

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,  $\text{CH}_3\text{COOH}$  and sodium \_\_\_\_\_,  $\text{CH}_3\text{COONa}$

b) Basic buffer

A basic buffer contains:

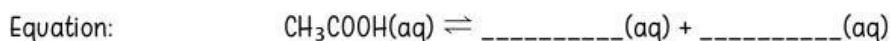
- A \_\_\_\_\_ base and its \_\_\_\_\_, that is usually present as \_\_\_\_\_

Eg: \_\_\_\_\_,  $\text{NH}_3$  and \_\_\_\_\_ chloride,  $\text{NH}_4\text{Cl}$

#### HOW DO BUFFERS WORK?

##### ACIDIC BUFFERS

Example of a weak acid:



Example of its salt, \_\_\_\_\_:



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  $\text{H}^+$  ions shifts the position of equilibrium to the \_\_\_\_\_ because  $\text{H}^+$  ions combine with \_\_\_\_\_ ions to form more \_\_\_\_\_ until equilibrium is established.
- The large reserve supply of  $\text{CH}_3\text{COO}^-$  ensure that the concentration of  $\text{CH}_3\text{COO}^-$  ions in solution \_\_\_\_\_ change significantly.

- The large reserve supply of  $\text{CH}_3\text{COOH}$  ensures that the concentration of  $\text{CH}_3\text{COOH}$  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  $\text{CH}_3\text{COOH}$  molecules ionise to form more  $\text{H}^+$  and  $\text{CH}_3\text{COO}^-$  ions until equilibrium is re-established.
- The large reserve supply of  $\text{CH}_3\text{COOH}$  ensure that the concentration of  $\text{CH}_3\text{COOH}$  molecules in solution does not change significantly.
- So the pH does not change significantly.

**BASIC BUFFER**

Example of a weak base:



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

---



---



---



---



---