**CHEMISTRY 233/3**

**PRACTICAL MARKING SCHEME 2019**

1. **TABLE I**

|  |  |  |
| --- | --- | --- |
| *Volume of water in boiling tube(cm3)* | *Temperature at which crystals of solid A first appear (oC)* | *Solubility of solid A (g/100g of water)* |
| *4* | *66* | *112.5* |
| *6* | *56* | *75.0* |
| *8* | *49* | *56.0* |
| *10* | *44* | *45.0* |

6marks

1. ***Complete table.........1mk***
* *complete table 1 mark otherwise penalise fully*
* *Penalise ½ mk if all temperature readings given in the table are constant.*
* *For initial temp, treat temp. below 40oC and those above 80o C as unrealistic and penalise ½ mk once.*

*ii)* ***Use of decimals.........*** *(Tied temperature readings)................. 1mk*

*Accept ONLY if all readings are recorded CONSISTENTLY as whole numbers or ONE decimal point of* ***.****0 or* ***.****5 other wise penalise fully.*

*iii)* ***Accuracy (AC)........*** *1mk*

 *Compare candidates first temperature reading with the SCHOOL VALUE / CENTRE VALUE. If within + 2oC of the S.V /C.V award 1 mk otherwise penalise fully.*

*iv)* ***Trend....*** *1 mk*

*Award 1mk for continuous decrease in the temperature.*

*v)* ***solubility calculation............2mks***

*Award ½ mk for each value of solubility correctly calculated*

b)

**Graph** .................. 3mks

Marks distributed as follows

***(a) L.A ................................................ ½ mk***

*Conditions / Penalties*

1. *Penalise fully for inverted axis.*
2. *Penalise fully for wrong units: if no units are given ignore and award fully .*
3. *If only one axis is labelled / units given, condition (ii) above is applied.*

***(b) Scale.......................................................½ mk***

1. *Area occupied by the ACTUAL plots MUST be at least ¾ of the graph paper provided.*
2. *Scale intervals MUST be constant / consistent.*
3. *The scale chosen must be able to accommodate all the plots / points.*

*(c ) Plotting ................................................. 1mk*

1. *Award 1mk if 4 points are correctly plotted.*
2. *Award ½ mk if only 3 points are correctly plotted: otherwise if less than 3points are plotted correctly: award 0 mk.*
3. *If scale intervals are inconsistent then accept plots if any within the FIRST interval only.*
4. *Accept plots even if the axis are inverted and award accordingly.*

***d) shape/ curve...............................................................1mk***

*Award 1mk for descending curve/ line passing through all the plotted points.*

*Otherwise penalise fully.*

C ii) Showing on the graph ½ mk

 Correct answer (630C+1) ½ mk

 iii) Showing on the graph ½ mk

 Correct answer (72+1g/100g H2O) ½ mk

**TABLE II (5 marks )**

|  |  |  |  |
| --- | --- | --- | --- |
|  | *I* | *II* | *III* |
| *Final burette reading (cm3)* | *15.0* | *15.0* | *15.0* |
| *Initial burette reading (cm3)* | *0.0* | *0.0* | *0.0* |
| *Volume of solution A used (cm3)* | *15.0* | *15.0* | *15.0* |

*CT lmk*

*DP lmk*

*AC 1mk*

*PA 1mk*

*FA lmk*

*1. Complete table: penalize to a maximum of ½ mk for:*

*• Inverted table*

*• Wrong arithmetic*

*• Burette readings beyond 50cm3 except where explained*

*• Unrealistic titre values (below 1cm3) and above 50cm3*

*2. Use of decimals*

*• One decimal or 2 decimal places throughout otherwise penalize fully*

*• For use of 2 decimal places, the 2nd digit after the decimal is either ‘0’ or ‘5’ otherwise penalize fully.*

*3. Accuracy*

*• Compare any of the teachers’ titre value. If any*

*• Within ±0.1 of T.V...lmk*

*• Within ±0.2 of T.V. ½ mk*

*• Non-within ±0.2 of T.V....Omk*

*4. Averaging*

*• If 3 Averaged and within ±0.2 of each... lmk*

*• If 2 averaged and within ±0.2 of each....1 mk*

*• Otherwise penalize fully for averaged values outside ±0.2 of s.v*

*5. Final answer*

 *Compare teacher’s averaged titre*

*• If within±0.1 of T. average titre....lmk*

*• If within ±0.2 of T. average titre.. ..½mk*

*• If outside of ±0.2 of T. averaged titre 0mk*

1. Average volume=$ \frac{v1+v2+v3}{3}$ (transferred to table II as shown above)

**Calculations**

1. I) No of moles of NaOH in 25 cm3 of solution = molarity x volume /1,000

 = 0. 3 x ans(a) /1000***🗸 ½ mk*** = ans ***🗸 ½ mk***

 II) No of moles of dibasic acid used

 Mole ratio = 2: 1

 = ½ x ans ***🗸 ½ mk*** = Ans ***🗸 ½ mk***

 III. $\frac{100 x ans ii (II)}{ans (i) }$ ***🗸 ½ mk*** = ans***🗸 ½ mk***

1. I) $\frac{4.5}{ans ii (II) }$***🗸 ½ mk***

 = final ans ***🗸 ½ mk***

 **II) 2 + X+ 2(18) = Ans ii (III) *🗸 ½ mk***

 **X = Ans ii (III) - 38*🗸 ½ mk***

2. You are provided with **solid E** containing two cations and one anion. Carry out the tests given and record your observations and deductions in the space provided.

