101 (a) and (c)

Explanation (Word-Friendly):

Buffer solution: Resists change in pH when small amounts of acid or base are added.

Types of buffers:

Acidic buffer: Weak acid + its salt with a strong base

Example: Acetic acid + Sodium acetate → pH < 7

Basic buffer: Weak base + its salt with a strong acid

Example: Ammonia + Ammonium chloride → pH > 7

Incorrect options:

(b) Sodium acetate + HCl → HCl neutralizes the base → no buffer.

(d) Ammonia + NaOH → Both are bases → cannot form a buffer.

202. (a,b,c) Because buffer solution are mixture of weak acid or weak base and their salt.

203. (c) Because $pH = 8$ is basic nature but $HCl$is a strong acid.

204. (c) $H_2SO_4 = 0.05 \times 2$

$\therefore [H^+] = 0.1$ and $pH = 1$

205. (b) $Mg(OH)_2 \rightleftharpoons Mg^{2+} + 2OH^-$

$K_{sp} = [Mg^{2+}][OH^-]^2$

$1 \times 10^{-12} = 0.01[OH^-]^2$

$[OH^-]^2 = 1 \times 10^{-10} \Rightarrow [OH^-] = 10^{-5}$

$[H^+] = 10^{-14}/10^{-5} = 10^9$

$pH = -log[H^+] = -log[10^{-9}] = 9$

206. (b) $[OH^-] = 1 \times 10^{-5}$

$pOH = -log[OH^-] = 5$

$pH + pOH = 14 \Rightarrow pH = 14 - 5 =$