**Chemistry pp3 Marking scheme**

***QUESTION 1 .***

***Table 1.***

|  |  |  |  |
| --- | --- | --- | --- |
| ***Titre number*** | ***I*** | ***II*** | ***III*** |
| ***Final burrette reading (cm3)*** |  |  |  |
| ***Initial burrette reading (cm3)*** |  |  |  |
| ***Vol. of soln. K used cm3*** | **a** | ***b*** | ***c*** |

***CT = 1***

***OP =1***

***AC =1***

***PA =1***

***FA = 1***

***5***

**Marking points**

**Complete table (CT) ……..……….1mrk**

The table should be completed.

Penalize the following errors if any occurs.

* Arithmetic error in subtraction.
* - Values recorded beyond 50cm3
* - Inversion of table
* Penalize ½ mk only on any one of these errors***.***

***Decimal point (d.p)………………… 1mk***

All values to be recorded to 1d.p or

All values to be recorded to 2dp second decimal value being 0 or 5 only

Award 0-mark if whole numbers used or 2dp are used.

**Accuracy mark (A)……………………1mrk**

Consider any one candidates’ titre if within ± 0.10cm3 of school value award 1mk.

 If it is ± 0.11 to 0.20 award ½ mk. If beyond 0.20 award 1mk

**Averaging principle (A)………………….1mrk**

Three titres to be averaged if within ±0.1cm3 to one another.

Two titres can only be arranged if they are consistent.

N/B- If a student averages two titres when three are consistent award 0mk.

**Final answer (F. A)………………………1mrk**

If averaged titre is within 0.0 to 0.10cm3 of S.V award 1mk

0.11 to 0.2cm3 of s.v award ½ mk

If beyond 0.20cm3 award 0mk.

***Summary***

***Complete table (CT) = 1mk***

***Correct use of decimals(dp) = 1mk***

***Accuracy (AC) = 1mk***

***Averaging (PA) = 1mk***

***Final answer (FA) = 1mk)***

***5mks***

**N/B – school vale (SV) teacher to perform practical to obtain school value.**

**Calculations**

**Procedure I**

1. ***a+ b + c = correct answer***

 ***3***

1. Concentration of Na2CO3, Solution Q.

R. F. M of Na2CO3 = (23x2) + 12 + (16x3) = 106

$$\frac{42.4 g}{106}$$

= 0.4M

1. Moles of Na2CO3 in 25cm3 that reacted.

$$\frac{ 0.4x25}{1000}$$

 = 0.01moles.

1. Moles of Hydrochloric acid that reacted with 25 cm3 of solution Q.

Na2CO3 + **2**HCl $\rightarrow $**2**NaCl + CO2 + H2O

Mole ratio of Na2CO3 : HCl is **1** :**2**

Moles of HCl = 0.01 x 2 = 0.02 moles

1. Concentration of hydrochloric acid, solution A

$$\frac{ 0.02 X 1000 }{ans in a}$$

 = correct answer

**Procedure II**

TABLE 2

 (i) Complete table 1 mk

 (ii) Accuracy to S.V. ½ mk

 (iii) Decimal ½ mk

 (iv) Trend. 1mk

 .

**Distributed as follows:-**

**Complete table**

- All columns filled 1mk

- Any 7 correctly filled ½mk

- Otherwise penalize fully

**Accuracy.................**

Compare candidate’s initial temperature with S.V; if with ±1units award ½ mk,

otherwise penalize fully.

**Use of decimals.** Award ½ mkfor decimal consistency, otherwise penalize fully.

**Trend........................1mk**

Award 1mk for, increase in temperature and**at least** a drop.

a) Graph

Temp

Vol. of HCl added

Labeling – ½ mk

Scale – ½ mk

Plotting – 1 mk

Shape – 1 mk

b) (i) ∆T shown in graph - (½ mk )

 Correct answer from graph - (½ mk

 (ii) - Shown in graph (½ mk)

 - Correct reading (½ mk)

N/B: **Wrong lines on the graph earns no mark on b) (i) and (ii)**but score on the subsequent questions when transferred correctly.

c) ∆H = MC∆T = (25 + c(ii) x 4.2 x c (i) ½mk

 Correct answer ½

 d) Moles = ans in procedure I (e) x ans in proc II b (ii) ½ = correct ans ½

 1000

 f) Molar heat = 1 x ans in (c). ½

 ans. (d)

 = Correct answer. ½

 Penalize ½mk for missing sign and also for wrong units

**2. Solid D**

|  |  |
| --- | --- |
| Observations | Inferences  |
| (a) - Colorlessliguid formed at the upper cooler parts of the boiling tube. **√½**- Moist blue litmus paper turns red**√½**While red litmus paper remains red.**√½**-White residue. **√½** Max 2 mrks | Hydrated salt **√1**Acidic gas produced/SO32-,CO32-, SO42-HCO3-**√1** 4 ions = 1mk3 ions = ½ mkLess than 3 = 0 mkN/B: Hydrated tied to colorless liquid formed. Max 2mks |
| b) i) –White precipitate **√½**soluble in excess **√½** | Zn2+, Al 3+, Pb2+present **√1**3 ions = 1mk2 ions = ½ mk1 ion = 0mk**Penalties**- Penalize ½ mk for every contradictory ion to a max of 1mk |
|  ii) - White ppt**√½** - Insoluble in excess**√½** | Al 3+, Pb2+present **√1** |
|  iii) No white precipitate **√½** No effervescence/ bubbles**√½** | Al 3+ present √**½**SO32-CO32-absent**√½**  |
| iv) – White precipitate,√1 | SO42- present √1 |

**3**a)**Solid P**

|  |  |
| --- | --- |
| Observation | Inferences |
| Burn with yellow sooty flame**√1**Yellow flame **√½** | Unsaturated organic compound. √1 Or –C = C– or – C ≡C–Rej C = C or C ≡ C - Penalize fully for any contradiction |

b)

|  |  |
| --- | --- |
| Observation | Inferences |
| Dissolve**√½** forming a colorless solution | Polar organic compound. **√½**Rej. Polar hydrocarbon  |

i)

|  |  |
| --- | --- |
| Observation | Inferences |
| pH= 4, 5 or 6**√½** | Weakly acidic.**√½**Rej: weak acid |

ii)

|  |  |
| --- | --- |
| Observation | Inferences |
| Purple color of H+/ KMnO4 changes to colorless. **√½** | R-OH, –C = C– or – C ≡ C -**√1** 2 Mentioned, ½ mks1 mentioned, 0 mkPenalize fully for any contradiction |

 iii)

|  |  |
| --- | --- |
| Observation | Inferences |
| Effervescence observed**√½** | R-OH, RCOOH **√1**1 mentioned ½  |

iv)

|  |  |
| --- | --- |
| Observation | Inferences |
| Effervescence observed.**√½** | RCOOH**√½** |