

Chem 112
Quiz No. 7
Mar. 10, 2006

Name: _____

Time taken OUT: _____ Time handed IN _____

This quiz (both sides, front and back) is to be taken during one of the permitted time slots and turned in within the maximum allotted time of 30 minutes. **SHOW ALL WORK. NO "MAGIC" PERMITTED. WATCH SIG FIGS.**

Glutamine (MW = 146.2) is an aminoacid (formal structure $\text{H}_2\text{N-CHR-COOH}$) whose complex side chain R does not participate in acid/base reactions in aqueous solutions. For the glutamine family, the pK_a values are: $\text{pK}_1 = 2.17$ and $\text{pK}_2 = 9.13$

- a) Construct the detailed pH line for the glutamine family members, including their formulas (as expected to exist when in aqueous solution) and all known numerical values.
- b) If 20.0 mL of 0.15M NaCl is mixed into 10.0 mL of 0.50M glutamine solution, determine the final pH and the formula of the solute species most abundant in the final solution. Indicate your reasoning clearly.
- c) If 20.0 mL of 0.15M HCl is mixed into 10.0 mL of 0.50M glutamine solution, determine the final pH and the formula of the solute species most abundant in the final solution. Indicate your reasoning clearly.

d) If glutamine particles were present free in a normal sample of blood ($\text{pH} = 7.40$), what would be the ratio of the most abundant forms of glutamine present?

e) If glutamine particles were present free in a normal sample of blood ($\text{pH} = 7.40$), what would be the % of uncharged species present

f) If 0.15 mmol of the sodium salt of glutamine ($\text{Na}^+\text{H}_2\text{N-CHR-COO}^-$) were dissolved in 10.0mL of water, what would be the expected pH of the final solution?

I have neither given nor received any unacknowledged aid on this quiz.

SIGNED _____