

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 ³)	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)

$$M_a V_a = M_b V_b$$

$$2 \times 25 = 250 \times V_b$$

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

(1 mark)

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

$$\text{Moles of acid used} = \frac{1}{3} \times 0.0005$$

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

(1 mark)

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

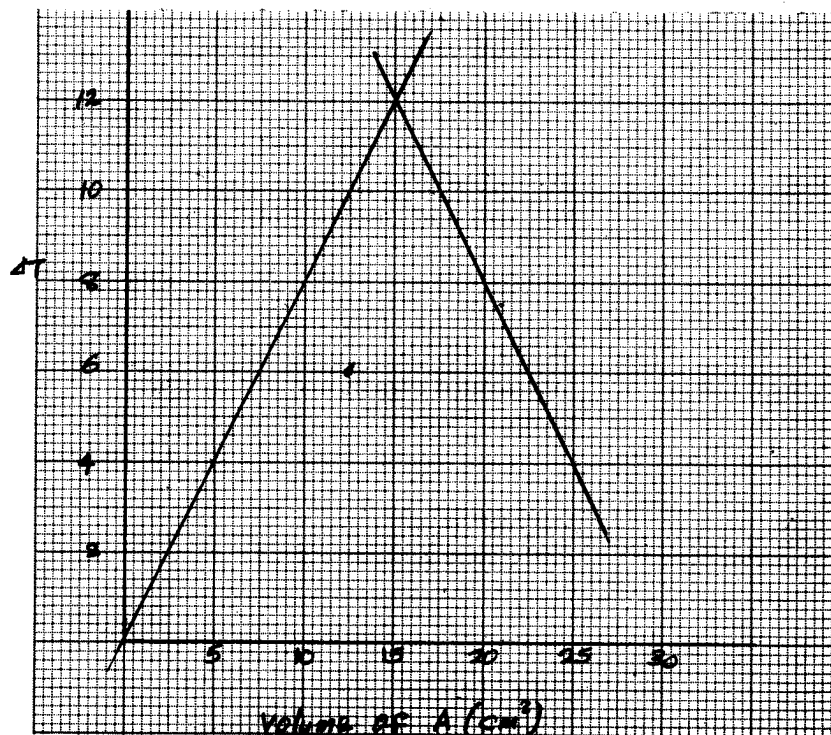
(1 mark)

Table 2

Volume of solution A (cm ³)	5	9	13	17	21	25
Volume of solution B (cm ³)	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 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	INFERENCE
White PPT formed ($\frac{1}{2}$)	CO_3^{2-} and SO_3^{2-} ions absent (1)
No effervescence ($\frac{1}{2}$)	Probably Pb^{2+} , Ba^{2+} or Ca^{2+} , may be present (1)

(3 marks)

(ii)

OBSERVATIONS	INFERENCE
White PPT which ($\frac{1}{2}$)	Pb^{2+} present (1)
Dissolves in excess ($\frac{1}{2}$)	

(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 - Odourless gas (1)	Confirm G was acid and F was a carbonate (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)