# NTIMA, NYAKI AND MUNICIPALITY CLUSTER EVALUATION - 2016

## Kenya Certificate of Secondary Education

## CHEMISTRY

Paper - **233/3**

**July/August 2016**

## Marking Scheme

**1. a)**

| | 1 | 2 | 3 |
|---|---|---|---|
| Final burette readings ($cm^3$) | 12.5 | 12.5 | 12.5 |
| Initial burette readings ($cm^3$) | 0.0 | 0.0 | 0.0 |
| Volume of solution D used ($cm^3$) | 12.5 | 12.5 | 12.5 |

Complete table ✓1
Decimals ✓1
Accuracy ✓1 ± 0.1 // ± 0.2 ✓½ (use S.V)
Final answer ✓1
Average ✓1

b) Moles of solution C $= \frac{0.1 \times 25}{1000}$ ✓½ ✓½
$= 0.0025$ *moles*

c)

$NaOH_{(aq)} + HCl_{(aq)} \xrightarrow{✓½} NaCl_{(aq)} + H_2O_{(l)}$

Moles of D = 0.0025 moles ✓½

d) Molarity ✓½
$= \frac{0.0025 \times 1000}{12.5}$ ✓½
$= 0.1M$

e)

$M_1V_1 = M_2V_2$ ✓½ ✓½
$M_1 \times 25 = 250 \times 0.2$
$M_1 = \frac{250 \times 0.2}{25} = 2M$

PROCEDURE II

TABLE 2

| | |
|---|---|
| Final temperature (°C) | 15.5 |
| Initial temperature (°C) | 20.0 |
| Temperature change (ΔT) | 4.5 |

Complete table ✓1
Decimals ✓1
Accuracy ✓1 *Use of school value*

a) $\Delta H = MC\Delta T$

$= \frac{80}{1000} \times 4.2 \times 4.5 = 1.512kJ$

*units must be indicated penalize ½ for wrong units.*

b) Moles of =

Molar heat = $\frac{4.5}{80} = 0.05625$ *moles*

PROCEDURE III (4 marks)

$\frac{1 \times 1.512}{0.05625} = +0.05625$ *moles*

Complete table ✓2
Trend ✓1
Accuracy ✓1

| Time (secs) | 23 | 27 | 45 | 133 |
|---|---|---|---|---|
| 1/t (secs) | 0.043 | 0.037 | 0.022 | 0.0075 |

