

# 17 • The Chemistry of Acids and Bases

## pH CALCULATION SITUATIONS

### Ch 17

- strong acid solution** – determine  $[H^+]$ , calculate pH  
Calculate the pH of 0.00125M  $HNO_3$
- strong base solution** – determine  $[OH^-]$ , calculate pOH, calculate pH  
Calculate the pH of 0.00125M  $KOH$
- weak acid solution** – determine  $[H^+]$  using ICE box, calculate pH  
Calculate the pH of 0.00125M  $HOCl$   $K_a = 3.5 \times 10^{-8}$
- weak base solution** – determine  $[OH^-]$  using ICE box, calculate pOH, calculate pH  
Calculate the pH of 0.00125M  $NH_3$   $K_b = 1.8 \times 10^{-5}$
- salt of a weak acid** – write hydrolysis, calc  $K_b$ , determine  $[OH^-]$  using ICE box, calc pOH, calc pH  
Calculate the pH of 0.00125M  $NaOCl$
- salt of a weak base** – write hydrolysis, calc  $K_a$ , determine  $[H^+]$  using ICE box, calc pH  
Calculate the pH of 0.00125M  $NH_4Cl$
- diprotic acid solution** – assume all  $[H^+]$  from first ionization, determine  $[H^+]$  using ICE box, calculate pH  
Calculate the pH of 0.00125M  $H_2CO_3$   $K_{a1} = 4.2 \times 10^{-7}$   $K_{a2} = 4.8 \times 10^{-11}$
- mixture of acid and base** – calculate moles of  $H^+$  and  $OH^-$ , determine moles of excess  $H^+$  or  $OH^-$ , determine total volume, calculate  $[H^+]$  or  $[OH^-]$ , calculate pH  
Calculate the pH of 20.0 mL of 0.00125M  $HNO_3$  + 30.0 mL of 0.00125M  $KOH$

For Later...

### Ch 18

- pH of a buffer with equal concentrations of donor  $[HA]$  and acceptor  $[A^-]$**   
 $pH = pK_a$  or  $pOH = pK_b$
- pH of a buffer with unequal concentrations of donor  $[HA]$  and acceptor  $[A^-]$**   
Henderson-Hasselbach equation

Answers:

1	2	3	4	5	6	7	8
pH = 2.903	pH = 11.097	pH = 5.18	pH = 10.15	pH = 9.28	pH = 6.08	pH = 4.64	pH = 10.398