

Class - U.G. Semester - II  
Subject - Chemistry (MJC)  
Paper - MJC - II  
Topic - pOH value

Dr. Rashmi Sinha

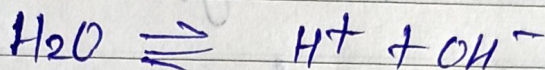
Deptt. of Chemistry

H.D. Jain College, Ara

## pOH value

pOH is defined as the negative logarithm of  $\text{OH}^-$  ions concentration.

Water dissociates into a very small extent according to the following equation



According to the law of mass action

$$K = \frac{[\text{H}^+][\text{OH}^-]}{[\text{H}_2\text{O}]}$$

$$\text{or } K[\text{H}_2\text{O}] = [\text{H}^+][\text{OH}^-]$$

Since water is in large scale  $[\text{H}_2\text{O}]$  may be taken to be constant.

Hence,

$$K_w = [\text{H}^+][\text{OH}^-]$$

Where  $K_w = \text{constant}$ , known as ionic product of water.

At  $25^\circ\text{C}$  the value of  $K_w$  is found to be  $10^{-14}$ . Since in water

$$[\text{H}^+] = [\text{OH}^-] = 10^{-7}$$

Because pure water is neutral. Hence pOH of any neutral solution is 7.

pOH is also defined to be -ve exponent to which when 10 is raised

the value becomes equal to  $\text{OH}^-$  ion concentration

$$\text{i.e. } 10^{-\text{pOH}} = [\text{OH}^-]$$

taking log both sides

$$\log 10^{-\text{pOH}} = \log [\text{OH}^-]$$

$$\text{or } -\text{pOH} \log_{10} = \log [\text{OH}^-]$$

$$\text{or } \text{pOH} \log_{10} = -\log [\text{OH}^-]$$

$$\text{But } \log_{10} = 1$$

$$\text{pOH} = -\log [\text{OH}^-]$$

$$\text{or, pOH} = \log \frac{1}{[\text{OH}^-]}$$

Hence pOH is equal to negative value of logarithm of  $\text{OH}^-$  ions to the base 10.

$$\text{or, pOH} = -\log_{10} [\text{OH}^-]$$

$$\text{or } \text{pOH} = \log_{10} \frac{1}{[\text{OH}^-]}$$