a) Concentration ✓1
b) Graph paper, 3 marks

c) $1.9 \times 10^{-2}$ time = ***1 mk***

***from a graph***

$\frac{1}{0.019} = 56.6$**seconds**

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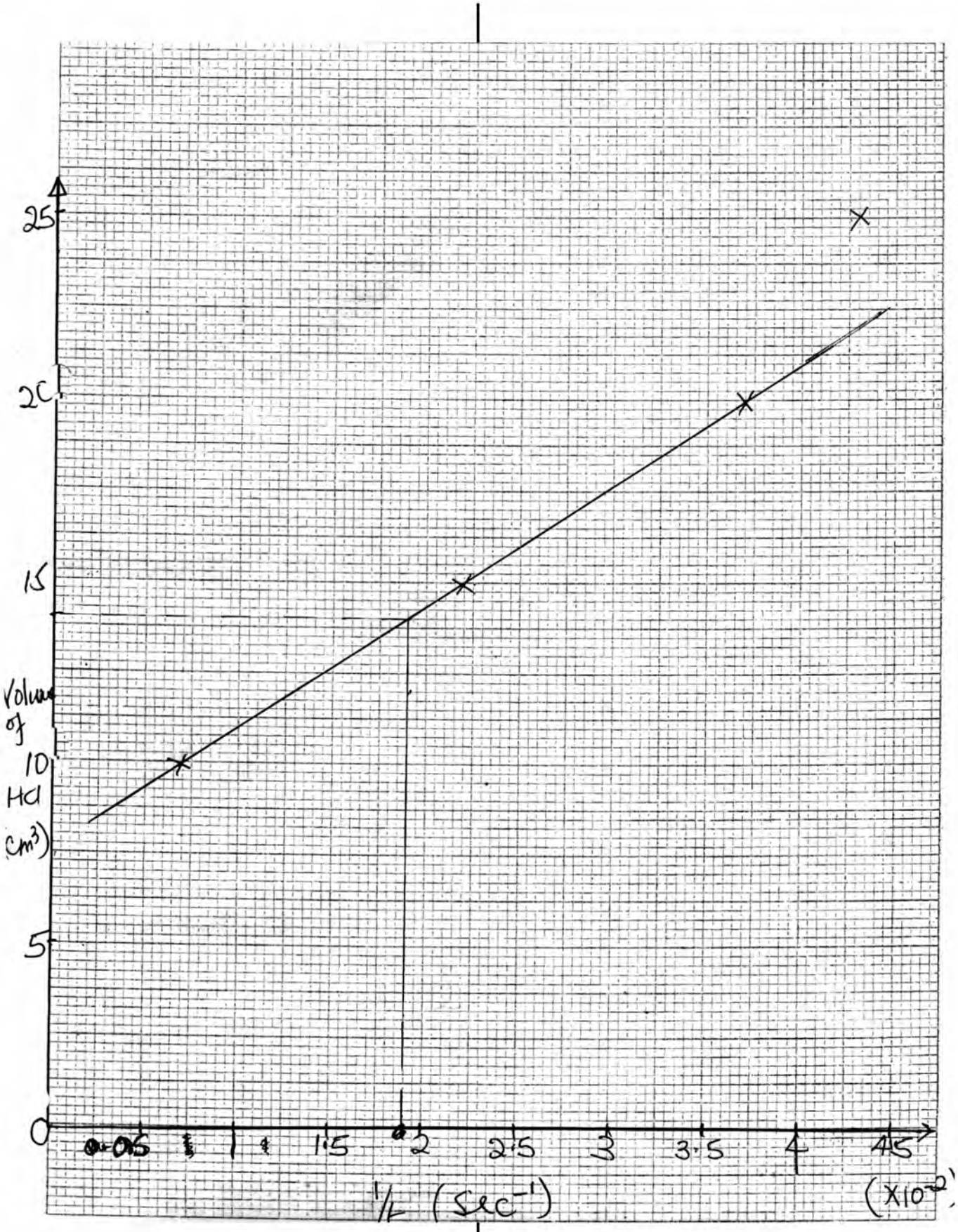


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| | | |
|---|---|---|
| a) | Observations<br>White solid settles ✓½ | Inferences<br>Insoluble salt ✓½ |
| b) | Observations<br>White residue, ✓½<br>Colourless filtrate ✓½ | |
| c) i) | Observations<br>Burn with a yellow flame ✓½ | Inferences<br>$Na^+$ present ✓½ |
| ii) | Observations<br>White ppt formed | Inferences<br>$SO^{2-}_4$, $SO^{2-}_3$, $CO^{2-}_3$, $Cl^-$ present. ✓1 All mentioned |
| iii) | Observations<br>White ppts formed ✓½ | Inferences<br>$SO^{2-}_4$, $SO^{2-}_3$, $CO^{2-}_3$, ✓1 present. All mentioned |
| iv) | Observations<br>White ppt, dissolves in dil $HNO_{3(aq)}$ ✓½ | Inferences<br>$SO^{2-}_3$, $CO^{2-}_3$, present. ✓½ |
| v) | Observation<br>Purple $KmNO_{4(aq)}$ decolourised ✓½ | Inferences<br>$SO^{2-}_{3(aq)}$confirmed ✓½ |
| d) | Observations<br>Effervescence occurs ✓½ | Inferences<br>$CO^{2-}_3$, $HCO^-_3$ present. ✓½ |
| e) i) | Observations<br>White ppt, ✓½ dissolves forming a colourless ✓½ solution | Inferences<br>$Pb^{2+}$, $Al^{3+}$, $Zn^{2+}$ ✓1 All mentioned |
| ii | Observations<br>White ppt ✓½ insoluble ✓½ | Inferences<br>$Al^{3+}$, $Pb^{2+}$ present. ✓½ All mentioned with no contradiction |
| iii) | Observations<br>White ppt formed ✓½ | Inferences<br>$Pb^{2+}$ present ✓½ |
| iv) | Observations<br>Yellow ppt formed ✓½ | Inferences<br>$Pb^{2+}$ confirmed ✓½ |

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