

ଅନୁପାତ ନିମ୍ନ ପ୍ରକାରେ

$$K_w = 1 \times 10^{-14} \text{ mol}^2 \text{dm}^{-6}$$

$$pH + pOH = 14$$

$$pH = 7$$

$$[H_3O^+] = 1 \times 10^{-7} \text{ mol dm}^{-3}$$

$$pH + pOH = 14$$

$$7 + pOH = 14$$

$$pOH = 7$$

$$[OH^-] = 1 \times 10^{-7} \text{ mol dm}^{-3}$$

$$[H_3O^+] < [OH^-]$$

∴ ଅମ୍ଳୀୟ ଚାରି.



$$\frac{1 \times 50.05}{1000}$$

$$\frac{1 \times 49.95}{1000}$$

ଉଦାହରଣ 50.05 × 10⁻³

$$49.95 \times 10^{-3}$$

ଉଦାହରଣ 49.95 × 10⁻³

$$49.95 \times 10^{-3}$$

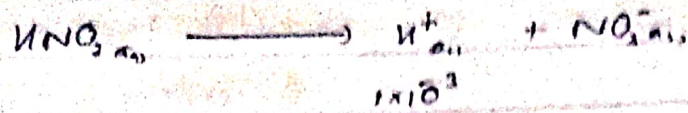
ଉଦାହରଣ 0.1 × 10⁻³

$$49.95 \times 10^{-3}$$

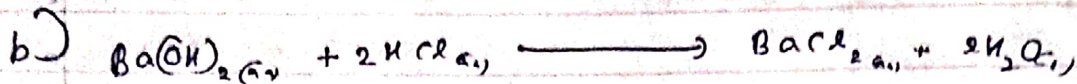
~~49.95~~

ଉଦାହରଣ $[KNO_3] = 0.1 \times 10^{-3} \times \frac{1000}{100}$

$$= 1 \times 10^{-3} \text{ mol dm}^{-3}$$



$$\begin{aligned} \text{pH} &= -\log(\text{H}^+) \\ &= -\log(1 \times 10^{-3}) \\ &= 3 \end{aligned}$$



7160 ml

$$1 \times \frac{90}{1000}$$

$$0.8 \times \frac{20}{1000}$$

$$90 \times 10^{-3}$$

$$16 \times 10^{-3}$$

500 ml

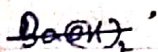
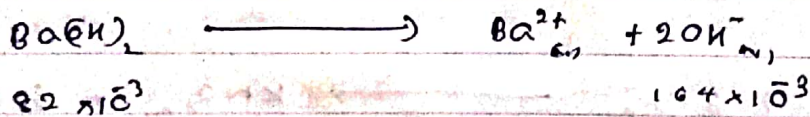
$$8 \times 10^{-3}$$

$$16 \times 10^{-3}$$

968 ml

$$82 \times 10^{-3}$$

←



$$[\text{OH}^-] = \frac{164 \times 10^{-3} \times 1000}{110}$$

$$= 1.49 \text{ mol dm}^{-3}$$

$$\begin{aligned} \text{pOH} &= -\log[\text{OH}^-] \\ &= -\log 1.49 \\ &= 0.1782 \end{aligned}$$

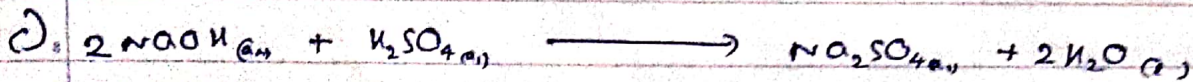


at 25°C

$$pH + pOH = 14$$

$$pH - 0.1732 = 14$$

$$pH = \underline{\underline{14.1732}}$$



gibson
ml

$$\frac{0.1 \times 10}{1000}$$

$$\frac{0.05 \times 20}{1000}$$

$$1 \times 10^{-3}$$

$$1 \times 10^{-3}$$

gibson
of ml

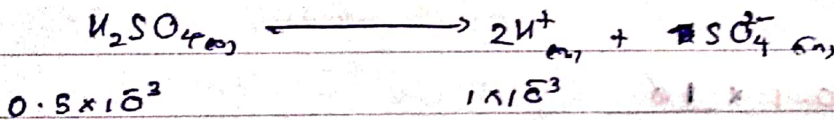
$$1 \times 10^{-3}$$

$$0.5 \times 10^{-3}$$

gibson
ml

—

$$0.5 \times 10^{-3}$$



$$0.5 \times 10^{-3}$$

$$1 \times 10^{-3}$$

$$[H^+] = 1 \times 10^{-3} \times \frac{1000}{100}$$

$$= 0.01 \text{ mol dm}^{-3}$$

$$pH = -\log[H^+]$$

$$= -\log 0.01$$

$$= \underline{\underline{2}}$$



No. _____

Date: _____

$$\begin{aligned} \text{d) } p\text{H} &= -\log[\text{H}^+] \\ 1 &= -\log[\text{H}^+] \end{aligned}$$

$$p\text{OH} =$$

$$\log[\text{H}^+] = -1 \quad \text{logic}$$

$$[\text{H}^+] = 0.1$$

$$p\text{H} + p\text{OH} = 14$$

$$13 + p\text{OH} = 14$$

$$p\text{OH} = 1$$

$$p\text{OH} = -\log[\text{OH}^-]$$

$$1 = -\log[\text{OH}^-]$$

$$[\text{OH}^-] = 0.1$$

∴

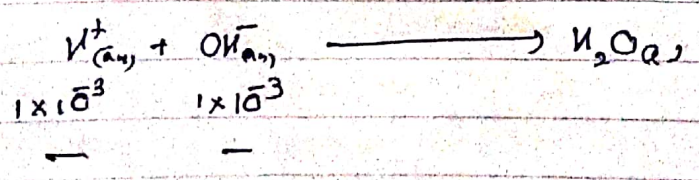
$$\text{H}^+ \text{ mol} = 0.1 \times \frac{10}{1000}$$

$$= 0.1 \times 10^{-2}$$

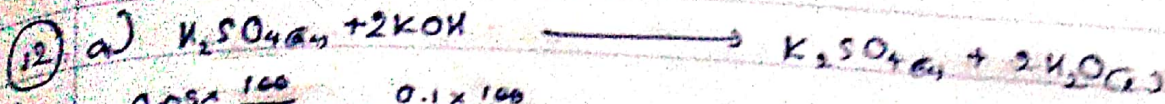
$$= 1 \times 10^{-3} \text{ mol}$$

$$\text{OH}^- \text{ mol} = 1 \times 10^{-3} \text{ mol}$$

যদিও সমান মোল H⁺ ও OH⁻ এর
 মোল OH⁻ অতিরিক্ত প্রতিক্রিয়ায়
 গঠিত হবে H₂O।
 অর্থাৎ 25°C তে pH 7 হবে।



