Answer on Question #76522, Chemistry / General Chemistry

The pH of a solution describes its acidity or alkalinity: Describe how pH and H_3O^+ 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 H^+ ions in the solutions. As H^+ ion is a single proton, it is very small and positive particle with high charge density, that's why it founds a molecule to join. It joins usually to a molecule of water (because there are a lot of them in the solution).

$H_2O + H^+ \rightarrow H_3O^+$

In other words in water solution H^+ ions exist in the form of H_3O^+. So their concentrations are equal.

pH is **negative** logarithm of the concentration of H^+.

$pH = -lg[H^+]$.

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 OH^- ions in the same way like pH

$pOH + pH = 14$, or $pH = 14 – pOH$

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.