

Common Ion Effect

Common Ion Effect and Buffers

Common Ion Effect

- Le Chatelier's Principle says that increasing the concentration of the product of a reaction will have what effect on the equilibrium?
 - Shift the equilibrium to the left, toward the reactants
- Consider the dissociation reaction for acetic acid
 - $\text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COO}^- + \text{H}^+$
 - What effect would increasing the concentration of CH_3COO^- have on the equilibrium?
 - How could we effect this change?
 - Add NaCH_3COO
 - What effect would it have on the strength of the acid?
 - pH?
- This is the common ion effect
 - The dissociation of a weak electrolyte is decreased by adding to the solution a strong electrolyte that has an ion in common with the weak electrolyte

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- What is the pH of a 0.30 M acetic acid solution?

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- What is the pH of a solution that is 0.30 M in acetic acid and 0.30 M in sodium acetate?
- The second solution is a buffer
- An interesting mathematical thought....
 - What calculation determines the pH of a buffer created by equal-molar amounts of acid and conjugate base ion?
 - The pKa
 - Remember this for later

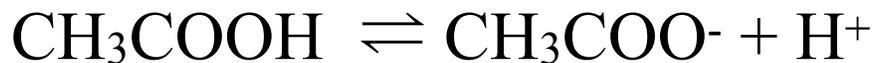
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Buffers

- Buffers are solutions which resist changes in pH
- Combination of a weak acid or base and a conjugate salt
- They behave as buffers by taking additional H^+ or OH^- ions and readjusting their equilibrium to “absorb” the change.

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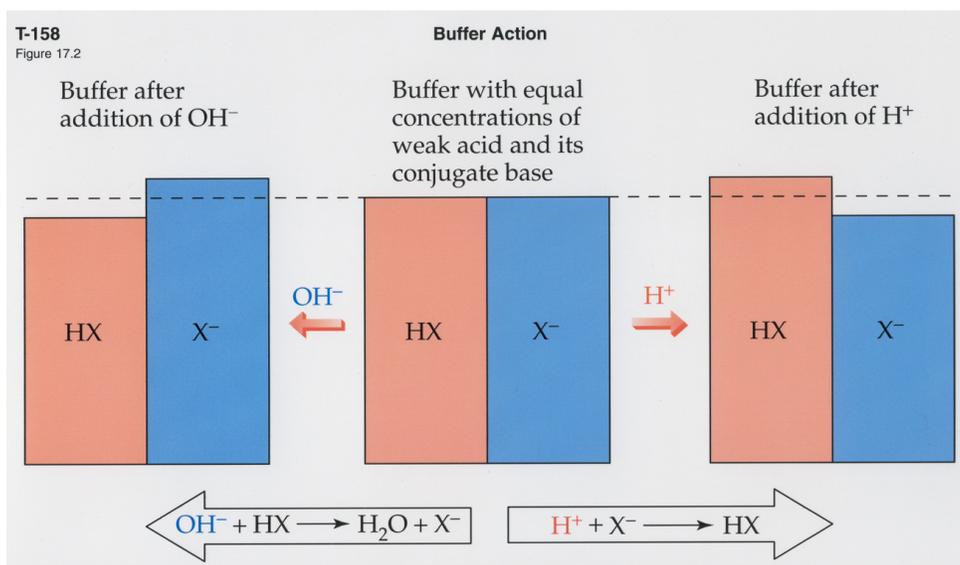
Buffers



- How would this reaction respond to additional H^+
- Additional OH^-
- The key players are the weak acid and the conjugate base
- The important part is how the response of solution 2 (the buffer) is different from solution 1 (the weak acid solution)

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Buffers



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Homework

- 17.1 / 17.2 / 17.3 / 17.4 / 17.14 / 17.15a&b / 17.17
- 17.19 - Explain why a mixture of CH_3COOH and NaCH_3COO can act as a buffer while a mixture of HCl and NaCl cannot
- 17.21b / 17.22a