JINJA JOINT EXAMINATIONS BOARD
JJEB MARKING GUIDE, 2019
545/4
CHEMISTRY
Paper 4
July/August, 2019

1. (b) **Results:**

Volume of pipette used: **25.00 / 25.0 /25** cm^3

Final burette reading (cm^3)	25.00	25.80	26.80
Initial burette reading(cm^3)	1.00	2.00	3.00
Volume of **BA4** used (cm^3)	24.00	23.80	23.80

Titre values used for calculating average volume of **BA4**: 23.80, 23.80 cm^3

Average volume of **BA4** used: $\frac{23.80 + 23.80}{2} = 23.80$ $\pm 0.1c\,m^3$
± 0.2
± 0.3
± 0.4
± 0.5

(c) $H^+_{(aq)} + \bar{O}H_{(aq)} \rightarrow H_2O_{(l)}$

(d) (i) $1000cm^3$ of **BA4** contain 0.1 moles of HCl
$\therefore$ $23.8cm^3$ of **BA4** contain $\frac{0.1 \times 23.80}{1000}$ moles of HCl
$= 2.38 \times 10^{-3}$ moles of HCl

(ii) Mole ratio of $H^+ : \bar{O}H = 1:1$
Moles of $\bar{O}H$ that reacted $= 1 \times 2.38 \times 10^{-3}$
$= 2.38 \times 10^{-3}$ moles

(iii) $25\ cm^3$ of **BA3** contain 2.38×10^{-3} moles of $\bar{O}H$
$1000\ cm^3$ of **BA3** contain $2.38 \times 10^{-3} \times \frac{1000}{25}$ moles of $\bar{O}H$
$= 0.095$ moles of $\bar{O}H$
2 moles of aqueous $\bar{O}H$ are produced by 1 mole of $\mathbf{M(OH)_2}$
0.095 moles of $\bar{O}H$ are produced by $\frac{0.095 \times 1}{2}$ moles of $\mathbf{M(OH)_2}$
$= 0.0475$ moles of $\mathbf{M(OH)_2}$

(iv) 0.0475 moles of $\mathbf{M(OH)_2}$ weigh 3.8g
$\therefore$ 1 mole of $\mathbf{M(OH)_2}$ weighs $\frac{3.8 \times 1}{0.0475}$ g
$= 80g$

RFM of $\mathbf{M(OH)_2}$ is 80g.
$\mathbf{M} + 2(16 + 1) = 80$
$\mathbf{M} + 34 = 80$
$\therefore$ $\mathbf{M} = 80 - 34 = 46$

Total Marks =

2.

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Heat a spatula endful of **Y** in strongly in a dry hard glass tube.	Colorless vapor or liquid turns anhydrous $CuSO_4$ from white to blue. Colourless gas turns moist blue litmus red and acidified $K_2Cr_2O_7$ orange to green White solid.	Hydrated salt Or water of crystallization. SO_2 produced; ∴ SO_4^{2-} present.
(b) Dissolve three spatula endfuls of **Y** in a boiling tube, add about 5cm³ of distilled water and shake. Divide the resultant solution into five parts.	Dissolves (soluble) forming a colourless solution.	Al^{3+} or Zn^{2+} or Pb^{2+} or Mg^{2+} probably present.
(i) To the first part of the solution, add dilute sodium hydroxide solution drop-wise until in excess.	White precipitate soluble in excess forming a colourless solution.	Al^{3+} or Zn^{2+} or Pb^{2+} probably present.
(ii) To the second part of the solution, add dilute ammonia solution drop-wise until in excess.	White precipitate insoluble in excess.	Al^{3+} or Pb^{2+} probably present.
(iii) To the third part of the solution, add 2 – 3 drops of potassium iodide solution.	No yellow precipitate or No observable change.	Pb^{2+} absent. ∴ Al^{3+} present
(iv) To the fourth part of the solution, add 2 – 3 drops of lead (II) nitrate solution then followed by dilute nitric acid.	White precipitate.	SO_4^{2-} or Cl^- probably present
(c) To the fifth part of the solution, add Barium nitrate solution drop wise until in excess. Filter and divide the filtrate into two portions.	White precipitate. White residue. Colourless filtrate.	SO_4^{2-} present
(i) To the first portion of the filtrate, add an equal volume of lead (II) nitrate then followed by 2 – 3 drops of dilute nitric acid. Boil and cool under tap water.	White precipitate, soluble on boiling and reforms/recrystallizes on cooling.	Cl^- confirmed.
(ii) To the second portion of the filtrate, add 2 – 3 drops of silver nitrate solution followed by dilute ammonia drop-wise until in excess.	White precipitate soluble in excess ammonia.	Cl^- confirmed.

(d) (i) Anions in **Y**: SO_4^{2-} (c) and Cl^- c(i) or c(ii)
(ii) Cation in **Y**: Al^{3+} b(iii) or b(ii)

Total Marks=

END