

Name: \_\_\_\_\_

Period: \_\_\_\_\_

Seat#: \_\_\_\_\_

**Directions:** Show all work. Box final answers.

**1) Strong Acid Solution** – *assume full dissociation*  
Calculate the pH of 0.00125 M  $\text{HNO}_3$  2.903  
>> Determine  $[\text{H}^+]$  and then the pH.

**2) Strong Base Solution** – *assume full dissociation*  
Calculate the pH of 0.00125 M  $\text{KOH}$  11.097  
>> Determine  $[\text{OH}^-]$ , calculate pOH, and then calculate the pH.

**3) Weak Acid Solution** – *does not fully dissociate*  
Calculate the pH of 0.00125 M  $\text{HOCl}$  5.18  
 $K_a = 3.5 \times 10^{-8}$   
>> Determine  $[\text{H}^+]$  using an ICE table, then calculate the pH.

**4) Weak Base Solution** – *does not fully dissociate*  
Calculate the pH of 0.00125 M  $\text{NH}_3$  10.15  
 $K_b = 1.8 \times 10^{-5}$   
>> Determine  $[\text{OH}^-]$  using an ICE table, calculate the pOH, then calculate the pH.

**5) Salt of a Weak Acid** – have to consider hydrolysis  
Calculate the pH of 0.00125 M NaOCl 9.28  
 $K_{a \text{ HOCl}} = 3.5 \times 10^{-8}$   
>> Write hydrolysis, calculate  $K_b$ , determine  $[\text{OH}^-]$  using an ICE table, calculate the pOH, then calculate the pH.

**6) Salt of a Weak Base** – have to consider hydrolysis  
Calculate the pH of 0.00125 M  $\text{NH}_4\text{Cl}$  6.08  
 $K_{b \text{ NH}_3} = 1.8 \times 10^{-5}$   
>> Write hydrolysis, calculate  $K_a$ , determine  $[\text{H}^+]$  using an ICE table, then calculate the pH.

**7) Diprotic Acid Solution** – 1<sup>st</sup> is strong, 2<sup>nd</sup> is weak  
Calculate the pH of 0.00125 M  $\text{H}_2\text{CO}_3$  4.64  
 $K_{a1} = 4.2 \times 10^{-7}$   $K_{a2} = 4.8 \times 10^{-11}$   
>> Assume the only impactful amount of  $[\text{H}^+]$  dissociated came from the 1<sup>st</sup> ionization, determine  $[\text{H}^+]$  using an ICE table, then calculate pH.

**8) Mixture of Acid and Base** – neutralize then see excess  
Calculate the pH of 20.0 mL of 0.00125 M  $\text{HNO}_3$  added to 30.0 mL of 0.00125 M KOH 10.398  
>> Determine the moles of excess  $\text{H}^+$  or  $\text{OH}^-$  taking into account the balanced chemical equation, determine the total volume of the mixture, calculate the  $[\text{H}^+]$  or  $[\text{OH}^-]$  based on the excess that was left after neutralization, then calculate the final pH.