**MARKING SCHEME**

**233/3**

**CHEMISTRY**

**MARCH/APRIl**

***Kenya Certificate of Secondary Education (K.C.S.E.)***

1. **Table 1**

 **Complete table** …………………………………… 1mark

 **Conditions:**

1. Complete table with 3 titrations done ……. 1 mark
2. Incomplete table with two titrations done….½ mark
3. Incomplete table with only one titration done ….0 mark

**Penalties:**

1. Wrong arithmetic
2. Inverted table
3. Unrealistic values i.e less than 1 cm3,or in 100s
4. Burette readings ˃50 cm3,unless explained

Penalize ½ mark each to a maximum of ½ mark, i.e, penalize ½ mark ONCE.

 **Use of decimal places**……………………………………… 1 mark ( Tied to

 1st and 2nd row only)

1. Accept 1 or 2 decimal places used consistently, otherwise penalize FULLY.
2. If two decimal places are used, the 2nd must be a “0” or a “5”, otherwise penalize FULLY.
3. Accept the inconsistency in the use of zeros in the initial burette readings e.g 0.0,0.00, 00.0

 **Accuracy**…………………………………………………….. 1 mark

 Compare candidate’s correct titre value with school value (s.v) and tick () if it earns a mark and award accordingly.

 **Coditions:**

1. If at least one titre value is within ± 0.1 cm3 of s.v

 award…………………………………………… 1 mark

1. If no value is within ± 0.1 cm3 of s.v but there is at least one within ±
	1. cm3 award ……………………………………… ½ mark
2. If no titre value is within ± 0.2 cm3  award………………… 0 mark

**Principles of averaging**………………………………………………… 1 mark

1. If three consistent values are averaged ……………………. 1 mark
2. If three titrations are done and only two are consistent and averaged…………………………………………………… (1 mark)
3. If two titrations are done, are inconsistent and averaged … (0 mark)

**Final Accuacy** (tied to correct average titre)………….. (1 mark)

Compare the candidate’s correct average titre with s.v;

1. If within ± 0.1 of s.v …….. 1 mark
2. If not within ± 0.1 but within ± 0.2 of s.v ………½ mark
3. If beyond ± 0.2 of s.v ……………………………. 0 mark
4. 250 cm3 1.325g of Na2CO3

 1.325 x 4g of Na2CO3

 = 5.3/ RFM

 = 5.3 grams per litre

 106

 = 0.05M 

1. i) Moles of Na2CO3 reacted = 0.05 x 25

 1000

= 0.00125 

 Reacting mole ratio of HA: Na2CO3 = 2:1

 ii) 0.0025 moles of HA average titre

 ? 1000cm3

 = 0.0025 x 1000

 Average titre

 = 0.12M 

**Table II: mark as in table I**

e) i) 1000cm3 0.12 mol.

 Titre volume average volume x 0.12 moles

 1000

 = correct answer

1. Reacting mole ratio of HA to Na2CO3 is 2 : 1

Moles of Na2CO3 = ½ \* answer above

=Correct answer

1. **Table 1**

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 **Conditions:**

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 1st and 2nd row only)

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 **Accuracy**…………………………………………………….. 1 mark

 Compare candidate’s correct titre value with school value (s.v) and tick () if it earns a mark and award accordingly.

 **Coditions:**

1. If at least one titre value is within ± 0.1 cm3 of s.v

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**Principles of averaging**………………………………………………… 1 mark

1. If three consistent values are averaged ……………………. 1 mark
2. If three titrations are done and only two are consistent and averaged…………………………………………………… (1 mark)
3. If two titrations are done, are inconsistent and averaged … (0 mark)

**Final Accuacy** (tied to correct average titre)………….. (1 mark)

Compare the candidate’s correct average titre with s.v;

1. If within ± 0.1 of s.v …….. 1 mark
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 Titre volume average volume x 0.12 moles

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 = correct answer

1. Reacting mole ratio of HA to Na2CO3 is 2 : 1

Moles of Na2CO3 = ½ \* answer above

=Correct answer

1. 25cm3 answer( ii)

75 cm3 answer (ii) x 75 = correct answer

 25

1. Original solution c: 75 x answer (iii) = correct answer
2. 0.00375 – answer (iV) = correct answer
3. Reacting mole ratio is 1 : 1 moles of M(OH)2.8H2O=

