EXAMPLES OF BUFFER PREPARATION

Acid	pK_a	Base	pK_b
phosphoric	2.12	triethylamine	2.99
pyruvic	2.49	ethylamine	3.19
lactic	3.86	dimethylamine	3.27
benzoic	4.19	methylamine	3.44
acetic	4.75	trimethylamine	4.19
carbonic	6.37	ammonia	4.75
dihydrogen phosphate	7.21	TRIS	5.92
hydrogen carbonate	10.3	pyridine	8.75
hydrogen phosphate	12.7	aniline	9.37

1. Prepare a 0.100 M buffer solution at pH 7.00.

   Use dihydrogen phosphate and its conjugate base (hydrogen phosphate) since its pKa is closest to desired pH.

$$H_2PO_4^{-1} + H_2O \rightleftharpoons HPO_4^{-2} + H_3O^+$$

$$\% \text{ base} = \frac{10^{(7.00-7.21)}}{1 + 10^{(7.00-7.21)}} \times 100\% = 38\ \%$$

$[\text{base}] = 0.100\ \text{M} \times 0.38 = 0.038\ \text{M}$ $[\text{acid}] = 0.100\ \text{M} \times 0.62 = 0.062\ \text{M}$

Then prepare a solution with each of these molarities using NaH_2PO_4 and Na_2HPO_4.

2. Prepare a 0.05 M buffer solution at pH 8.00.

   Use TRIS·H^+ and its conjugate base (TRIS) since its pKa is closest to desired pH.

$$\% \text{ base} = \frac{10^{(8.00-8.08)}}{1 + 10^{(8.00-8.08)}} \times 100\% = 45\ \%$$

$[\text{base}] = 0.050\ \text{M} \times 0.45 = 0.0225\ \text{M}$ $[\text{acid}] = 0.050\ \text{M} \times 0.55 = 0.0275\ \text{M}$