



**Centurion**  
**UNIVERSITY**  
*Shaping Lives...*  
*Empowering Communities...*

# **CONCEPT OF PH, POH AND BUFFER**

**BY, LIPSA SAMAL**

**ASST. PROF (PA & QA), SPLS, CUTM**



**Centurion**  
**UNIVERSITY**

*Shaping Lives...  
Empowering Communities...*

## PH AND POH

- **pH is the measure of the concentration of hydrogen ions in a solution.**
- **pH is measured on a log scale.**
- **$\text{pH} = -\log[\text{H}^+]$**
- **pH is used to indicate the degree of acidity or alkalinity (basic) of a solution.**
- **A solution is of a water solvent (polar)**



**Centurion**  
**UNIVERSITY**

*Shaping Lives...*

*Empowering Communities...*

- **When there is a high  $[H^+]$ , the solution is acidic. On the other hand when the  $[H^+]$  concentration is low, the solution is basic.**
- **So if there is a high  $[H^+]$ , there must be a low  $[OH^-]$  and If there is a low  $[H^+]$ , there must be a high  $[OH^-]$ .**
- **pH Scale The pH scale ranges from 0 to 14. 0 being the most acidic and 14 being the most basic.**
- **Ph scale having no unit.**



O.P.J.S.  
UNIVERSITY

Shaping Lives...  
Empowering Communities...

**QUESTION-** If given HCl with a concentration of 0.003M, what would be the pH?

**Ans-**  $\text{pH} = -\log [\text{H}^+]$

$$\text{pH} = -\log[0.003\text{M}]$$

$$\text{pH} = 2.52$$

- pH and pOH relate in the following way,

$$\text{pH} + \text{pOH} = 14$$

**pOH is the measure of the  $[\text{OH}^-]$  concentration.**



**Centurion**  
**UNIVERSITY**

*Shaping Lives...  
Empowering Communities...*

## **BUFFER**

- **A buffer solution is a solution which resists changes in pH when a small amount of acid or base is added.**
- **Typically a mixture of a weak acid and a salt of its conjugate base or weak base and a salt of its conjugate acid.**
- **TYPES OF BUFFERS**
- **Two types : ACIDIC BUFFERS – Solution of a mixture of a weak acid and a salt of this weak acid with a strong base.**
- **E.g.  $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$  ( weak acid ) ( Salt )**



**Centurion**  
**UNIVERSITY**

*Shaping Lives...*

*Empowering Centurions...*

**BASIC BUFFERS – Solution of a mixture of a weak base and a salt of this weak base with a strong acid.**

**e.g.  $\text{NH}_4\text{OH} + \text{NH}_4\text{Cl}$  (Weak base) ( Salt)**

### **HENDERSON HASSELBALCH EQUATION**

- **Lawrence Joseph Henderson wrote an equation, in 1908, describing the use of carbonic acid as a buffer solution. Karl Albert Hasselbalch later re-expressed that formula in logarithmic terms, resulting in the Henderson–Hasselbalch equation.**



**Centurion**  
**UNIVERSITY**

*Shaping Lives...  
Empowering Communities...*



$$K_a = [\text{H}^+] [\text{A}^-] / [\text{HA}]$$

**take the -log on both sides,**

$$-\log K_a = -\log [\text{H}^+] -\log [\text{A}^-] / [\text{HA}]$$

$$\text{pH} = \text{p}K_a + \log [\text{A}^-] / [\text{HA}] = \text{p}K_a + \log [\text{Proton acceptor}] / [\text{Proton donor}]$$

- **The greater the buffer capacity the less the pH changes upon addition of H<sup>+</sup> or OH<sup>-</sup>.**
- **Choose a buffer whose pK<sub>a</sub> is closest to the desired pH. pH should be within pK<sub>a</sub> ± 1**



**Centurion**  
**UNIVERSITY**

*Shaping Lives...*  
*Empowering Communities...*

**THANK YOU**