AP Unit 7 Quiz Kahoot

#1.) $LiClO \rightarrow Li^+$ (parent LiOH = strong base, no hydrolysis)

$\rightarrow ClO^-$ (parent HClO = weak acid, yes hydrolysis)

$$ClO^-(aq) + H_2O(l) \rightleftharpoons HClO(aq) + \boxed{OH^-(aq)}$$

basic

#3.) $HCOOH(aq) \rightleftharpoons H^+(aq) + COOH^-(aq)$

→ What increases % ionization? ⇒ what shifts rxn right?

✗ I. Adding NaCOOH ⇒ ↑ [COOH-], shift left

✗ II. Adding HCl ⇒ ↑ $[H^+]$, shift left

✓ III. Increasing pH ⇒ ↓ $[H^+]$, shift right

✗ IV. Decreasing pH ⇒ ↑ $[H^+]$, shift left

#4.) $K < 1$ ⇒ reactant-favored ⇒ reactants are weaker acid/base!

$$\underset{B}{CO_3^{2-}} + \underset{A}{NH_4^+} \rightleftharpoons \underset{CA}{HCO_3^-} + \underset{CB}{NH_3}$$

stronger!

#5.) Equimolar strong base (LiOH) + strong acid ($HClO_4$) ⇒ completely neutralize

(0.20 mol each)

$$\underset{SB}{LiOH} + \underset{SA}{HClO_4} \rightarrow H_2O + \underset{\text{neutral salt} \Rightarrow pH = 7}{LiClO_4}$$

#6.) $RbN_3 \Rightarrow N_3^- + H_2O \rightleftharpoons HN_3 + OH^-$ $\quad K_b = \frac{x^2}{0.4} = 10^{-9}$

RbOH (SB) ↙ $\quad$ HN_3 (WA) ↘

N_3^-	$+H_2O \rightleftharpoons$	$HN_3 + OH^-$
0.40		
$-x$		$+x \quad +x$
$0.40 - x$		

x negl.

$$K_b = \frac{K_w}{K_a} = \frac{10^{-14}}{10^{-5}} = 10^{-9}$$

$$[OH^-] = x = \sqrt{(4E-1)(1E-9)} = \sqrt{4E-10} = 2E-5$$

$\Rightarrow pOH \approx 5 \Rightarrow pH = 14 - 5 = \boxed{9}$

#8.) Adding NH_3 = adding base ⇒ neutralizes acid, so more weak acid is able ionize ⇒ $\boxed{HNO_2}$

(not HNO_3: strong acid already 100% dissociated)

#9.) $pH = 4 \Rightarrow [H^+] = 10^{-4} = x$

$$K_a = \frac{x^2}{[HA]_i} = \frac{(10^{-4})^2}{0.1} = \frac{10^{-8}}{10^{-1}} = \boxed{1 \times 10^{-7}}$$

#10.) $RbF \nearrow Rb^+ \Rightarrow RbOH$ (SB) $\searrow F^- \Rightarrow HF$ (WA) } strong wins ⇒ basic salt ⇒ $pH = 8.95$ (only basic choice)

#12.) $$K_a = \frac{x^2}{[HA]_i} = \frac{x^2}{0.1} = 1.8E\text{-}5 \Rightarrow x \approx \sqrt{(1E\text{-}1)(1E\text{-}5)} = \sqrt{1E\text{-}6} = \underbrace{1E\text{-}3\,M}_{[H^+]}$$

$$\%\ \text{Ionization} = \frac{[H^+]_{eq}}{[HA]_i} \times 100 = \frac{1E\text{-}3}{0.1} \times 100 = \frac{(1E\text{-}3)}{(1E\text{-}1)} \times 1E2 = \boxed{1\%}$$

#14.) $NH_4Br \Rightarrow NH_4^+ + H_2O \rightleftharpoons \underbrace{H_3O^+}_{\text{acidic!}} + NH_3$

NH_3 WB ↙ HBr SA ↘

need $K_a = \frac{K_w}{K_b} = \frac{1E\text{-}14}{2E\text{-}5} \approx \frac{10^{-14}}{10^{-5}} = 10^{-9}$

$$K_a = \frac{x^2}{[HA]_i} = \frac{x^2}{3E\text{-}4} = 1E\text{-}9$$

$$[H^+] = x = \sqrt{(3E\text{-}4)(1E\text{-}9)} \approx \sqrt{(1E\text{-}4)(1E\text{-}9)} = \sqrt{10^{-13}} = 10^{-6.5}$$

$$pH = -\log(10^{-6.5}) = \boxed{6.5}$$