Mr. Bracken
AP Chemistry

Name _____
Period _____

Acids & Bases Notes #3

Acid Strength Trends: (Memorize)

HI > HBr > HCl >> HF **HF = weak acid, trend follows**
strongest acid *weakest acid*

$HClO_3$ > $HBrO_3$ > HIO_3 **Cl has the greatest charge/size ratio**
strongest acid *weakest acid*

$HClO_4$ > $HClO_3$ > $HClO_2$ > HClO **More oxygens = stronger acid**

2. Explain the following observations:

(a) HNO_3 is a stronger acid than HNO_2

(b) H_2S is a stronger acid than H_2O

(c) H_2SO_4 is a stronger acid than H_2SeO_4

3. Complete the following table where pKa = -log [Ka]

Acid	**pKa**	**Ka**
A		1.8×10^{-3}
B	4.12	
C	3.34	

4. Ka is related to the strength of an acid. The greater the Ka value, the stronger the acid. Which acid (A, B, or C) shown above would be the strongest?

Consider the following equilibrium system:

	A	**+**	**H_2O**	**⇆**	**C**	**+**	**D**
Initial	0.25 M				0		0.41 M

Which direction (right or left) will the equilibrium shift immediately?

What is the pH of a 0.30 M $HC_2H_3O_2$ solution? The Ka for $HC_2H_3O_2$ is 1.8×10^{-5}.

pH = 2.64

Consider the same reaction, but what will happen to the overall equilibrium pH if 0.30 moles of solid $NaC_2H_3O_2$ is added to 1 Liter of the 0.30 M $HC_2H_3O_2$ solution? (assume the solution volume remains 1 Liter)

$NaC_2H_3O_2$ is a strong electrolyte which breaks apart to produce Na^{1+} and $C_2H_3O_2^{1-}$ ions

Buffers

Buffered Systems: resist changes in pH when small amounts of acids or bases are added.

Buffered Systems: contain combinations of **weak acids** and **weak bases**

Common Buffer Combinations:

$HC_2H_3O_2$ mixed with $C_2H_3O_2^{1-}$ NH_4^{1+} mixed with NH_3

Buffer Example #1:
What is the pH of a buffer that is 0.12 M **H**$C_3H_5O_2$ and 0.10 M $NaC_3H_5O_2$? Ka = 1.3×10^{-5}

Buffer Example #2:
What is the pH of a buffer made from 0.12 M benzoic acid (**H**$C_7H_5O_2$) and 0.20 M sodium benzoate ($NaC_7H_5O_2$) ? Ka = 6.3×10^{-5}