∴ প্রতিক্রিয়া ০। ∴ 25°C তে
 pH = 7



$0.05 \times \frac{100}{1000}$ $0.1 \times \frac{100}{1000}$

$5 \times 10^3 \text{ mol}$ 0.01 mol

0.005 mol 0.01 mol

ಇಲ್ಲಿ $pH = 7$

i) $pH = -\log[H^+]$

$2.3 = -\log[H^+]$

$-2.3 = \log[H^+]$

$[H^+] = \text{antilog}(2.3)$

$= 5 \times 10^{-3} \text{ mol dm}^{-3}$

-2.000	-0.3000
10^{-2}	$\frac{+1.000}{-0.3000}$
	0.7000
	50.12×10^1
	10^1

ii) $pH = 3.242$

$pH = 4.7285$

$pH = 2.18$

$pH = 5.192$

$pH = 3.242$

$-\log[H^+] = 3.242$

$[H^+] = \text{antilog}(-3.242)$

$= 5.728 \times 10^{-4} \text{ mol dm}^{-3}$

-3.000	-0.242	-1.000
10^{-3}	$\frac{1.000}{-0.242}$	10^1
	0.758	
	5.728	

$pH = 4.7285$
 $-\log[H^+] = 4.7285$

$[H^+] = \text{antilog}(-4.7285)$
 $= 1.868 \times 10^{-5} \text{ mol dm}^{-3}$

-4.000	-0.7285	-1.000
10^4	1.0717285	10^1
	1.0000	
	-0.7285	
	<hr/>	
	0.2715	
	1.868	

$pH = 2.18$
 $-\log[H^+] = 2.18$

$[H^+] = \text{antilog}(-2.18)$

$= 6.607 \times 10^{-3} \text{ mol dm}^{-3}$

-2.000	-0.18	-1.000
10^2	1.000	10^1
	-0.180	
	<hr/>	
	0.820	
	6.607	

$pH = 5.192$
 $-\log[H^+] = 5.192$

$[H^+] = \text{antilog}(-5.192)$

$= 6.47 \times 10^{-6} \text{ mol dm}^{-3}$

-5.000	-0.192	-1.000
10^5	1.000	10^1
	-0.192	
	<hr/>	
	0.808	
	6.47	

b) ii) $pH + pOH = 14$
 $pOH = 14 - 2.3$
 $= 11.7$

$pOH = -\log[OH^-]$
 $11.7 = -\log[OH^-]$

$[OH^-] = \text{antilog}(-11.7)$
 $= 5.012 \times 10^{-12} \text{ mol dm}^{-3}$
 $= 2 \times 10^{-12} \text{ mol dm}^{-3}$

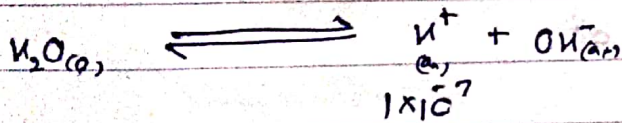
-12.000	-0.3	-1
10^{12}	1.0	10^1
	-0.3	
	<hr/>	
	0.7	
	5.012	
-11.000	0.7	-1.0
10^{11}	1.0	10^1
	-0.3	
	<hr/>	
	0.995	



$$[\text{H}^+] = 10^{-9} \text{ mol dm}^{-3}$$

$$\begin{aligned} \text{pH} &= -\log[\text{H}^+] \\ &= -\log(10^{-9}) \\ &= 9 \end{aligned}$$

HNO_3 හි විඝටනයෙන් ලැබෙන $[\text{H}^+]$ ඒවලට අමතරව විඝටනයෙන් ලැබෙන $[\text{H}^+]$ ට ඉඩ කඩයා නම් ඒහි සමානව ප්‍රමාණයක් අමතරව ලැබෙන්නේ වායුමය ජල විච්චිත නොවේ.



$$\begin{aligned} \text{මුළු } [\text{H}^+] &= 1 \times 10^{-9} + 1 \times 10^{-7} \\ &= \text{~~1.01~~ } 0.01 \times 10^{-7} + 1 \times 10^{-7} \\ &= 1.01 \times 10^{-7} \text{ mol dm}^{-3} \end{aligned}$$

$$\begin{aligned} \text{pOH} &= -\log[\text{H}^+] \\ &= -\log[1.01 \times 10^{-7}] \\ &= -(0.0043 - 7) \\ &= 6.9957 \end{aligned}$$

15)

$$pH = -\log[H^+]$$

$$= -\log(0.544)$$

$$\begin{array}{r} 1.000 \\ -0.544 \\ \hline 0.456 \\ \hline 1.855 \end{array}$$

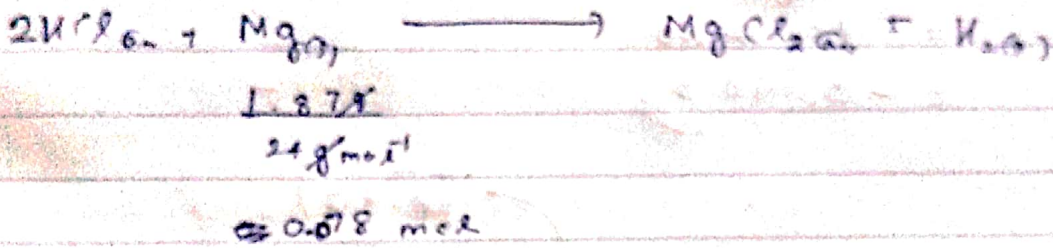
$$pH = -\log[H^+]$$

$$-0.544 = -\log[H^+]$$

$$[H^+] = \text{antilog } 0.544$$

$$= 3.499$$

$$= 3.5 \text{ mol dm}^{-3}$$



required HCl mol = $3.5 \times \frac{80}{1000}$

$$= 28.0 \times 10^{-2} \text{ mol}$$

$$= 0.28 \text{ mol}$$

$$= 0.098 \text{ mol}$$

~~required~~ Mg mol = 0.078×2

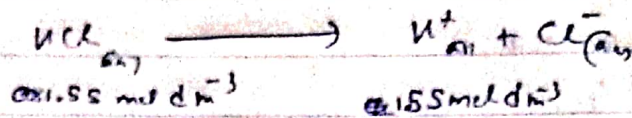
$$= 0.156 \text{ mol}$$



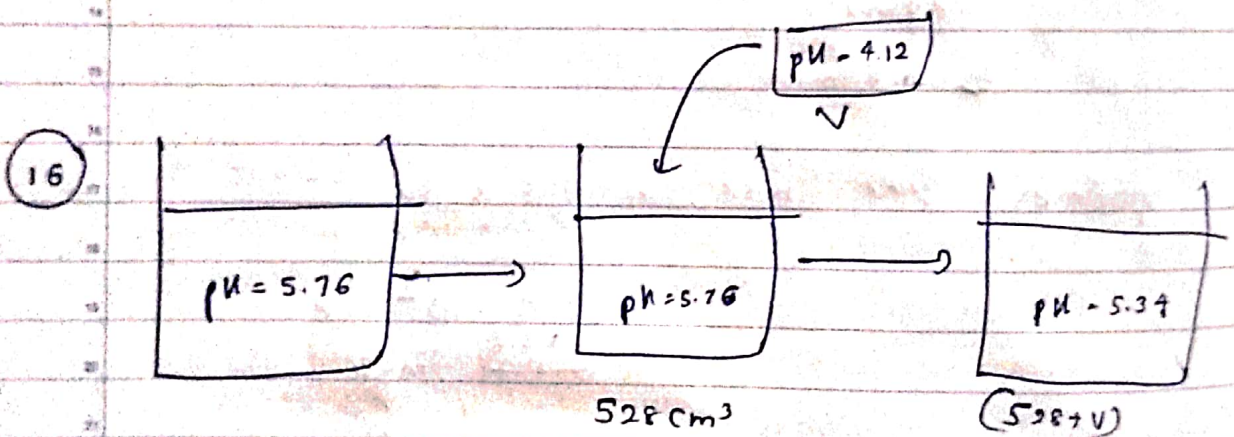
0.078 0.156 mol

— 0.124

$$\begin{aligned}
 [\text{H}^+] &= \frac{0.124 \text{ mol} \times 100 / \text{dm}^3}{8} \\
 &= \frac{1.24}{8} \text{ mol dm}^{-3} \\
 &= 0.155 \text{ mol dm}^{-3}
 \end{aligned}$$