 (a) Place half of solid **E** in a clean dry test-tube and heat gently then strongly. Test any gases produced with both blue and red litmus papers.

|  |  |
| --- | --- |
| Observation | Deductions |
| * *Blue litmus remains blue*
* *Red litmus turns blue****🗸 ½ mk***
* *Colourless liquid forms on cooler parts****🗸 ½ mk***
* *White residue****🗸 ½ mk***

*( 2 mks)* | * *NH4+ (tied to Red litmus turns blue)* ***🗸 ½ mk***
* *Hydrated salt (tied to Colourless liquid forms on cooler parts)* ***🗸 ½ mk***

 *( 1 mk)* |

(b) Place the remaining solid E into a boiling tube. Add 10cm3 of distilled water and shake thoroughly. Divide the resultant mixture into 4 portions.

(i) To the first portion add a few drops of sodium hydroxide solution till in excess.

|  |  |
| --- | --- |
| Observation | Deductions |
| *White precipitate* ***🗸 ½ mk*** *dissolves in excess****🗸 ½ mk 🗸 1 mk***( 1 mk) | Zn2+, Al3+, Pb2+ ***3 mentioned 🗸1 mk*** ***2 mentioned 🗸 ½ mk*** ***1 mentioned 🗸0 mk****Penalize fully for any contradictory ion*( 1 mk) |

(ii) To the second portion, add a few drops of ammonium hydroxide solution till in excess.

|  |  |
| --- | --- |
| Observation | Deductions |
| *White precipitate* ***🗸 ½ mk*** *insoluble in excess****🗸 ½ mk 🗸 1 mk***( 1 mk) |  Al3+, Pb2+***2 mentioned 🗸1 mk*** ***1 mentioned 🗸 ½ mk****Penalize fully for any contradictory ion* ( 1 mk) |

(iii) To the third portion, add 2-3 drops of dilute hydrochloric acid.

|  |  |
| --- | --- |
| Observation | Deductions |
| *No White precipitate****🗸 1 mk******No effervescence***( 1 mk) |  Pb2+ absent*SO32- , CO32- absent*(1 mk) |

(iv) To the third portion, add 2-3 drops of Lead (II) nitrate solution.

|  |  |
| --- | --- |
| Observation | Deductions |
| *White precipitate* ***🗸 1 mk***( 1 mk) | *SO42- ,Cl-* ***2 mentioned 🗸1 mk*** ***1 mentioned 🗸 ½ mk****Penalize fully for any contradictory ion*(1 mk) |

 (v) To the third portion, add a few drops of Barium chloride solution.

|  |  |
| --- | --- |
| Observation | Deductions |
| *White precipitate****🗸 ½ mk***( ½ ) mk) | *SO42-* ***🗸 ½ mk****Penalize fully for any contradictory ion*( ½ ) mk) |

3) You are provided with solid **F**. Carry out the tests below. Record your observations and inferences in the spaces provided.

i). Place about half of solid **F** on a metallic spatula and burnt it using a non-luminous flame

|  |  |
| --- | --- |
| Observations  | Inferences  |
| *Burns with yellow smoky/sooty/luminous flame* *(1mk)* | *,* ***🗸1 mk*** *Any one mentioned (1mk)* |

ii) Place the remaining solid **F** in a clean boiling tube and add about 5cm3 of water and shake thoroughly.

1. To about 2cm3 of the solution **F**, put the universal indicator paper provided to determine its PH.

|  |  |
| --- | --- |
| Observation  | Inference  |
| *pH = 4 -6* *( 1 mk)* |  *Weakly acidic***🗸1 *mk*** *Reject weak acid ( ½ mk)*  |

II) To about 2cm3 of solution **F**, add three drops of acidified potassium manganate (VII) solution

 and warm.

|  |  |
| --- | --- |
| Observation  | Inference  |
| *Purple KMnO4 solution decolourised* *(1mk)* | , **🗸 ½ *mk*** , R- OH**🗸 ½ *mk*** *(1mk)*  |

1. To about 2cm3 of solution **F**, add solid sodium hydrogen carbonate.

|  |  |
| --- | --- |
| Observation  | Inference  |
| *Effervescence occurs/ bubbles of colourless gas* *(1mk)* | *-COOH / H+/ H3O+* *(1mk)**Any one mentioned, award 1 mk*  |