Buffers – Reading Guide

*section 14.6 in OpenStax*

What is a **buffer** and what two components are required to make a buffer?

Consider a buffer that is 0.250 *M* HF and 0.200 *M* F–.

What component in the buffer neutralizes any added base?

What component in the buffer neutralizes any added acid?

For buffer solutions, an ICE table may be used to determine equilibrium concentrations. Follow Example 14.20 (part a) to see how this is done. Create an ICE table for a buffer that is 0.250 *M* HF and 0.200 *M* F–.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | HF (*aq)* + H2O (*l*) | | ⮀ | F– (*aq)* + H3O+ (*aq*) | |
| I |  | -- |  |  |  |
| C |  | -- |  |  |  |
| E |  | -- |  |  |  |

Use your ICE table to calculate the pH of this buffered solution. The Ka of HF is 3.5 x 10-4. *You may assume x is small.*

*(ans. [H3O+] = 4.37 x 10-4 M, pH=3.36)*

The pH of **buffered solutions** can also be calculated using the Henderson-Hasselbalch equation, which states

pH =

Calculate the pH for a buffer that is 0.250 *M* HF and 0.200 *M* F- using the Henderson-Hasselbalch equation. The Ka of HF is 3.5 x 10-4.

*(ans. pH=3.36)*

Define **buffer capacity**:

The effective range for a buffering system is plus or minus \_\_\_\_\_\_\_\_\_pH unit.

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the concentrations of both acid and conjugate base, the more effectively the buffer can resist pH change.

In order for a buffer to be effective, the relative concentrations of acid and conjugate base should not differ by more than \_\_\_\_\_\_\_\_\_%.

**End of Chapter 14 Practice Problems**

#89, 95, 97, 101

For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”