$$\begin{aligned}
 \text{pH} &= -\log[\text{H}^+] \\
 &= -\log 0.155 \\
 &= -0.1903
 \end{aligned}$$



$$\begin{aligned}
 \text{pH} = 5.76 &\implies \text{pH} = -\log[\text{H}^+] \\
 5.76 &= -\log[\text{H}^+]
 \end{aligned}$$

$$\begin{aligned}
 [\text{H}^+] &= \text{antilog}(5.76) \\
 &= 1.738 \times 10^{-6} \text{ mol dm}^{-3}
 \end{aligned}$$

$$528 \text{ cm}^3 \text{ of water } \text{H}^+ \text{ mol} = \frac{1.738 \times 10^{-6} \times 528}{1000}$$

$$= 1.738 \times 528 \times 10^{-9}$$

$$\begin{array}{r}
 -3.00 \\
 10^6 \\
 -0.76 \\
 \hline
 11.00 \\
 -0.76 \\
 \hline
 10.24
 \end{array}$$



ଅନାୟ ଉପ ଗ୍ରହଣ କର $[H^+] \Rightarrow pH = -\log[H^+]$

$$4.12 = -\log[H^+]$$

$$[H^+] = \text{antilog}(-4.12)$$

$$= 7.585 \times 10^{-5} \text{ mol dm}^{-3}$$

ଅନାୟ ଉପ H^+ ମିଲ

$$= \frac{7.585 \times 10^{-5} \times V}{1000}$$

$$= 7.585V \times 10^{-8} \text{ mol}$$

ମୋଟ ଉପାଦାନ H^+ ମିଲ $= 1.738 \times 528 \times 10^{-9} + 7.585V \times 10^{-8}$

$$= (0.1738 \times 528 + 7.585V) \times 10^{-8}$$

①

ଅନାୟ ଉପ ଗ୍ରହଣ କର $[H^+] \Rightarrow pH = -\log[H^+]$

$$5.34 = -\log[H^+]$$

$$[H^+] = \text{antilog}(-5.34)$$

$$= 4.571 \times 10^{-6} \text{ mol dm}^{-3}$$

ନି H^+ ମିଲ

$$= \frac{4.571 \times 10^{-6} \times (528 + V)}{1000}$$

$$= 0.4571 \times 10^{-8} (528 + V)$$

②

① - ②

$$(0.1738 \times 528 + 7.585V) \times 10^8 = (0.4571 \times 528 + 0.4571V) \times 10^8$$

$$7.585V - 0.4571V$$

$$7.1279V$$

V

$$= 528 (0.4571 - 0.1738)$$

$$= 528 \times 0.2833$$

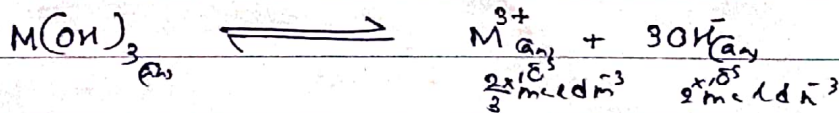
$$= \frac{528 \times 2833}{71279}$$

$$71279$$

$$= \frac{5.28 \times 2.833}{7.128} \times 10$$

$$7.128$$

19



$$pH + pOH = 14$$

$$9.301 + pOH = 14$$

$$pOH = 14 - 9.301$$

$$= 4.699$$

$$pOH = -\log(OH^-)$$

$$4.699 = -\log(OH^-)$$

$$[OH^-] = \text{antilog}(4.699)$$

$$= 2 \times 10^{-5} \text{ mol dm}^{-3}$$

$$\begin{array}{r} -4.0 \\ 10^4 \quad 10^2 \\ \hline 0.699 \\ 0.901 \\ \hline 9.0 \end{array}$$



No:

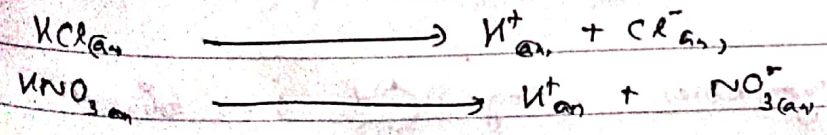
Date:

$$\begin{aligned}
 K_{sp} &= [M_{aq}^{3+}] [OH_{aq}^-]^3 \\
 &= \left(\frac{2}{3} \text{ mol dm}^{-3}\right) \times 8 \text{ mol}^3 \text{ dm}^{-9} \left(\frac{2 \times 10^{-5} \text{ mol dm}^{-3}}{3}\right) \times (2 \times 10^{-5} \text{ mol dm}^{-3})^3 \\
 &= \frac{16}{3} \text{ mol}^4 \text{ dm}^{-12} \qquad = \frac{16}{3} \times 10^{-20} \text{ mol}^4 \text{ dm}^{-12}
 \end{aligned}$$

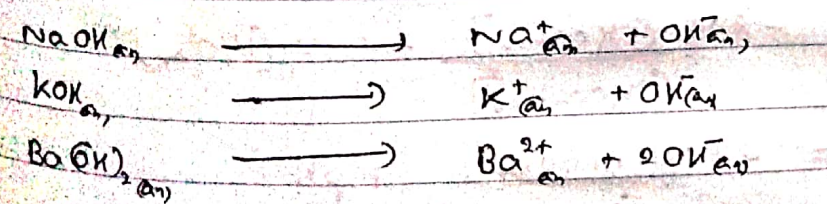
දුබල අම්ල හා දුබල ආම්ලික ජීව්‍ය වන ජලය.

අම්ල වායුවක්ද පුනර්ජීව්‍ය වන බැවින් H^+ ලබාදෙන අයුරු ප්‍රබල අම්ල ලෙසද සංලක්ෂ්‍ය පුනර්ජීව්‍ය වන බැවින් OH^- ලබාදෙන අයුරු ප්‍රබල ආම්ලික ලෙසද හඳුන්වයි.

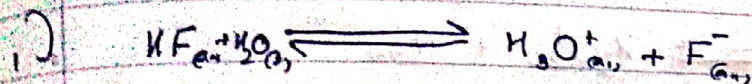
ප්‍රබල අම්ල



ප්‍රබල ආම්ල



අම්ල වායුවක්ද පුනර්ජීව්‍ය වන බැවින් H^+ ලබාදෙන අයුරු දුබල අම්ල ලෙසද සංලක්ෂ්‍ය පුනර්ජීව්‍ය වන බැවින් OH^- ලබාදෙන අයුරු දුබල ආම්ලික ලෙසද හඳුන්වයි.



