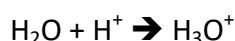


## Answer on Question #76522, Chemistry / General Chemistry

The pH of a solution describes its acidity or alkalinity: Describe how pH and  $\text{H}_3\text{O}^+$  concentration are related and explain why diluting an acid raises the pH, but diluting a base lowers the pH.

### Answer

pH shows the concentrations of  $\text{H}^+$  ions in the solutions. As  $\text{H}^+$  ion is a single proton, it is very small and positive particle with high charge density, that's why it finds a molecule to join. It joins usually to a molecule of water (because there are a lot of them in the solution).



In other words in water solution  $\text{H}^+$  ions exist in the form of  $\text{H}_3\text{O}^+$ . So their concentrations are equal.

pH is **negative** logarithm of the concentration of  $\text{H}^+$ .

$$\text{pH} = -\lg[\text{H}^+].$$

That means that if the concentration is 0.1 M or  $10^{-1}$  M, pH is 1. If the concentration is 0.01M or  $10^{-2}$  M, pH is 2. Less concentration of acid means higher pH. If acidic solution is very diluted like  $10^{-6}$  M, pH is 6.

In case of bases there is another unit pOH that shows the concentration of  $\text{OH}^-$  ions in the same way like pH

$$\text{pOH} + \text{pH} = 14, \text{ or } \text{pH} = 14 - \text{pOH}$$

In this case diluting the base we increase pOH and increase pH at the same time.

If the concentration of base is  $10^{-1}$  M, pOH is 1, so pH is 13. If the base is more diluted like  $10^{-4}$  M, pOH is 4, and pH is 10. The lower concentration of base means the lower magnitude of pH only because it is **negative** logarithm.