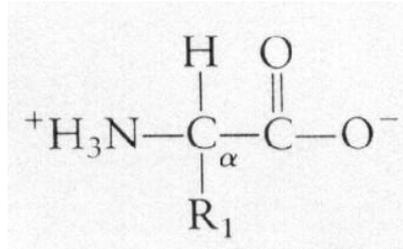
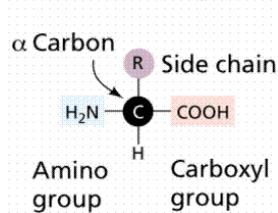


Amino acids, proteins

Amino acids

Conventional depiction



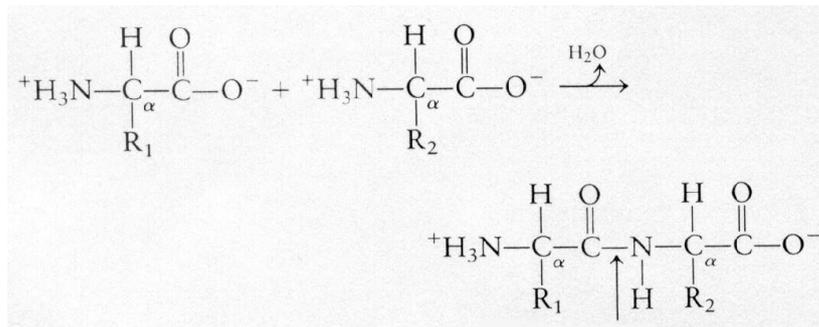
(1) normal (unionized) and

(2) zwitterionic forms

The groups of amino acids, based on side chain characteristics:

- Polar side chains
 - Charged side chains:
 - Positive: alkalic (basic): arginine, lysine, histidine
 - Negative: aspartic acid, glutamic acid
 - Uncharged polar side chains: serine, threonine, asparagine, glutamine, tyrosine
- Nonpolar (hydrophobic) side chains: alanine, cysteine, glycine, leucine, isoleucine, methionine, phenylalanine, valine, proline, tryptophan

Peptide bond:



2 amino acids connect: carboxyl group to amino group

Peptide bond: CONH

peptide bond

Proteins:

Polypeptides

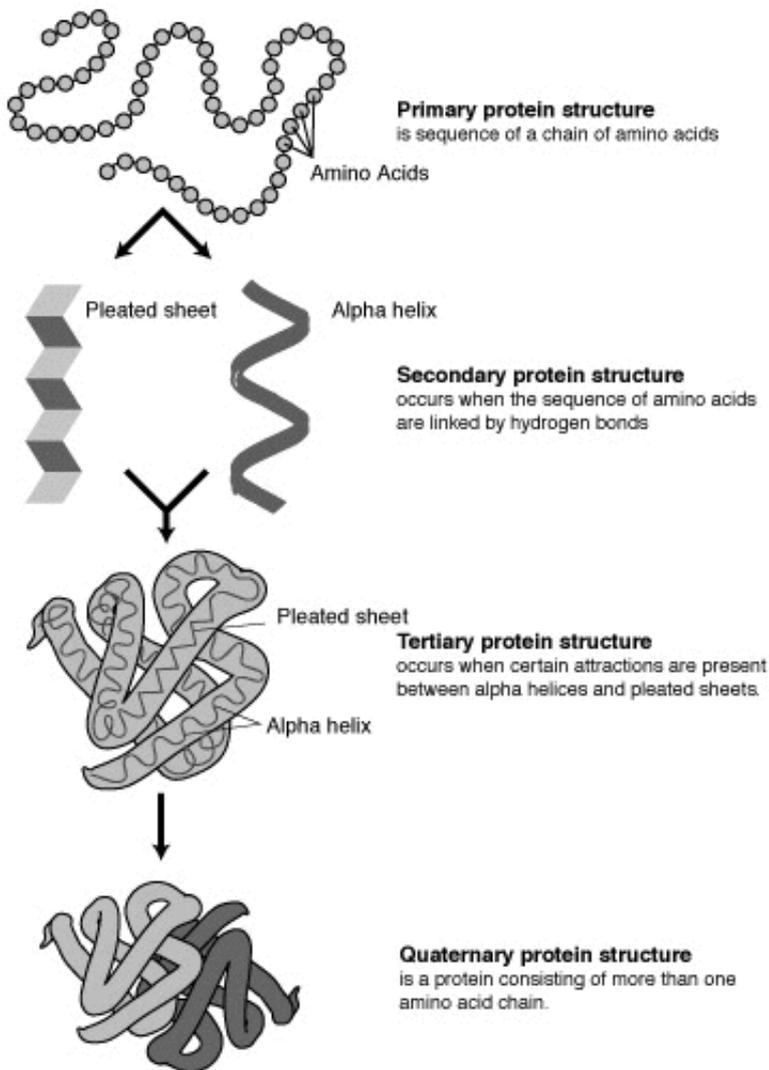
N-terminus: free amino group

C-terminus: free carboxyl group

Examples for proteins according to function:

- Structural proteins (keratin in hair, nail, collagen fibers in extracellular space, actin-myosin in muscle cells)
- Enzymes (amylase, pepsin in digestive system)
- Proteins with defense function (antibodies)
- Transporters (hemoglobin transports O₂, ion channels in cell membrane)
- Regulatory proteins (Hormones eg. insulin)
- Receptors (hormone receptors)

The structure of proteins:



1. Primary structure: amino acid sequence.
2. Secondary structure: Alpha helix or beta sheet. Stabilized by hydrogen bonds between the atoms in peptide bonds of parallel polypeptide chains.
3. Tertiary structure: 3D conformation. Stabilized by bonds between the amino acid sidechains: hydrogen bonds, ionic bonds (polar-polar), van der Waals forces (apolar-apolar), disulfide bonds (covalent, between cysteines).
4. Quaternary structure: multiple polypeptide chains join together or a protein-nonprotein complex.