Hydrogen ion	0.2		
Fluoride ion	0.2 0.2α	0.2	0
HF	$0.2(1-\alpha)$	0.2α	0.2α

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{F}^-]}{[\text{HF}]}$$

$$3.2 \times 10^{-4} = \frac{0.2\alpha \times 0.2\alpha}{0.2(1-\alpha)}$$

$$= \frac{0.2\alpha^2}{1-\alpha}$$

$$1 \gg \alpha$$

$$1-\alpha \approx 1$$

$$3.2 \times 10^{-4} = 0.2\alpha^2$$

$$\alpha^2 = 16 \times 10^{-4}$$

$$\alpha = 4 \times 10^{-2}$$

$$\begin{aligned} [\text{H}_3\text{O}^+][\text{HF}] &= 0.2(1-\alpha) \\ &\approx 0.2(1-0.04) \\ &= 0.2 \times 0.96 \\ &= 192 \times 10^{-3} \\ &= 0.192 \text{ mol dm}^{-3} \end{aligned}$$

$$\begin{aligned} \text{pH} &= -\log[\text{H}_3\text{O}^+] \\ &= -\log(8 \times 10^{-3}) \\ &= 3 - 0.9031 \\ &= 2.0969 \end{aligned}$$

$$\begin{aligned} [\text{H}_3\text{O}^+] = [\text{F}^-] &= 0.2\alpha \\ &= 0.2 \times 0.04 \\ &= 0.008 \text{ mol dm}^{-3} \end{aligned}$$



$$pK_a = pK - \log \frac{[H_3O^+]}{[HA]}$$

$$= 4.5 - \log \left(\frac{9.162 \times 10^5}{10^1} \right)$$

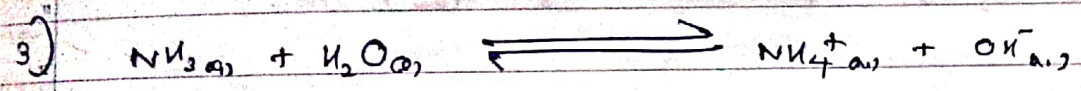
$$= 4.5 - \log (3.162 \times 10^4)$$

$$= 4.5 + 4 - 0.5$$

$$= 8.5 - 0.5$$

$$= 8$$

$$pK_a = -\log(K_a)$$



$$0.4$$

initial
concn

$$0.4\alpha$$

$$0.4(1-\alpha)$$

$$0.4\alpha$$

$$0.4\alpha$$

$$K_b = \frac{[NH_4^+][OH^-]}{[NH_3]}$$

$$1.8 \times 10^5 = \frac{0.4\alpha \times 0.4\alpha}{0.4(1-\alpha)}$$

$$= \frac{0.4\alpha^2}{1-\alpha}$$

$$1 \gg \alpha$$

$$1-\alpha = 1$$

$$1.8 \times 10^5 = 0.4\alpha^2$$

$$\alpha^2 = \frac{9}{2} \times 10^5$$

$$1.8 \times 10^5 = \frac{[OH^-]^2}{0.4(1-\alpha)}$$

$$1 \gg \alpha$$

$$1-\alpha = 1$$

$$1.8 \times 10^5 = \frac{[OH^-]^2}{0.4}$$

$$[OH^-]^2 = 7.2 \times 10^6$$

$$= \sqrt{7.2 \times 10^6}$$

$$= 2683 \times 10^3$$

$$pOH = -\log [OH^-]$$

$$= -\log (2683 \times 10^3)$$

$$= 2.5713$$

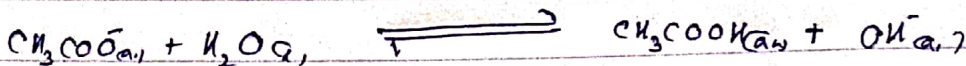
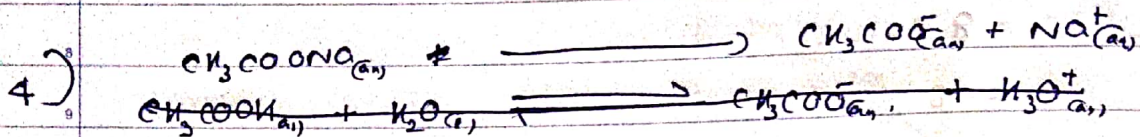
25°C

$$pH + pOH = 14$$

$$pH + 2.5712 = 14$$

$$pH = 14 - 2.5712$$

$$= 11.4287$$



ଆବେଶ

$$0.1$$

ନିକାଶ

$$0.1\alpha$$

ଅବଶିଷ୍ଟ

$$0.1(1-\alpha)$$

$$0.1\alpha$$

$$0.1\alpha$$

$$K_b = \frac{[CH_3COOH][OH^-]}{[CH_3COO^-]}$$

$$5.6 \times 10^{-10} = \frac{[OH^-]^2}{0.1(1-\alpha)}$$

$$(1-\alpha) \gg \alpha$$

$$1-\alpha \approx 1$$

$$5.6 \times 10^{-10} = \frac{[OH^-]^2}{0.1}$$

$$[OH^-]^2 = 5.6 \times 10^{-11}$$

$$= 56 \times 10^{-12}$$

$$[OH^-] = \sqrt{56 \times 10^{-12}}$$

$$= 7.483 \times 10^{-6} \text{ mol dm}^{-3}$$

$$pOH = -\log[OH^-]$$

$$= -\log(7.483 \times 10^{-6})$$

$$= 6 - 0.8741$$

$$= 5.1259$$

25°C

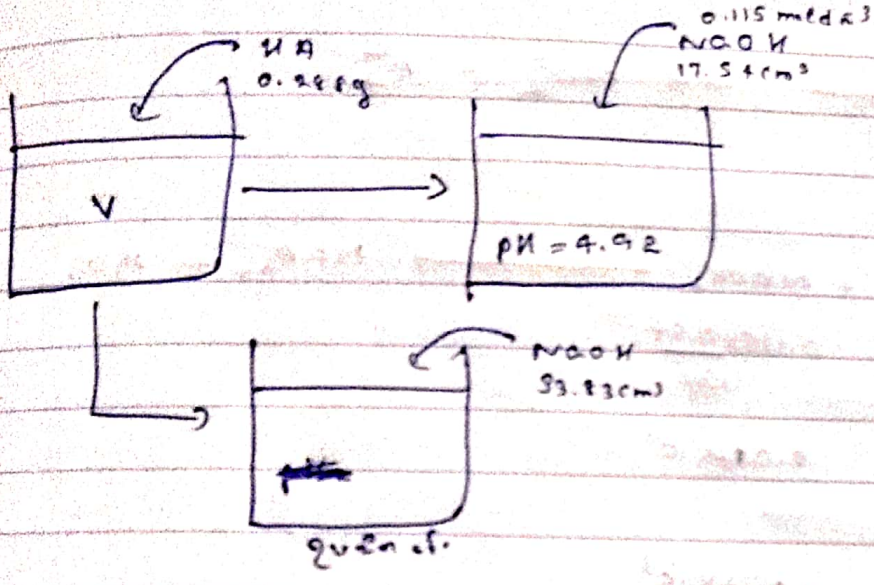
$$pH + pOH = 14$$

$$pH + 5.1259 = 14$$

$$pH = 8.8741$$



17



i)



$$\frac{HA \text{ குவளம் முடிவு}}{28800 \text{ மூல}} = \frac{0.115 \times 33.83}{1000} = 3.89 \times 10^{-3} \text{ mol}$$

$$\text{HA mol} = 3.89 \times 10^{-3}$$

$$M_{HA} = \frac{0.288g}{3.89 \times 10^{-3} \text{ mol}}$$

$$= \frac{288}{3.89} \text{ g mol}^{-1}$$

$$= \frac{28800}{389} \text{ g mol}^{-1}$$

$$= 74 \text{ g mol}^{-1}$$

—)

