Protonation states

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1 Introduction

The Henderson-Hasselbalch equation states that

$$\text{pH} = \text{p}K_a + \log_{10} \frac{[\text{base}]}{[\text{acid}]}.$$

By rearranging terms, we can write the Henderson-Hasselbalch equation as

$$\frac{[\text{base}]}{[\text{acid}]} = 10^{\text{pH}-\text{p}K_a}.$$

In this form, we can see that when the pH of the surroundings is greater than $\text{p}K_a$, more base is present. In other words, the **deprotonated form dominates when the acid is more acidic than its surroundings**. Furthermore, for every increase in the difference $\text{pH}-\text{p}K_a$, the dominance of the deprotonated form increases ten-fold.