

# Buffer solution and its Application.

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The <sup>buffer</sup> solution is that solution which can resist the change in pH even after the addition of small amount of acid or base ~~solutio~~ solution from outside. It is called

In a biological system, blood is an example of buffer solution and its pH remains almost constant to 7.4 and maintained by by ~~act~~ addition of  $H_2CO_3$ ,  $NaHCO_3$  and  $CO_2$ .

Blood (pH 7.35-7.44)  $\rightarrow$  maintained by  $H_2CO_3$  &  $NaHCO_3$ .

(Tendency to resist change in pH after addition of acid or base.)  
(Buffer solutions)

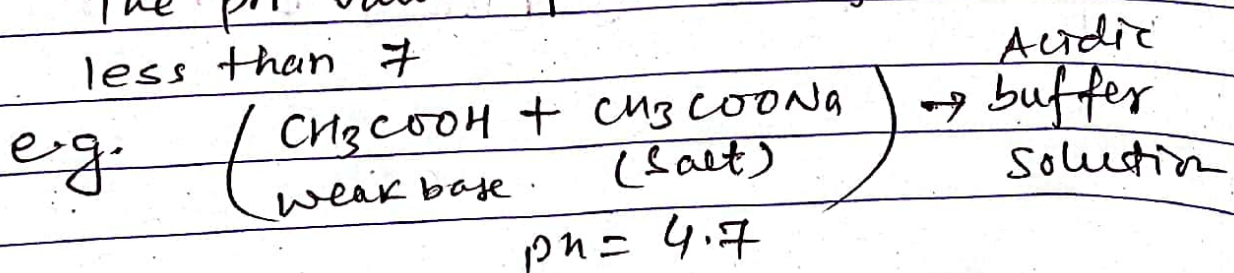
Buffer solutions are of two types:-

## ① Acidic buffer solution.

The acidic buffer solution prepared by mixing equimolar concentration solution of weak acid and its salt solution is called acidic buffer solution.

eg.

The pH value of acidic buffer solution is less than 7





## (ii) Basic Buffer solution:-

The buffer solution prepared by mixing of equimolar concent quantities of weak base and its salt solution is called basic buffer solution.

The pH value of basic buffer solution is more than 7.

examples:-

The equimolar mixture of solution of  $\text{NH}_4\text{OH}$  and its salt solution  $\text{NH}_4\text{Cl}$ .

Sol<sup>n</sup> of  $\text{NH}_4\text{OH}$  + solution of  $\text{NH}_4\text{Cl} \Rightarrow \text{pH} = 9.25$   
(weak base) (Salt)

$\text{H}_2\text{CO}_3 + \text{NaHCO}_3 \rightarrow \text{pH} = 7.35$

The pH of buffer solution can be calculated by Henderson equation.

$$\text{pH} = \text{pK}_a + \log \frac{[\text{Salt}]}{[\text{Acid}]} \quad (\text{for acidic salt buffer})$$

$$\text{pOH} = \text{pK}_b + \log \frac{[\text{Salt}]}{[\text{Base}]} \quad [\text{For basic buffer}]$$



## Applications of Buffer Solution.

### 1. Maintenance of life:-

Most biochemical process work within a relatively small pH values.

The body uses buffers solution to maintain a constant pH.

eg. Blood contains a carbonate/bicarbonate buffer to maintain pH close to  $7.35 \pm 0.05$

### 2. In industry → In brewing industry -

Buffer solutions are added before fermentation begins. It prevents the solutions becoming too acidic and spoiling the product

→ In textile, paper, drugs ~~industry~~, pharmaceutical industry → It used for the manufactures of paper, dyes, ink, paint, drugs etc.

### ③ In shampoos.

citric acid/~~solution~~ sodium citrate balance the pH of shampoos.

### ④ In analytical chemistry → for qualitative analysis of group IIIA and II B, the solution of salts are buffered by $\text{NH}_4\text{Cl} + \text{NH}_4\text{OH}$ .

~~NH<sub>4</sub>Cl~~