

JINJA JOINT EXAMINATIONS BOARD

MARKING GUIDE 545/3

CHEMISTRY 2.022

1. Table of results

Volume of pipette used = 25.0 / 25.00 / 25

To 1/0 dcp give
4 for final and
initial

Vol of BA2 give

	1, 3
Titration number	1 2
	18.002 34.70 18.70
Final burette readir (cm ³)	1.00 18.00 2.00
Initial burette reading (cm ³)	17.00 16.70 16.70
Volume of BA2 used (cm ³)	17.00 16.70 10.70

Titre Range ±5.0

Volume of BA2 used to calculate the average volume 16.70 and

16.70 agree ± 0.2

Average volume of BA2 used $\frac{16.70 + 16.70}{2} = 16.70 \pm 0.1$ ± 0.2 ± 0.3 ± 0.4 ± 0.5

Questions

(a) (i)

Rfm NaOH = 23 + 16 + 1 = 40 40g of NaOH is mass of 1 mole 1g of NaOH is mass of $\frac{1 \times 1}{40}$

= 0.025 moles in 250 cm³ of BA1 250cm³ of solution BA1 contain 0.025 moles of NaOH

 $\therefore 25cm^3 \text{ of solution BA1 contain } \frac{0.025 \times 25}{250}$ $= 25 \times 10^{-3}$

16%

OR Alternatively

250cm³ of solution BAI contain 1g of NaOH ::1000cm3 of solution BA1 contain 1

= 4g of NaOH

40g is mass of 1 mole of NaOH ∴ 4g is mass of $\frac{1 \times 4}{40} = 0.1$ moles of NaOH in 1000cm³

1000cm³ of solution BA1 contain 0.1 mole \Rightarrow 25cm³ of solution BA1 contain $\frac{0.1 \times 25}{1000}$

 $= 2.5 \times 10^{-3}$ moles of NaOH

(ii)

98g of mass of 1 mole o, H_nX 4.9g is mass of $\frac{1 \times 4.9}{98} = 0.05$ moles of H_nX in 1dm^3

 1000cm^3 of solution BA2 contain 0.05 moles of $H_n X$

 \therefore 16.7cm³ of solution BA2 contain $\frac{0.05 \times 16.7}{1000}$

 $= 8.35 \times 10^{-4}$

(b) H_nX

NaOH

n

 2.5×10^{-3} 8.35×10^{-4} Moles

 $: \frac{2.5 \times 10^{-3}}{8.35 \times 10^{-4}}$ Mole ratio

 $\Rightarrow n = 3$

 $\rightarrow Na_3X_{(aq)} + 3H_2O_{(l)}$ (c) $3NaOH_{(aq)} + H_3X_{(aq)}$

without dear		
with	DEDUCTIONS	
OBSERVATIONS	$CO_{2(g)}^{1}$:: CO_{3}^{2-1} / HCO_{3}^{-1}	
(a) - White solid - Colourless gas turns most blue - Colourless gas turns most blue litmus red and limewater milky litmus red and limewater milky Residue is Reddish brown or orange (hot) and yellow (cold)	Pb0 : Pb ²⁺	4
(b) - Effervescence or bubbles of a colourless gas turns moist blue litmus red and lime water milky. - Colourless solution	$CO_{2(g)}$:: CO_3^{2-} Probably Al^{3+} or Zn^{2+} or Pb^{2+} or Mg^{2+}	F
- White ppt insoluble in excess - White residue	N. OK	2
- Colourless filtrate	Probably Al ³⁺ or Pb ²⁺ or Zn ²⁺	
(d) White ppt soluble in acid	Probably Al ³⁺ or Pb ²⁺ or Zn ²⁺	
(i) White ppt soluble in excess giving a colourless solution	Probably Al ³⁺ or Pb ²⁺ or Zn ²⁺	
(ii) White ppt insoluble in ammonia	Probably Al ³⁺ or Pb ²⁺	
(iii) White ppt	Pb ²⁺ present	
(iv) On addition of potassium iodide solution / KI _(aq) gives a yellow ppt	Pb ²⁺	1/2
(e) Colourless solution (i) White pot insolubled	Probably Ca ²⁺ or Mg ²⁺	1
PP+ IIISUIUUIC	Probably Ca2+ dr Mg2+	17
PPI of INO observable	Ca ²⁺ absent	2
change (iii) White ppt insoluble	$\therefore Mg^{2+1} \text{ present}$ $Mg^{2+1} \text{ present}$	12
(i) Cations in O are Ph2+ and M 21	O J	Ł

(f) (i) Cations in Q are Pb^{2+} and Mg^{2+} (ii) anions in Q is CO_3^2