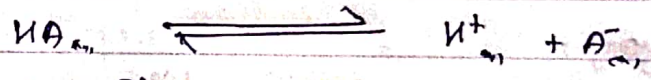
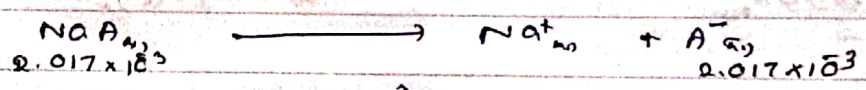


प्रबन्धन मात्र 3.89×10^3 $0.115 \times \frac{17.5}{100}$

~~प्रबन्धन मात्र~~ 2.017×10^3

प्रबन्धन मात्र 2.47×10^3 2.017×10^3

प्रबन्धन मात्र $\frac{1.873 \times 10^3}{1.873 \times 10^3} \quad \quad \quad 2.017 \times 10^3$



प्रबन्धन मात्र 1.873×10^3

प्रबन्धन मात्र x

प्रबन्धन मात्र $1.873 \times 10^3 - x \quad \quad \quad x \quad \quad \quad x$

प्रबन्धन मात्र $A^- \text{ mol} = 2.017 \times 10^3 + x$
 $= 2.017 \times 10^3$

प्रबन्धन मात्र $HA \text{ mol} = 1.873 \times 10^3 - x$
 $= 1.873 \times 10^3$

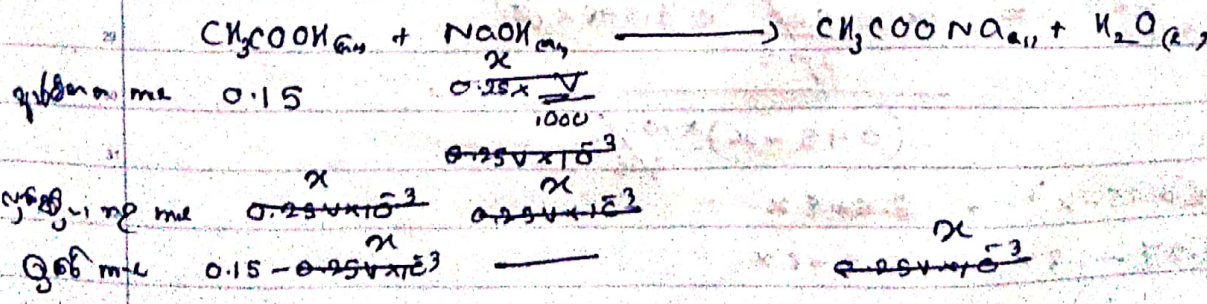
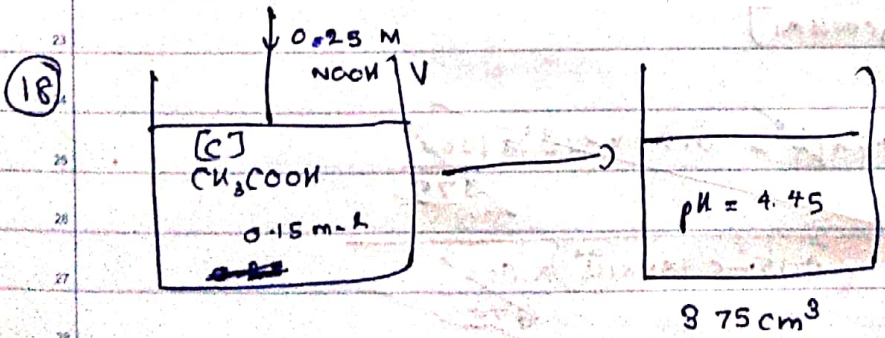
$pH = -\log[H^+]$
 $4.92 = -\log[H^+]$

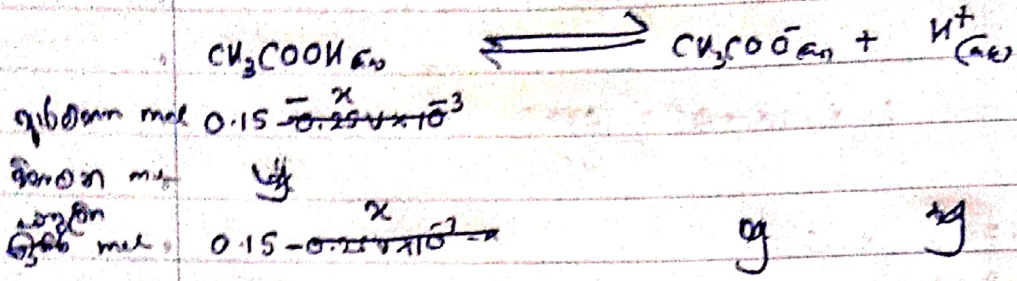
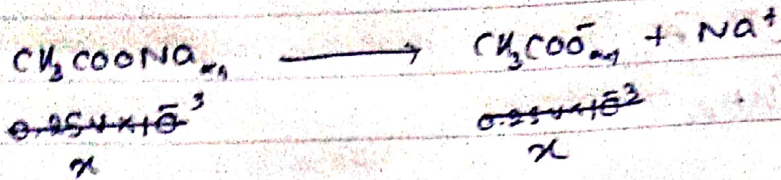
$[H^+] = \text{antilog}(-4.92)$
 $= 1.202 \times 10^{-5}$



$$\begin{aligned}
 K_a &= \frac{[H^+] [A^-]}{[HA]} \\
 &= \frac{1.209 \times 10^{-5} \times \left(\frac{2.017 \times 10^{-3} \times 1000}{V} \right)}{\frac{1.273 \times 10^{-3} \times 1000}{V}} \\
 &= \frac{1209 \times 10^{-5}}{1873} \\
 &= 0.2314 \times 10^{-5} \\
 &= 2.314 \times 10^{-6} \text{ mol dm}^{-3}
 \end{aligned}$$

iii) 16.92 cm^3 എന്ന രാസമാതൃക (അളവുകൾ) കുറിച്ചു വെച്ചിരിക്കുന്നു.
 \therefore ചുരുക്കി ഉൾക്കൊള്ളുന്ന അളവുകൾക്ക് കുറിച്ചു വെച്ചിരിക്കുന്നു. അതിൽ
 എത്രയെങ്കിലും തുല്യമായി ചേർത്താൽ K_a ന്റെ മൂല്യം $[H^+]$ ന്റെ മൂല്യം
 കണ്ടുപിടിക്കാൻ സാധിക്കും. \therefore ചുരുക്കി pH
 ന്റെ മൂല്യം $[H^+]$ ന്റെ മൂല്യം കണ്ടുപിടിക്കാൻ സാധിക്കും. \therefore ചുരുക്കി pH
 ന്റെ മൂല്യം $[H^+]$ ന്റെ മൂല്യം കണ്ടുപിടിക്കാൻ സാധിക്കും.





gaban $\text{CH}_3\text{COO}^-_{aq}$ mol = ~~0.254×10^{-3}~~ x

asyran CH_3COOH mol = ~~$0.15 - 0.254 \times 10^{-3}$~~ $0.15 - x$

$\text{pH} = -\log[\text{H}^+]$
 $4.45 = -\log[\text{H}^+]$

$[\text{H}^+] = \text{antilog}(-4.45)$
 $= 3.548 \times 10^{-5}$

$$K_a = \frac{[\text{CH}_3\text{COO}^-][\text{H}^+]}{[\text{CH}_3\text{COOH}]}$$

~~$$1.8 \times 10^{-5} = \frac{3.548 \times 10^{-5} \times 0.254 \times 10^{-3} \times 1000}{(0.15 - 0.254 \times 10^{-3}) \times 1000}$$~~

