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# **CHEMISTRY PAPER 3**

## **ANSWERS**

### **KCSE 2010**

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### 30.6.3 Chemistry Paper 3 (233/3)

#### 1. Table 1

	I	II	III
Final burette reading	13.80	27.80	40.70
Initial burette reading	0.00	13.80	27.30
Volume of solution used (cm <sup>3</sup> )	13.80	13.50	13.40

(4 marks)

$$\text{Average volume used} = \frac{13.50 + 13.40}{2} = 13.45 \text{ cm}^3$$

(1 mark)

$$\begin{aligned} M_a V_a &= M_b V_b \\ 2 \times 25 &= 250 \times V_b \end{aligned}$$

$$\frac{2 \times 25}{250} = V_b = 0.20 \text{ M}$$

(1 mark)

$$\text{Moles of NaOH used} = 0.2 \times \frac{25}{1000} = 0.005 \text{ moles}$$

$$\text{Moles of acid used} = \frac{1}{3} \times 0.005$$

$$\text{Concentration of acid} = \frac{0.005 \times 100}{13.45 \times 3} = 0.12 \text{ M}$$

(1 mark)

$$\text{Molar mass of acid} = \frac{25}{0.12} = 208.3$$

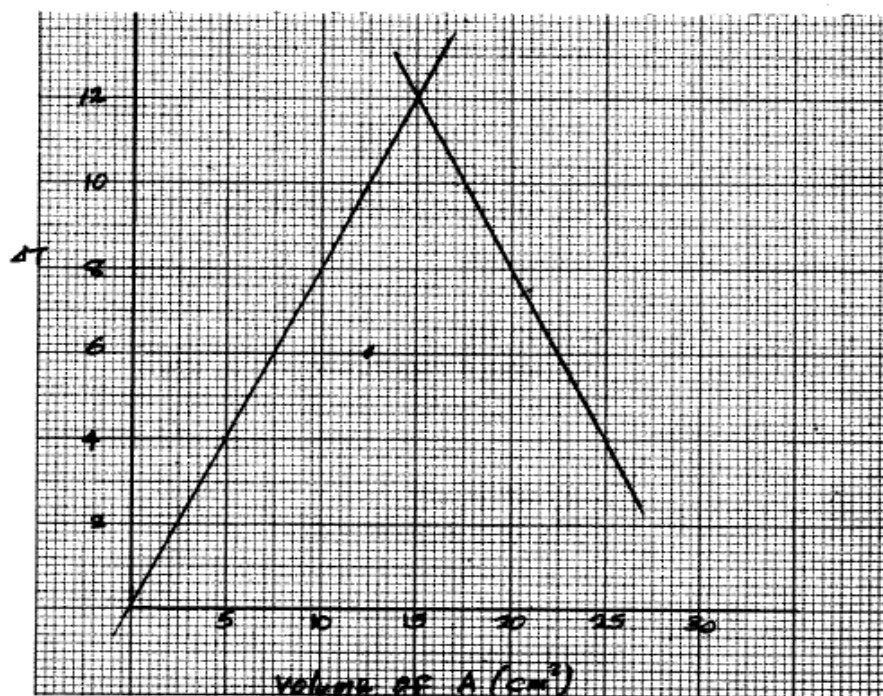
(1 mark)

Table 2

Volume of solution A (cm <sup>3</sup> )	5	9	13	17	21	25
Volume of solution B (cm <sup>3</sup> )	25	21	17	13	9	5
Maximum temperature (°C)	30.5	34.0	36.5	36.5	34.0	30.5
Initial temperature (°C)	26.5	26.5	26.5	26.5	26.5	26.5
ΔT change in temperature	4.0	7.5	10.0	10.0	7.5	4.0

(6 marks)

(a)



(b)  $15 \text{ cm}^3$  (1 mark)

(c)  $30 - 15 = 15 \text{ cm}^3$  (1 mark)

(d) (i)  $15 : 15 = 1 : 1$  (1 mark)

(ii)  $M_a V_a = M_b V_b$

$$\frac{M_a \times 15}{2 \times 15} = \frac{1}{1}$$

$$M_a = \frac{2 \times 15}{15} = 2$$

$$M_a = 2M$$

(1 mark)

## Question 2

(a)

(i)

### OBSERVATIONS

White PPt formed ( $\frac{1}{2}$ )

No effervescence ( $\frac{1}{2}$ )

### INFERENCES

$\text{CO}_3^{2-}$  and  $\text{SO}_3^{2-}$  ions absent (1)

Probably  $\text{Pb}^{2+}$ ,  $\text{Ba}^{2+}$  or  $\text{Ca}^{2+}$ , may be present (1)

(3 marks)

(ii)

### OBSERVATIONS

White PPt which ( $\frac{1}{2}$ )

Dissolves in excess ( $\frac{1}{2}$ )

### INFERENCES

$\text{Pb}^{2+}$  present (1)

(2 marks)

(iii)	
OBSERVATIONS	INFERENCES
White PPt formed (1)	Insoluble cpd of $Pb^{2+}$ is formed (1)
	(2 marks)
(iv)	
OBSERVATIONS	INFERENCES
Yellow PPt (1)	$Pb^{2+}$ ions confirmed or $PbI_2$ formed (1)
	(2 marks)
(b)	
(i)	
OBSERVATIONS	INFERENCES
Burns with a smoky flame (1)	Unsaturated organic cpd or long chain Hydrocarbon (1)
	(2 marks)
(ii)	
OBSERVATIONS	INFERENCES
Colourless solution, turns red $P^{H}$ 1 – 2 (1)	Carboxylic acid present (1)
	(2 marks)
(iii)	
OBSERVATIONS	INFERENCES
- Effervescence colourless gas evolved	Confirm G was acid and F was a carbonate (1)
- Odourless gas (1)	
	(2 marks)
I	
OBSERVATIONS	INFERENCES
Decolourised $KMnO_4$ (1)	Unsaturated alkene or alcohol present (1)
	(2 marks)
II	
OBSERVATIONS	INFERENCES
Bromine water decolourised (1)	Unsaturated alkene present or alkyne (1)
	(2 marks)