101. (c) For NH_4OH.

$[OH^-] = C.\alpha$; $C = \frac{1}{10}M$, $\alpha = 0.2$

$[OH^-] = \frac{1}{10} \times 0.2 = 2 \times 10^{-2}M$

$pOH = -log \quad [OH^-] = log \quad [2 \times 10^{-2}]$; $pOH = 1.7$

$pH = 14 - pOH = 14 - 1.7 = 12.30$.

102. (c) $pH = pK_a + \log\frac{[\text{Salt}]}{[\text{Acid}]}$. For small concentration of buffering agent and for maximum buffer capacity $\frac{[\text{Salt}]}{[\text{Acid}]} \approx 1$.

103. (a) $[H^+]$ = increased ten fold means pH of solution decreased by one.

$pH = \log\frac{1}{[H^+]}$

104. (a) Because the pH of buffer are not changed.

105. (c)$pH = pK_a + \log\frac{[\text{Salt}]}{[\text{Acid}]}$; $5.5 = 4.5 + \log\frac{[\text{Salt}]}{[0.1]}$

$\log\frac{[\text{Salt}]}{0.1} = 5.5 - 4.5 = 1$

$\frac{[\text{Salt}]}{0.1}$ =antilog 1 = 10 ; $[\text{Salt}] = 1$

106. (a) Moles of $H_2SO_4 = \frac{0.49}{98} = 5 \times 10^{-3}$ moles of H_2SO_4 present per litre of solution (molarity) $= \frac{.005}{1} = .005M$.

$H_2SO_4 + 2H_2O \rightleftharpoons 2H_3O^+ + SO_4^{--}$

one mole of H_2SO_4 give 2 moles of H_3O^+ions.

$H_3O^+ = 2 \times (H_2SO_4) = 2 \times 0.005 = 0.01M$

$[H^+] = 10^{-2}M\,;\, pH = 2$

107. (c) CH_3COONH_4 is a simple buffer and called salt of weak acid.

108. (c) N.eq. for $HCl = \frac{0.4}{1000} \times 50 = 0.02$

N.eq. for $NaOH = \frac{0.2}{1000} \times 50 = 0.1$

Now $[OH^-]$ left $= 0.1 - 0.02$

$[OH^-] = .08 = 8 \times 10^{-2}M$

$pOH = -\log 8 \times 10^{-2}M\,;\, \mathbf{pOH = 1.0}$

109. (d) Buffer is mixture of weak base and its acid salt.

110. (b) $[NaOH] = 0.4/40\, mole/l. = 0.1M$

$[OH^-] = 10^{-1}M,\ \mathbf{[H^+] = 10^{-13}M, pH = 13}$

111. (d) $pH + pOH = 14$, $pH = 4$, $H^+ = 10^{-4}$ *mole/litre.*

112. (d) Buffer solution have constant *pH*. When we add the water into this buffer solution. So no effect on it.

113. (b) $Ba(OH)_2 \rightleftharpoons Ba^{2+} + 2OH^-$

One molecule on dissociation furnishes $2OH^-$ ions.

So, $[OH^-] = 2 \times 10^{-4}N$

$N = M \times 2\,;\ M = \frac{N}{2} = \frac{2\times10^{-4}}{2} = 10^{-4}$

$pOH = -log[OH^-] = -log(1 \times 10^{-4}) = -4$

$pH + pOH = 14; pH = 14 - 4 = 10.$

114. (a) M.eq. of 0.10 $MHCl = \frac{0.10}{1000} \times 40 = 0.004M$

M.eq. of 0.45 $MNaOH = \frac{0.45 \times 10}{1000} = 0.0045M$

Now left $[OH^-] = 0.0045 - 0.004 = 5 \times 10^{-4}M$

Total volume = 50 *ml*.

$[OH^-] = \frac{5 \times 10^{-4}}{50} \times 1000; [OH^-] = 1 \times 10^{-2}$

$pOH = 2$; $pH = 14 - pOH = 12.$

115. (c) 0.001 $M\,HCl = 10^{-3}M[H^+], pH = 3.$

116. (d) $[NaOH] = \frac{0.4}{40} = 0.01M; [OH^-] = 10^{-2}M$

$\boldsymbol{[H^+] = 10^{-12}, pH = -log[H^+] = 12}$

117. (b) Those substance which give a proton is called Bronsted acid while

CH_3COO^- doesn't have proton so it is not a Bronsted acid.

118 (b) 2

Explanation (Word-friendly):

H_2SO_4 is a strong dibasic acid → it gives 2 H^+ ions.

Concentration of H_2SO_4 = 0.005 M

Total H^+ produced = 2 × 0.005 = 0.01 M

Now,

pH = –log (H^+)

pH = –log (0.01) = 2

119. (d) Weak acid and conjugate base

Explanation (Word-friendly):

A buffer solution resists change in pH.

It is usually made from:

A weak acid (like CH_3COOH)

And its salt with a strong base, which provides the conjugate base (like CH_3COONa)

Example:

$CH_3COOH + CH_3COONa \rightarrow$ Buffer solution

120. (c) $pH = -log \quad [H^+]$