

ACID-BASE CALCULATIONS

- In each of the following solutions, determine: i) hydronium ion concentration iii) pH
ii) hydroxide ion concentration iv) pOH
 - $0.030 \text{ mol/dm}^3 \text{ HCl}$
 - $0.125 \text{ mol/dm}^3 \text{ HBr}$
 - $0.025 \text{ mol/dm}^3 \text{ NaOH}$
 - $0.050 \text{ mol/dm}^3 \text{ Ca(OH)}_2$
 - $0.100 \text{ mol/dm}^3 \text{ H}_2\text{CO}_3$
 - $0.250 \text{ mol/dm}^3 \text{ HCN}$
 - $0.125 \text{ mol/dm}^3 \text{ HNO}_2$
 - $0.150 \text{ mol/dm}^3 \text{ HOCCOOH}$
 - $0.175 \text{ mol/dm}^3 \text{ H}_2\text{SO}_3$
- Calculate $[\text{H}_3\text{O}^+]$, $[\text{ClO}_4^-]$ and $[\text{OH}^-]$ in an aqueous solution that is 0.150 M in $\text{HClO}_4(\text{aq})$. Is the solution acidic or basic?
- Calculate $[\text{OH}^-]$, $[\text{K}^+]$ and $[\text{H}_3\text{O}^+]$ in an aqueous solution that is 0.250 M in $\text{KOH}(\text{aq})$. Is the solution acidic or basic?
- Compute $[\text{Ca}^{2+}]$, $[\text{OH}^-]$ and $[\text{H}_3\text{O}^+]$ for a solution that is prepared by dissolving 0.600 g of Ca(OH)_2 in enough water to make 0.500 dm^3 of solution.
- The pH of human muscle fluid is 6.8 . Compute the value of $[\text{H}_3\text{O}^+]$ in muscle fluid at 25°C .
- The pH of household ammonia is about 12 . Calculate the value of $[\text{OH}^-]$ for the ammonia solution.
- The pH of human blood is fairly constant at 7.4 . Compute the hydronium ion and the hydroxide ion concentrations in human blood.
- The pH of the world's oceans is remarkably constant at 8.15 . Compute the hydronium ion and hydroxide ion concentrations in the oceans.
- Normal rainwater has a pH of about 5.6 , whereas what is called acid rain has been observed to have pH values as low as 3.0 . Compute the ratio of $[\text{H}_3\text{O}^+]$ in acid rain to that in normal rain.
- The value of K_a in water at 25°C for benzoic acid, $\text{HC}_7\text{H}_5\text{O}_2$ is 6.46×10^{-5} . Calculate the pH of an aqueous solution with a total concentration of $\text{HC}_7\text{H}_5\text{O}_2$ of 0.0200 M .
- Sulfamic acid, HO_3SNH_2 , is used as a stabilizer for chlorine in swimming pools. Calculate the pH of a 0.0400 M sulfamic acid solution given that $K_a = 0.100$.
- Calculate the pH of an aqueous solution of 0.150 M HClO .
- Suppose two aspirin tablets ($1 \text{ tablet} = 324 \text{ mg}$) are dissolved in enough water to make 500.0 cm^3 of solution. Compute the pH of the resulting solution if $K_a = 2.75 \times 10^{-5}$ and the molar mass for aspirin (acetylsalicylic acid) is 180.15 g/mol .
- What is the hydronium ion concentration in a solution of $0.100 \text{ M CH}_3\text{COOH}$ and $2.00 \text{ M NaCH}_3\text{COO}$?
- What is the hydronium ion concentration in a solution of 0.0875 M HClO and 0.0550 M NaClO ?
- Calculate the $[\text{H}_3\text{O}^+]$ in a solution that is $1.125 \text{ M CH}_3\text{COOH}$ if enough NaCH_3COO is added to make the solution 0.5005 M with respect to the CH_3COO^- ?
- A solution was made up to be 0.100 M in chloroacetic acid ($\text{HC}_2\text{H}_2\text{O}_2\text{Cl}$) and also 0.00200 M in sodium chloroacetate ($\text{NaC}_2\text{H}_2\text{O}_2\text{Cl}$). The K_a for chloroacetic acid is 1.36×10^{-3} . Determine the pH of the solution.
- Find the pH of a litre of solution, in which is dissolved 0.0800 mol of $\text{HC}_2\text{H}_3\text{O}_2$ and 0.100 mol of $\text{NaC}_2\text{H}_3\text{O}_2$.
- 25.0 mL of a 0.100 M HCOOH is added to 35.0 mL of 0.0500 M HCOONa . Determine the pH.
- 100.0 mL of $0.300 \text{ M CH}_3\text{COOH}$ is mixed with 100.0 mL of $0.400 \text{ M CH}_3\text{COONa}$. Determine the pH.