$\frac{1.8}{27.0} \times 10^3$

$$1.8 \times 10^{-5} = \frac{x \times \frac{1000}{27.5} \times 3.548 \times 10^{-5}}{(0.15 - x) \times \frac{1000}{27.5}}$$

$$1.8(0.15 - x) = 3.548x$$

$$0.27 - 1.8x = 3.548x$$



$$(5.348 + 1.8) x = 0.27$$

$$5.348 x = 0.27$$

$$x = \frac{0.27}{5.348}$$

CH_3COOH 0.15 mol බවට $NaOH$ දැමුවේ
 මෙහි pH අගය 4.45 බව දී ඇත.
 මෙහිදී අර්ධ-මුද්ගමනයක් සිදු වී ඇත.
 මෙහිදී CH_3COOH හි මවුල අර්ධය $NaOH$ මවුල අර්ධයට
 සමාන වේ. CH_3COOH හි මවුල අර්ධය $NaOH$ මවුල අර්ධයට
 සමාන වීමෙන් CH_3COONa හි මවුල අර්ධය CH_3COOH හි මවුල අර්ධයට
 සමාන වේ. එනම් CH_3COONa හි මවුල අර්ධය 0.075 mol වේ.

$$[CH_3COONa] = 0.0505 \text{ mol} \times \frac{1000}{375}$$

$$= \frac{50.5}{375} \text{ mol dm}^{-3}$$

$$= 5.05 \times 10^{-1} \text{ mol dm}^{-3}$$

$$= 0.505 \text{ mol dm}^{-3}$$

$$= 0.1346 \text{ mol dm}^{-3}$$

ii) $x = 0.25 \times \frac{V}{1000}$

$$0.0505 = 0.25 V \times 10^{-3}$$

$$V = \frac{0.0505}{0.25 \times 10^{-3}}$$

$$= \frac{5.05 \times 10^{-2}}{2.5 \times 10^{-4}}$$

$$= \frac{5.05 \times 10^2}{2.5}$$

$$= 202 \times 10^2$$

$$= 20200 \text{ cm}^3$$

iii) $CH_3COOH + NaOH = 375$
 මවුල මවුල

$$V \times 0.25 + 27202 = 375$$

$$\frac{0.25V}{2} = 173 \text{ cm}^3$$

$$= \frac{0.173}{173}$$



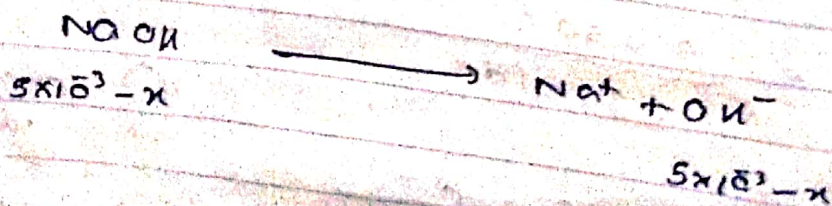
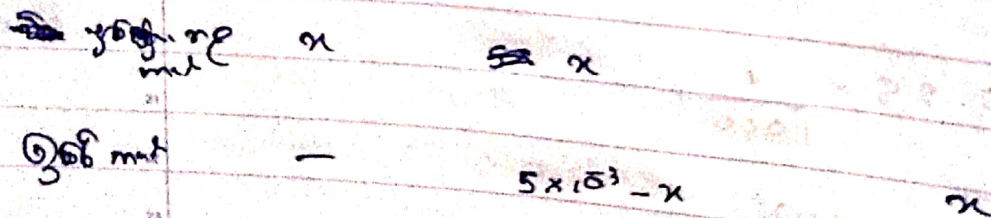
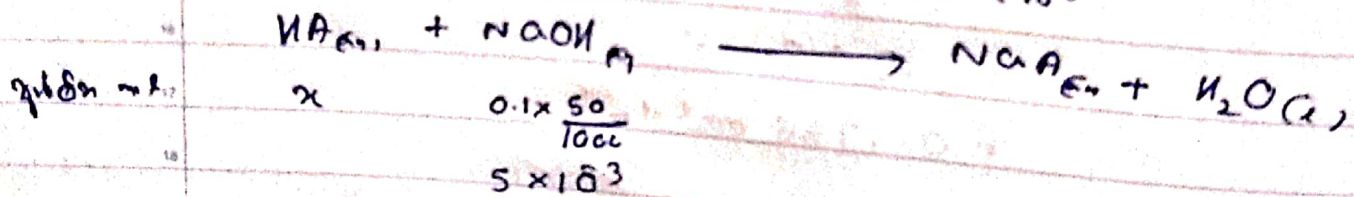
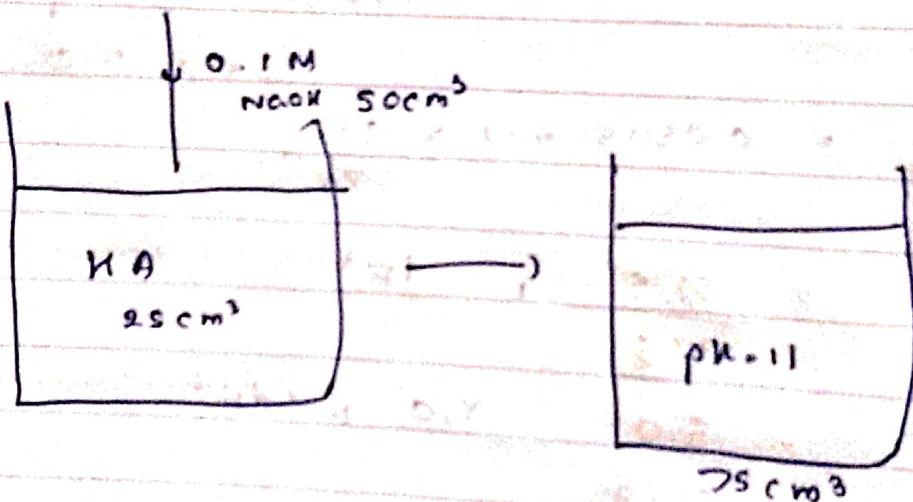
$$0 = \frac{n}{V}$$

