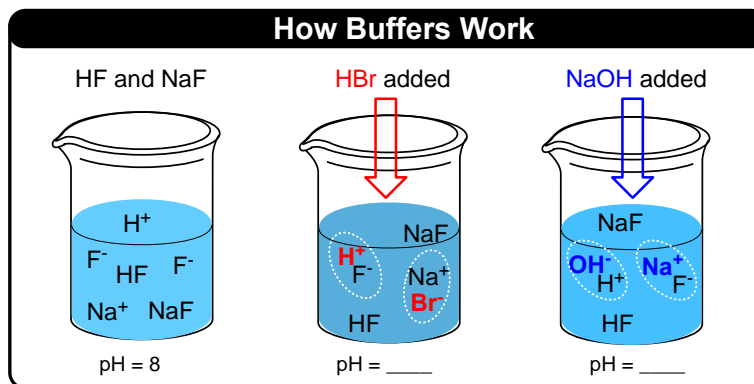<u>**CONCEPT:**</u> <u>INTRO TO BUFFERS</u>

● **Acid-Base Buffers** are solutions which _____ drastic changes in pH by _____ additional acid or base.

   □ A *Buffer* contains both _____ and _____, which neutralizes added ____ and ____ ions, respectively.

Buffer Creation

● There are ____ ways to create a Buffer:

Buffer Creation	
1. Weak acid or base + _____	0.40 M NH_3 and 0.40 M NH_4^+ - ideal buffer: [weak] [conj.]
2. Strong Acid + Weak Base - weak base needs to be ___ [ ]	0.20 M HCl and ___ M CH_3NH_2
3. Strong Base + Weak Acid - weak acid needs to be ___ [ ]	1.3 M KNH_2 and ___ M H_2SO_3

EXAMPLE: Select ALL pair(s) that could form a buffer solution.

a) CH_3CO_2H and HF   b) HNO_3 and NH_3 c) HCl and NaCl   d) KOH and HCN   e) NaBr and NaOH

PRACTICE: Which pairs of compounds are capable of making a buffer? Select all that apply.

a) 1.3 M LiOH and 1.7 M HCOOH

b) 0.784 M NH_4^+ and 0.800 M $HClO_4$

c) 0.35 M CH_3CO_2H and 0.35 M NaOH

d) 0.80 HNO_3 and 0.15 MgO

<u>CONCEPT:</u> INTRO TO BUFFERS

<u>**Buffer Capacity**</u>

● The _____ of acid or base that a buffer can _____ before the pH of the solution starts to noticeably change.

　　□ The _____ the concentration of buffer components, the _____ the buffer capacity

　　　　- _____ concentrations of WA and CB = better buffer

EXAMPLE: Which of the following combinations would make a buffer with the greatest buffering capacity? (1 L solution.)

a) 0.25 moles $HClO_2$ and 0.20 moles $NaClO_2$　　　　　　c) 0.35 moles HNO_2 and 0.30 moles KNO_2

b) 0.35 moles $HClO_2$ and 0.25 moles $NaClO_2$　　　　　　d) 0.50 moles HNO_2 and 0.48 moles KNO_2

<u>**Buffer Range**</u>

● Buffer is effective as long as it has the right concentration _____ of weak species to its _____.

　　□ **Buffer Range**: WA:CB = _____ or _____

　　　　- Buffer is ideal when [WA] = [CB]

　　□ Larger the _____ in [ ]s between weak species and its conjugate, the less effective a buffer will be.

EXAMPLE: Which of the following combinations would create the most effective buffer?

a) 1.2 M CH_3NH_2 and 1.0 M $CH_3NH_3^+$　　　　　c) 0.25 M CH_3NH_2 and 1.5 M $CH_3NH_3^+$

b) 1.3 M CH_3NH_2 and 0.78 M $CH_3NH_3^+$　　　　　d) 0.68 M CH_3NH_2 and 6.8 M $CH_3NH_3^+$

PRACTICE: Determine which of the following actions will destroy a buffer composed of 0.50 L of 1.44 M H_3PO_4 and 0.60 L of 1.25 M NaH_2PO_4.

a) Addition of 1.45 moles of KH_2PO_4

b) Addition of 0.85 moles of HCl

c) Addition of water

d) Addition of 0.30 moles of $Ca(OH)_2$

e) Addition of 0.70 moles of HIO_4