

Chem 321

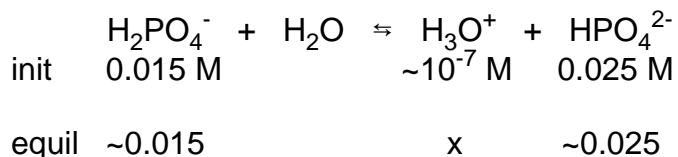
Module 14: Calculation of the Buffer pH Using Concentrations

Buffer solution: mix 100 mL of 0.030 M KH_2PO_4 + 100 mL of 0.050 M K_2HPO_4

Solution

Since equal volumes of the solutions are mixed, the resulting concentration of each salt is just one-half of its starting concentration.

$$[\text{H}_2\text{PO}_4^-] = 0.015 \text{ M} \quad \text{and} \quad [\text{HPO}_4^{2-}] = 0.025 \text{ M}$$



$$K_a = 6.3 \times 10^{-8} = \frac{[\text{H}_3\text{O}^+][\text{HPO}_4^{2-}]}{[\text{H}_2\text{PO}_4^-]} = \frac{[\text{H}_3\text{O}^+](0.025)}{(0.015)}$$

$$[\text{H}_3\text{O}^+] = 3.7_8 \times 10^{-8} \Rightarrow \text{pH} = -\log([\text{H}_3\text{O}^+]) = \mathbf{7.42}$$