$$= 0.15 \times \frac{1000}{173}$$

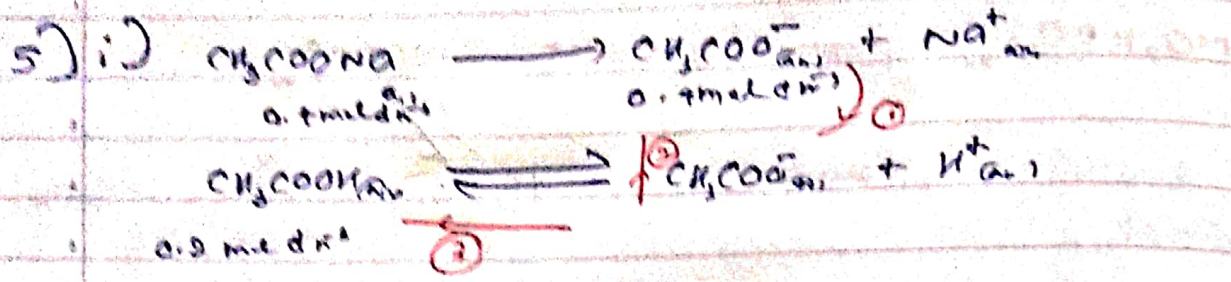
$$= 8.671 \times 10^{-4} \times 10^3$$

$$= 0.8671 \text{ mol dm}^{-3}$$

23



25 x 10³



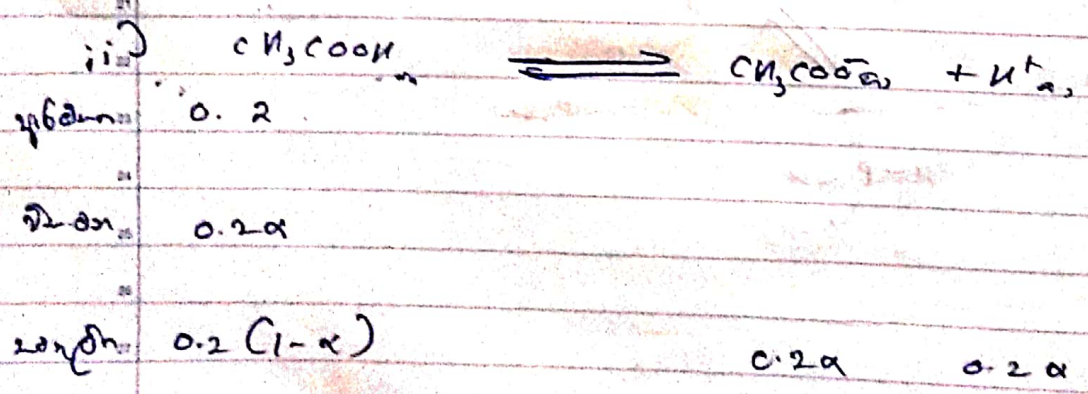
$$\text{pH} = \text{pKa} + \log \frac{[\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}]}$$

$$= -\log(1.8 \times 10^{-5}) + \log\left(\frac{0.1}{0.1}\right)$$

$$= 5 - 0.2553 + 0.3010$$

$$= 5 - 0.5563 = 4.4437$$

$$= 5.0457$$



$$K_a = \frac{[\text{CH}_3\text{COO}^-][\text{H}^+]}{[\text{CH}_3\text{COOH}]}$$

$$1.8 \times 10^{-5} = \frac{(0.2\alpha)^2}{0.2(1-\alpha)}$$

0.9563
2.2818

No. _____
Date: _____

0.2782

$1 > \alpha$
 $1 - \alpha = 1$

$$1.8 \times 10^5 = \frac{[H^+]^2}{0.2}$$

$$[H^+]^2 = 0.96 \times 10^5$$

$$= 9.6 \times 10^6$$

$$[H^+] = \sqrt{9.6} \times 10^3 \text{ mol dm}^{-3}$$

$$= 1.897 \times 10^3 \text{ mol dm}^{-3}$$

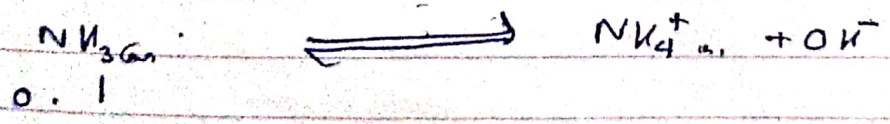
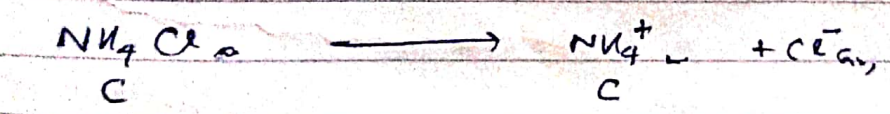
$$pH = -\log [H^+]$$

$$= -\log (1.897 \times 10^3)$$

$$= 3 - 0.2782$$

$$= \underline{\underline{2.7218}}$$

7



2.5?
 $pK_a + pK_b = 14$

$pK_b = 14 - 9 = 5$

$$pOH = pK_b + \log \frac{[NH_4^+]}{[NH_3]}$$

$$5 = -\log (1.8 \times 10^3) + \log \left(\frac{c}{0.1} \right)$$



$$5 = 5 - 0.2553 + \log\left(\frac{C}{0.1}\right)$$

$$= 4.7447 + \log\left(\frac{C}{0.1}\right)$$

$$\log\left(\frac{C}{0.1}\right) = 5 - 4.7447$$

$$= 0.2553$$

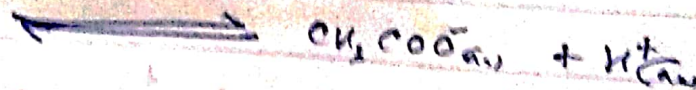
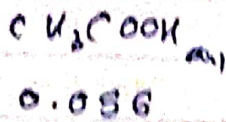
$$\frac{C}{0.1} = 1.8$$

$$C = 1.8 \times 0.1 \text{ mol dm}^{-3}$$

$$n_{\text{NH}_4\text{Cl mol}} = 0.18 \text{ mol dm}^{-3} \times 1 \text{ dm}^3$$

$$= 0.18 \text{ mol}$$

(25) P प्रश्न



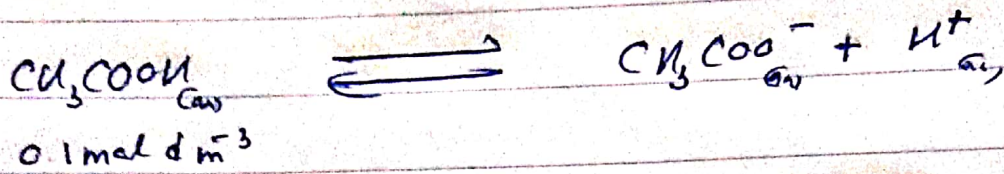
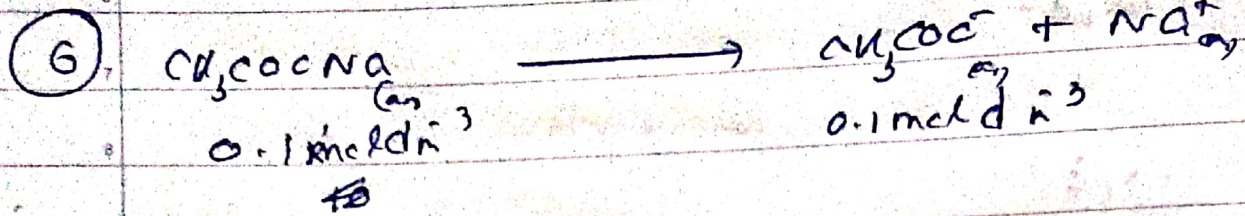
$$0.056(1-\alpha)$$

$$0.056(1-\alpha)$$

$$0.056\alpha$$

$$0.056\alpha$$

$$K_a = \frac{[\text{CH}_3\text{COO}^-][\text{H}^+]}{[\text{CH}_3\text{COOH}]}$$



14

15

$$\text{pH} = \text{pKa} + \log \frac{[\text{CH}_3\text{COONa}]}{[\text{CH}_3\text{COOH}]}$$

17

$$= 4.7447 - \log(1.8 \times 10^{-5}) + \log\left(\frac{0.1}{0.1}\right)$$

19

20

$$= 4.7447$$

23

24

$$\text{pH} = \text{pKa} + \log \frac{[\text{CH}_3\text{COONa}]}{[\text{CH}_3\text{COOH}]}$$

