

Name: _____ Date: _____

CHAPTER 25: EQUILIBRIA

4. BUFFER SOLUTION

Learning objectives:

- Define a buffer solution explain its function in resisting pH
- Identify acidic and basic buffer solution and state the components of each

BUFFER SOLUTION

- A buffer solution is a solution that _____ changes in _____ when _____ amounts of _____ or _____ are added.
- Buffer solutions work due to the presence of a _____ equilibrium.

TYPES OF BUFFER SOLUTION

a) Acidic buffer

An acidic buffer contains:

- A _____ acid and its _____ that is usually present as _____
- Eg: _____ acid, CH_3COOH and sodium _____, CH_3COONa

b) Basic buffer

A basic buffer contains:

- A _____ base and its _____, that is usually present as _____
- Eg: _____, NH_3 and _____ chloride, NH_4Cl

HOW DO BUFFERS WORK?

ACIDIC BUFFERS

Example of a weak acid:

Equation: $\text{CH}_3\text{COOH}(\text{aq}) \rightleftharpoons \text{_____}(\text{aq}) + \text{_____}(\text{aq})$

Example of its salt, _____:

Equation: _____

In the buffer solution, it contains relatively high concentration of both _____ and _____.

• Addition of acid in acidic buffer

When a small amount of acid is added:

- Added _____ ions react with _____ ions

Explanation:

- addition of H^+ ions shifts the position of equilibrium to the _____ because H^+ ions combine with _____ ions to form more _____ until equilibrium is established.
- The large reserve supply of CH_3COO^- ensure that the concentration of CH_3COO^- ions in solution _____ change significantly.

- The large reserve supply of CH_3COOH ensures that the concentration of CH_3COOH molecules in solution _____ change significantly.
- So the pH _____ change significantly.

● Addition of alkali in acidic buffer

When a small amount of alkali is added:

- _____ ions react with _____ ions

Explanation:

- The added _____ ions combine with the _____ ions to form water.
- This reduces the concentration of _____ ions.
- The position of equilibrium will shift to the _____
- So CH_3COOH molecules ionise to form more H^+ and CH_3COO^- ions until equilibrium is re-established.
- The large reserve supply of CH_3COOH ensure that the concentration of CH_3COOH molecules in solution does not change significantly.
- So the pH does not change significantly.

BASIC BUFFER

Example of a weak base:

Equation: $\text{NH}_3(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightleftharpoons \text{NH}_4^+(\text{aq}) + \text{OH}^-(\text{aq})$

Example of its salt, _____

Equation: _____

In the buffer solution, it contains relatively high concentration of both _____ and _____

Explain how this buffer solution minimises changes in pH of addition of small amount of:

i) dilute hydrochloric acid

ii) Dilute sodium hydroxide
