses consistently otherwise penalize fully
* If 2 d.p used the 2nd d.p should be either 0 or 5 otherwise penalize fully

c) Accuracy ……………………………………………………………………….1mk

Compare the candidates titre values with the S.V

* If any value is within +- 0.1 award 1mk
* If within + -0.2 award ½ mk
* If beyond +- 0.2 award zero mark

1. Principles of averaging ……………………………………………………….1mk

1f 3 consistent titrations done and averaged 1mk

If 3 titrations done but only 2 are consistent and averaged (1mk)

If only two titrations done, are consistent and averaged (1mk)

If 3 titrations done and are consistent but only 2 are averaged ( 0mk)

If 3 inconsistent titres averaged ( 0mk)

1f 2 inconsistent titres averaged (0mk)

1. Final answer accuracy……………………………………………………………..1mk

Compare the candidates correct average titre with S.V

* If within +- 0.1 of S.V (1mk)
* If within +- 0.2 of S.V ( ½ mk)
* If beyond +- 0.2 of S.V ( 0mk)

Calculations

ii) 2moles \_\_\_\_\_\_\_\_ 1000cm3

? \_\_\_\_\_\_\_\_ 25cm3

25 x 2 ½ = 0.05 moles ½

1000

iii) 0.05 moles \_\_\_\_\_\_ 250cm3

? \_\_\_\_\_\_\_\_\_ 1000cm3

1000 x 0.05 ½ = 0.2 moles 1 litre

250

iv) Mole of base

0.2 moles \_\_\_\_\_\_ 1000cm3

? \_\_\_\_\_\_\_ 25cm3

25 x 0.2 = 0.005 moles

1000

v) 0.0025 \_\_\_\_\_\_ average volume

? \_\_\_\_\_\_ 1000cm3

0.0025 x 1000 ½ = correct answer ½

Average

vi) 6.2g \_\_\_\_\_ 250cm3

? \_\_\_\_\_ 1000cm3

6 x 1000 ( ½ ) = 24.8g ( ½ )

250

Answr in (v) = 24.8g

RFM

RFM = 24.8 ( ½ ) = correct answer in (v) ( ½ )

**Note:**

i) Answer for moles should be given to at least 4 d.p unless it works out exactly other wise penalize ½ mk for rounding off to less than 4 d.p

ii) Answer for concentration in moles per litre should be given to at least 3 d.p unless it works out exactly otherwise penalize ½ mk for rounding off to less than 3 d.p.

iii) Units may or may not be given but if given must be correct otherwise penalize ½ mk for wrong units.

iv) Average volume should be given to at least 2 d.p unless it works out exactly to less than 2 d.p otherwise penalize ½ mk for rounding off to less than 2 d.p.

v) Answer for (vi) above should be between 121- 144 otherwise penalize ½ mk for answer outside this range.

2. You are provided with solid E.

(i) Add sodium hydroxide solution dropwise until in excess

|  |  |
| --- | --- |
| Observations | Inferences |
| No white ppt  (1/2 mark) | Pb2+,✓ ½ Zn2+ or Al3+ ions absent ✓1mk  Only 2 correct…(1/2 mark)  Only 1 correct….. 0 mk  Ignore sodium ions   1. mark) |

(ii) To the second position dip a clean glass rod and hold its tip in the non-luminous Bunsen burner flame.

|  |  |
| --- | --- |
| Observations | Inferences |
| Yellow flame  1 mark | Na+ present  Ignore unsaturation.  1 mark |

1. To the third portion add two drops of barium nitrate solution

|  |  |
| --- | --- |
| Observations | Inferences |
| White ppt  1 mark | SO2-4 ions, CO2-3, SO2-3 present✓1mk  Only 2 correct….………. (1/2 mark)  Only 1 correct…………….0 mk  Penalize 1/2 mark for any contradictory ion upto max of 1 mk.  1 mark |

1. To the fourth portion add two drops of acidified potassium manganite (VII)

|  |  |
| --- | --- |
| Observations | Inferences |
| Purple potassium manganate (VII) is decolourised.  1 mark | SO2-3 present✓1mk  Penalize fully for any contradictory ion.  1 mark |

b. Put the residue in a boiling tube and add about 5 cm3 of dilute nitric (V) acid provided and shake thoroughly.

|  |  |
| --- | --- |
| Observations | Inferences |
| Bubbles  1/2 mark | CO3 2- and SO32- present…… 1mk  Only 1 correct….1/2 mk  Penalize ½ mk for ay contradictory ion upto a max of 1 mk.  1 mark |

Divide the solution into two equal portions.

1. To the first portion add sodium hydroxide solution dropwise until in excess

|  |  |
| --- | --- |
| Observations | Inferences |
| White ppt soluble in excess  1 mark | Pb2+,✓ ½ Zn2+ or Al3+ ions present.  Only 2 correct…………… 1/2 mark  Only 1 correct……………..0 mk  1 mark |

1. To the second portion add two drops of sodium iodide solution.

|  |  |
| --- | --- |
| Observations | Inferences |
| Yellow ppt  1/2 mark | Pb2+ present.  Penalize fully for any contradictory ion.  1/2 mark |

3. You are provided with liquid L

a) Place about 3 drops of liquid L on a watch glass and ignite using a Bunsen burner flame.

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| --- | --- |
| Observations | Inferences |
| Burns with blue flame  1 mark | absent… 1mk  Saturated organic compound present……1 mk  1 mark |

1. Divide the remaining liquid L into four portions in test tubes.
2. To the first portion, add about 6cm3 of distilled water and shake well.

|  |  |
| --- | --- |
| Observations | Inferences |
| Miscible to form a colourless solution  ½ mark | Polar liquid.  ½ mark |

1. To the second portion, add the sodium hydrogen carbonate solid provided.

|  |  |
| --- | --- |
| Observations | Inferences |
| No bubbles  ½ mark | R – COOH absent....1 MK  H+ absent………..................½ mark  1 mark |

1. To the third portion, add two drops acidified potassium manganite (VII) solution.

|  |  |
| --- | --- |
| Observations | Inferences |
| Purple potassium manganate (VII) turns colourless  ½ mark | ….½ mark  R-OH PRESENT……. ½ mark  Penalize ½ mark for any contradictory ion upto max of 1 mk |

1. To the last portion, add two drops acidified potassium dichromate (VI) solution.

|  |  |
| --- | --- |
| Observations | Inferences |
| Orange potassium dichromate turns green  1 mark | R – OH…………1mk  Penalise fully for any other contradictory ion.  1 mark |