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 ✓1mkOnly 2 correct…(1/2 mark) Only 1 correct….. 0 mkIgnore sodium ions1. 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+ presentIgnore 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✓1mkOnly 2 correct….………. (1/2 mark) Only 1 correct…………….0 mkPenalize 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…… 1mkOnly 1 correct….1/2 mkPenalize 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 markOnly 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.

|  |  |
| --- | --- |
| Observations | Inferences |
| Burns with blue flame 1 mark | absent… 1mkSaturated 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 MKH+ 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 markR-OH PRESENT……. ½ markPenalize 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…………1mkPenalise fully for any other contradictory ion. 1 mark |