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8.9 Henderson-Hasselbalch Equation

AP Chemistry

Show your work. Use $pH = pK_a + \log([A^-] / [HA])$. Report pH to two decimal places.

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1. Calculate the pH of a buffer that is 0.200 *M* CH_3COOH and 0.300 *M* CH_3COONa. (K_a of $CH_3COOH = 1.8 \times 10^{-5}$)

2. A chemist has 500.0 mL of 0.400 *M* NH_3 ($K_b = 1.8 \times 10^{-5}$). What mass of NH_4Cl (53.49 g/mol) must be dissolved in it to make a buffer with pH 9.00? Assume the volume does not change.

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3. A 1.00 L buffer contains 0.200 mol CH_3COOH and 0.300 mol CH_3COO^- (pK_a = 4.74). Assume no volume change.

(a) Calculate the pH after 0.0100 mol HCl is added.

(b) Calculate the pH after 0.0100 mol HCl is added to 1.00 L of pure water. Compare (a) and (b).

4. Blood plasma is buffered near pH 7.40 by $H_2PO_4^-$ and HPO_4^{2-} (pK_a = 7.21). What ratio $[HPO_4^{2-}] / [H_2PO_4^-]$ gives pH 7.40?

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