Chemistry 2, HW 26

Here's a list of amino acids classified according to their properties:

Nonpolar Amino Acids:

Glycine (Gly) Alanine (Ala) Valine (Val) Leucine (Leu) Isoleucine (Ile) Methionine (Met) Proline (Pro) Phenylalanine (Phe)

Polar Amino Acids:

Serine (Ser) Threonine (Thr) Cysteine (Cys) Tyrosine (Tyr) Asparagine (Asn) Glutamine (Gln) Tryptophan (Trp)

Acidic Amino Acids (Negatively Charged):

Aspartic Acid (Asp) Glutamic Acid (Glu)

Basic Amino Acids (Positively Charged):

Lysine (Lys) Arginine (Arg) Histidine (His)

Remember, some amino acids can have characteristics that place them in more than one category, depending on the context.



α-Amino acid drawn as a zwitterion



α-Amino acid drawn as an uncharged molecule; not an accurate respresentation of amino acid structure

At a specific pH known as the isoelectric point (pI), the positive and negative charges of an ionized amino acid are equal. Glycine has pI = 6. If we put it into more acidic solution (pH lower than 6), COO⁻ group will accept the proton to form COOH, because NH₃⁺ group still has the positive charge, the overall charge of glycine molecule will be positive. If we put the same amino acid in more basic solution (higher pH), NH₃⁺ group will donate the proton, the overall charge on the amino acid will be negative.

The formation of a peptide bond is a key step in the synthesis of proteins, which are composed of long chains of amino acids linked together by these bonds. Condensation Reaction: The actual formation of the peptide bond occurs through a condensation reaction between the carboxyl group (-COOH) of one amino acid and the amino group (-NH₂) of another amino acid. During this reaction, a molecule of water (H₂O) is eliminated, and the carboxyl group of one amino acid bonds covalently with the amino group of the adjacent amino acid, resulting in peptide formation.

Questions:

- 1. Write the reaction of peptide formation between
 - a) Serine and Alanine.
 - b) Glycine and Threonine.
- 2. pI of cysteine equals 5.1. What does it mean? At pH 3.0 how does the zwitterion change? At pH 8.5 how does the zwitterion change?