**SCHOOL BASED EXAMINATION 2019**

**CHEMISTRY 233/3**

**MARKING SCHEME**

**JULY/AUGUST 2019**

1. Table 1 ………………………………… (5mks)

**A. Complete table** ……………………. (1mk)

**Conditions:** i) Complete table with 3 titrations done (1mk)

 ii) Incomplete table with 2 titrations done (1/2mk)

 iii) Incomplete table with only one titrations done (0mk)

**Penalties** i) Wrong arithmetic

 ii) Inverted table

 iii) Burette readings beyond 50.0cm3 unless explained.

 iv) Unrealistic titre valves i.e. less than 1.0cm3 and in hundred

**N/B: Penalize** 1/2 mk for EACH to a max penalty of 1/2 mk i.e. penalize 1/2mk once.

**B. Use of decimals** …………….. 1mk

 i) Tied to 1st and 2nd rows only

 Condition/Penalties: Accept or 2 d.p. used consistently otherwise penalize FULLY (award 0mk)

 ii) If 2 d.p. are used the 2nd decimal place must be a zero / 5 otherwise penalize FULLY.

 iii) Accept inconsistency in the use of zeros as initial burette reading e..g 0. 0.0, 0.00

**C. Accuracy 1mk**

Compare the candidate correct titre valves with the S.V (teacher’s correct average titre) & award as follows.

i) If at least one is within + 0.1 of S.V. then award 1 mk

ii) If none is within + 0.1S.V but at least one is within +0.02 of S.V award 1/2 mk

iii) If no value is within + 0.2 of S.V award 0mk

 (Tick the correct valve in the table that earns credit)

**N/B:** If there was wrong arithmetic or no subtraction done in the table compare correctly worked out valued with S.V. and award accordingly.

i) Where there 2 possible S.V from the teachers’ results BTH should be written on candidates

 scripts and one closer to the candidate value used for awarding accuracy and final accuracy.

ii) If no S.V is given or cannot be worked out from the teacher’s titre valves as per the principles of averaging then;

All candidates correct average titre values should be written down and CLOSE values picked

for averaging per session i.e. sampling to be done.

 **D. PRINCIPLES OF AVERAGING**  1mk

 i) If 3 consistent titrations done and averaged 1mk

 ii) If 3 titrations done but ONLY 2 possible and are average 1mk

 iii) If only 2 titrations done, are consistent and averaged 1mk

 iv) If 3 inconsistent titrations are done and averaged 0mk

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

 vi) If 2 titrations inconsistent and averaged 0mk

 vii) If only ONE titrations done 0mk

 **Penalties**

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

 ii) Penalize 1/2 mk for no working shown but answer given is correct.

 iii) If answer given is correct but from WRONG working award 0 mk

 e.g. 20 + 20 + 20 = 20 x 3

 N/B: (a) Accept rounding off/truncation of answer to 2 d.p e.g. 20.666 as 20.66 or

 20.67.

 (b) Otherwise 1/2 mk for rounding off to 1 d.p. or whole number e.g. 20.6 or 20.7 or 21.

 c) Accept answer if works out exactly to 1 d.p. or whole number

 **F FINAL ACCURACY………………….. 1MK**

 **(Tied To The Correct Average Titre)**

 Compare the candidates’ correct average titre value with S.V and award as follows:

 i) If within +0.01 of the S.V. 1mk

 ii) If not within +0.10 of the S.V but within +0.2 of the S.V 1/2 mk

 iii) If not within +0.2 of the S.V. 0mk

 N.B: If there are 2 possible correct average titre values from the candidates results use the

 CLOSEST to the S.V. and award accordingly.

 ii) If wrong principles of averaging is used by the candidate PICK the correct values (if any)

 average and award accordingly

 e.g. 25.0, 25.0, 24.8, 25.0 + 25.0 = 25.0 CORRECT 25 + 25 + 24.8 = 24.93

 2 3

 Calculations

* b) i) Moles of Q in 25cm3 = 2 x 25 ✓ 1

 1000

 = 0.05 ✓ 1

 Mole of P in 250cm3 = Mole of Q in 25cm3 ✓ 1/2 = 0.05 ✓ 1/2

 ii) 0.05 x ans (a) ✓ 1

 250

 = Correct answer ✓ 1

 c) i) HCl (aq) + NaOH(aq) NaCl(aq) + H2O(l)

* Mole ratio of HCl : NaOH = 1 : 1 ✓ 1
* .: Moles of NaOH = Moles of HCl in P = answer b(ii) ✓ 1

 ii) Molarity of R = 1000 x ans c(i) ✓ 1/2

 25

 = Correct ans

 RFM of NaOH = 23 + 16 + 1 ✓ 1/2

 = 40 ✓

 .: Mass of NaOH = Correct ans above x 40 ✓ 1/2

 iii) % purity = ans c(ii) x 100 ✓ 1

 12

 = correct ans ✓ 1

**2. Table II** (6mk)

 A. Complete table …………………………. (3mks)

 Distributed as follows;

 i) All the values of temperature written (1mk)

 ii) All the solubility values calculated (2mks)

 B. Decimal place (1mk)

 Tied to the values of temperature

 i) Can be written consistently as whole numbers.

 ii) If written to 1 decimal place, the value after the decimal point should either “0” ie. Zero or “5”

 C. Accuracy ……………………… (1mk)

 Tied to the first value of temperature.

 Credit fully if within + 20C of the school value.

 D. Trend (1mk)

 Tied to decreasing valves of temperature.

 Questions

 i) Graph (3mks)

 - Labelling of axes 1/2mk

 NB: Units not a must but if there must be correct.

 Scale 1/2mk

 NB:

* Should occupy more than half of the grid given.
* Should accommodate all the points in the table.
* Interval should be consistent.
* Plotting all the points as they are from the table 1mk
* Drawing the expected graph 1/2mk

ii) - Showing the solubility at 450C on the graph 1/2mk

* Correct reading 1/2mk

NB: If not shown on the graph but correctly read credit fully i.e. 1mk

|  |  |  |
| --- | --- | --- |
| **3. a)** | **Observations** | **Inferences** |
|  i) | White solid dissolves✓ 1/2  to A colourless solution✓ 1/2  | Cu 2+, Fe 2+ , Fe 3+ absent OR 1mkAll Na+ K+ NH4+ present |
|  ii) | Formation of a white precipitateWhich dissolves in excess NaOH | Al 3+, Zn 2+, Pb 2+ present3 ions mentioned ………….. 1mk2 ions mentioned …………….1/2mk1 ion mentioned ……………..0mk |
|  iii) | Formation of a whitePrecipitate ✓ 1/2 insoluble ✓ 1/2 in excess | Al 3+, Pb 2+ present |
|  iv) | Formation of a white precipitate | Pb 2+ present |
|  v) | Formation of a yellow precipitate | Pb 2+ present |
| **b)** | **Observation** | **Inferences** |
| i) | Dissolves forming a homogenous solution// no formation of two/separate layers// colourless solution formed | Polar organic Compound |
| ii) | Purple H+ / KMnO4 remainsPurple //H+/KMNO4 is not decolourised. |   C C present ✓ 1/2  or C C , C C absent R OH absent ✓ 1/2   |
| iii) | Effervescence occurs // bubbles // fizzing// produced | H+ // H3O+ // COOH presentNote: Accept for 1/2 mk acidic solution |
| iv) | pH = 4 or pH = 5 any one Reject if given as a range | Weakly acidic |