26

27

$$= 4.7447 - \log(1.8 \times 10^{-5}) + \log\left(\frac{2}{1}\right)$$

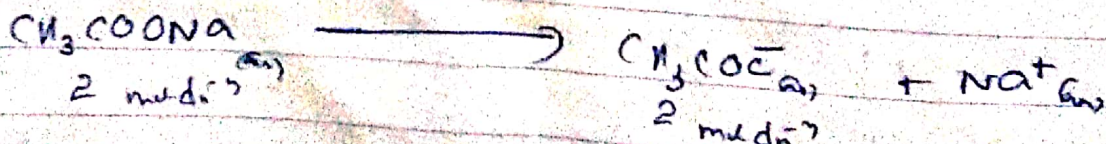
28

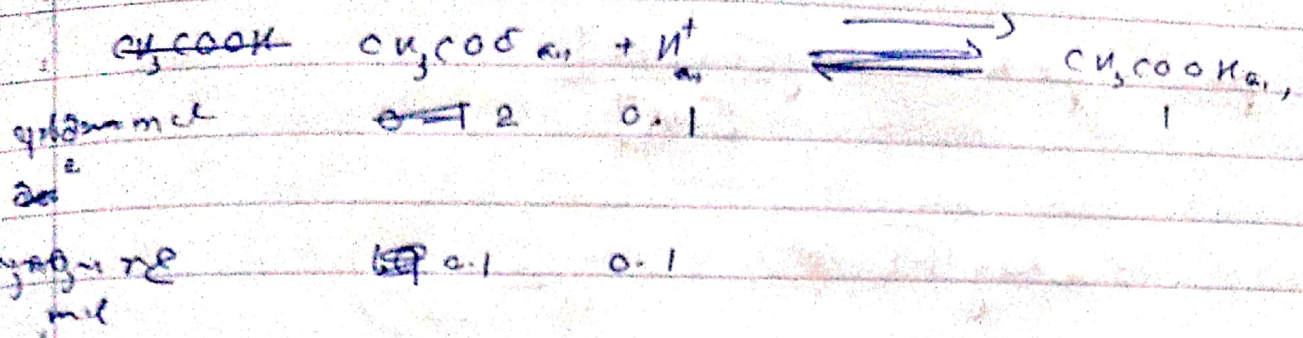
$$= 4.7447 + 0.3010$$

29

30

$$= 5.0457$$





සමතුලිත ලක්ෂ් $a = 1.9$ 0.1
 මිල

$$\begin{aligned}
 \text{pH} &= \text{pKa} + \log \frac{[\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}]} \\
 &= -\log(1.8 \times 10^{-5}) + \log \left(\frac{1.9}{1.1} \right) \\
 &= 4.7447 + \log(1.727) \\
 &= 4.7447 + 0.2372 \\
 &= 4.9819
 \end{aligned}$$

CH_3COO^- , H^+ දෙක සමාන වන්නේ CH_3COOH ප්‍රමාණය සමඟිනි. එම නිසා, එම මොදකින් මුහුණ දෙන ලදී. එම නිසා, එම මොදකින් මුහුණ දෙන ලදී.



9)

$$pH = pK_b + \log \frac{[NH_4Cl]}{[NH_3]}$$

$$= -\log(1.8 \times 10^{-5}) + \log\left(\frac{0.03}{0.02}\right)$$

$$= 4.7447 + \log(1.5)$$

$$= 4.7447 + 0.1761$$

$$= 4.9208$$

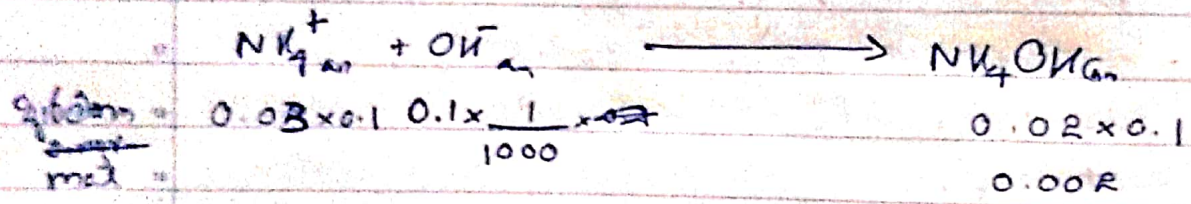
$$pH + pOH = 14$$

$$pH = 14 - 4.9208$$

$$pH = 9.0792$$



9.15 ml
 $\frac{0.03 \times 0.1}{1000}$



9.68 ml
 1×10^{-4} 1×10^{-4}

9.68 ml
 $\frac{0.003 - (1 \times 10^{-4})}{0.0029}$ $\frac{0.002 + 1 \times 10^{-4}}{0.0021}$

$$pH = pK_b + \log \frac{[NH_4^+]}{[NH_3]}$$

$$= -\log(1.75 \times 10^{-5}) + \log\left(\frac{0.0029 \times \frac{10}{1000}}{0.0021 \times \frac{10}{1000}}\right)$$

$$= 4.7530 + 0.1899$$

$$= 4.9429$$

$$pH + pOH = 14$$

$$pH = 14 - 4.9429$$

$$= 9.0571$$

(11) පහත දැක්වා ඇති ජේදයේ අදාළ හිස්තැන් පුරවන්න. තවද අනවශ්‍ය වචන කපා හරින්න.

කිසියම් ජලීය ද්‍රාවණයක $2H_2O \rightleftharpoons H_3O^+ + OH^-$ ආකාරයේ ගතික සමතුලිතතාවක් පවතී.
 25°C ජලයේ අයනික ගුණිතය $1 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-6}$ වන අතර සංශුද්ධ ජලයේ 25°C දී H^+ අයන සාන්ද්‍රණය
 $1 \times 10^{-7} \text{ mol dm}^{-3}$ වේ. සංශුද්ධ ජලයේ 25°C දී H^+ අයන සාන්ද්‍රණය K_w අගයට වඩා වැඩි වේ. / අඩු
 වේ. උෂ්ණත්වය වැඩිවන විට K_w අගය වැඩි වේ. / අඩු වේ. 100 °C දී $K_w = 10^{-12} \text{ mol}^2 \text{ dm}^{-6}$ නම් එම
 උෂ්ණත්වයේ දී සංශුද්ධ ජලයේ pH අගය **6** ක් වේ.

කිසියම් ජලීය ද්‍රාවණයක pH අගය 7 ක් වන අතර එහි උෂ්ණත්වය 25°C ට වඩා වැඩි වේ නම් එම
 ද්‍රාවණය ~~ආම්ලික~~ / ~~භාෂ්මික~~ / ~~උදාසීන~~ වේ. කිසියම් ජලීය ද්‍රාවණයක උෂ්ණත්වය 25°C ට වඩා අඩුවන අතර
 එහි pH අගය 7 ක් වේ නම් එම ද්‍රාවණය **භෂ්මික** වේ. උෂ්ණත්වය 25°C ට වඩා වැඩි නම්
 ජලීය ද්‍රාවණය pH + pOH අගය 14 ට වඩා අඩු වේ / වැඩි වේ / සමාන වේ. ජලීය ද්‍රාවණයක pH + pOH
 අගය 14 ට වඩා වැඩි නම් එහි උෂ්ණත්වය 25 °C ට වඩා **අඩු** වේ.