= answer (v)

 f) i) answer b(vi) are in 25 cm3 of M(OH)2.8H2O

 x 1000 cm3

 25

 x = answer x 1000

 25

 = correct answer (moles per litre) 

 ii) 15.75 g answer (i)

 ?? 1mol.

 x = 18.3 x 1

 answer (i)

 = correct answer  (accept rounded off to ma whole number)

1. M + 178 = answer (ii)

M = Answer (ii) - 178

 R.A.M of M = correct answer 

1. answer( ii)

75 cm3 answer (ii) x 75 = correct answer

 25

1. Original solution c: 75 x answer (iii) = correct answer
2. 0.00375 – answer (iV) = correct answer
3. Reacting mole ratio is 1 : 1 moles of M(OH)2.8H2O=

= answer (v)

 f) i) answer b(vi) are in 25 cm3 of M(OH)2.8H2O

 x 1000 cm3

 25

 x = answer x 1000

 25

 = correct answer (moles per litre) 

 ii) 15.75 g answer (i)

 ?? 1mol.

x = 18.3 x 1

 answer (i)

= correct answer  (accept rounded off to a whole number)

1. M + 178 = answer (ii)

M = Answer (ii) - 178

R.A.M of M = correct answer 

**Question 2**

 **Table**

 (i) Complete table…..2 readings recorded…. 1 mk

 Penalty:

 penalize fully for any space not filled.

 (ii) Use of decimal…… 1 mk

 Accept temperature readings for 1 mk if consistently given either as whole numbers of
 1 d.p. of .0 or .5

 (iii) Accuracy……… 1 mk

 Compare candidate’s initial temperature reading to school value. Award 1 mk for
 value within + 2oC of SV otherwise penalize fully.

Questions

1. ∆T= Final-Initial = Correct ans 1 mk

Penalties

* Penalise ½ mark for wrong units or omission of unit on the answer.
1. (i)Accept correct transfer of ∆T, even if rejected in (a) above.

 Heat change= m.c. ∆T

 = 30 x 4.2 x ∆T 1 mk

 = correct ans 1 mk

ii) Number of moles = 0.01587 1 mk

* Penalise ½ mk for wrong units used otherwise ignore if omitted.

iii) Molar heat of solution.

 ∆H=  ½ mk

 = correct ans ½ mk

Penalties

- Penalise ½ mk for transfer of either b(i) or b(ii), otherwise penalize fully for strange values.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 3 | i) | Observation | Inference |
|  |  |  | No white precipitate formed ½ | ½ |

|  |  |  |  |
| --- | --- | --- | --- |
|  | (ii) | Observation | Inference |
|  |  | Burns with a golden-yellowflame 1 | Na+ present ½  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | (iii) | Observation | Inference |
|  |  | White precipitate ½ dissolves on addition of HCl acid ½ |   |

|  |  |  |  |
| --- | --- | --- | --- |
|  | (iv) | Observation | Inference |
|  |  | Colour changes from orange to green ½ |  ½ |

b) You are provided with solid F. Carry out the tests below and record your observations and inferences in the spaces provide

(i) Using a metallic spatula, heat half of solid F in a non-luminous burnsen burner flame for some time then remove when it ignites

|  |  |
| --- | --- |
| Observations  | Inferences  |
| Melts burns with a sooty/smoky/luminous yellow flame√½(accept melts on its own for ½ mk) |  C= C or -C = C- present √1Organic compound with high C:H ratio long chain organic compound ( ½ mk) |

ii) Put a half spatula endful of solid F into a boiling tube. Add about 10cm3 of distilled water and shake vigorously

|  |  |
| --- | --- |
| Observations  | Inferences  |
| Dissolves into a colourless solution ½ mk | Soluble compound /salt/polar substance ½ mk |

iii)Divide the resulting solution into two portions

a) To the first portion,add 2-3 drops of universal indicator and dertermine its PH

|  |  |
| --- | --- |
| Observations  | Inferences |
| pH2.0√ ½  | Strongly acidic H+/-COOH √ ½ ( ½ mk |

b) To the second portion, add two drops of acidified potassium manganate (VII) solution and shake vigorously

|  |  |
| --- | --- |
| Observations  | Inferences  |
| H+/KMnO4 decoclourises √1 ( ½ mk) |  C= C or –C= C- present √ ½ OrR-OH present √ ½  |