

LECTURE 21

1. Using the values of K_b provided, calculate the pH and $[\text{OH}^-]$ for each of the solutions below:

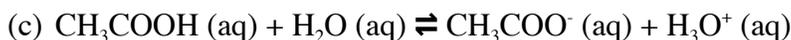
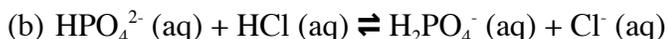
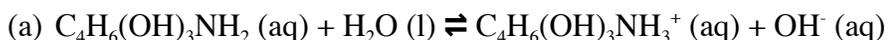
(a) 0.30 M ammonia ($K_b = 1.8 \times 10^{-5}$)

(b) 0.54 M hydroxylamine ($K_b = 1.1 \times 10^{-8}$)

(a) $[\text{OH}^-] = 2.3 \times 10^{-3} \text{ M}$; pH = 11.36 (or 11.37)

(b) $[\text{OH}^-] = 7.7 \times 10^{-5} \text{ M}$; pH = 9.89

2. The following reactions are important for buffer creation in biological chemistry labs. Identify the conjugate acid-base pairs.



(a) As written, $\text{C}_4\text{H}_9(\text{OH})_3\text{NH}_2$ is the base and $\text{C}_4\text{H}_9(\text{OH})_3\text{NH}_3^+$ (aq) is its conjugate acid. H_2O is the acid and OH^- is its conjugate base.

(b) As written, HPO_4^{2-} is the base and H_2PO_4^- is its conjugate acid. HCl is the acid and Cl^- is its conjugate base.

(c) As written, CH_3COOH is the acid and CH_3COO^- is its conjugate base. H_2O is the base and H_3O^+ is its conjugate acid.

3. Ketoacidosis is a serious medical condition caused by a build up of ketone bodies. A 0.50 M solution of one of those ketone bodies, acetoacetic acid, is found to have a pH of 1.95. Determine the K_a of acetoacetic acid.

2.6×10^{-4}

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5.111 Principles of Chemical Science
Fall 2014

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