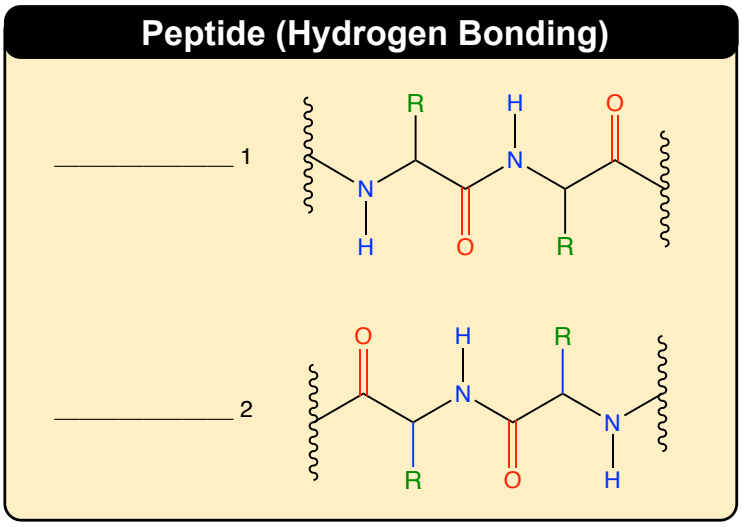
CONCEPT: SECONDARY PROTEIN STRUCTURE

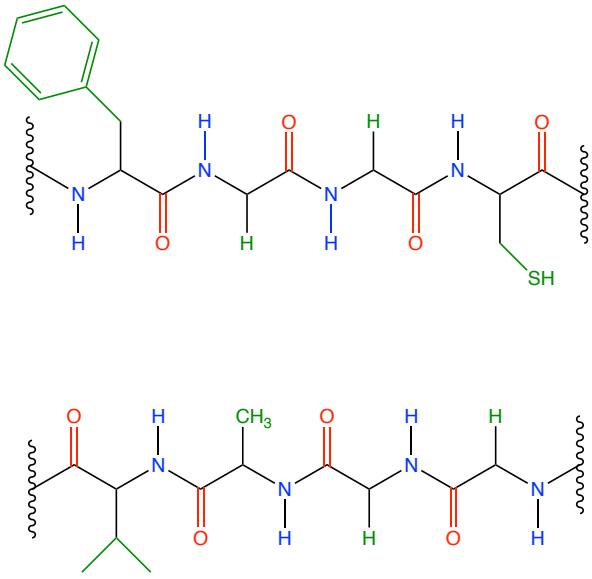
- The type of structure that results from _____ _____ of the atoms in the backbone of a protein.
  - □ Involves the connection between the _____ ____ of one peptide with the _____ ____ of another.



EXAMPLE: Determine which of the following amino acid pairs could potentially perform hydrogen bonding between their respective R groups?

a) Gly and Ser b) Asp and Glu c) Val and Leu d) Asp and Arg

PRACTICE: How many hydrogen bonding pairs are possible when the following two peptides interact?



a) 3 b) 5 c) 4 d) 6 e) 1

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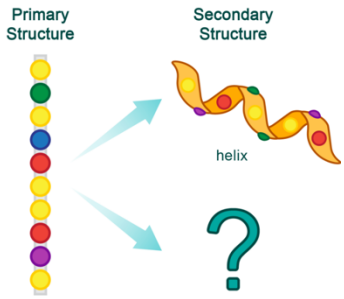
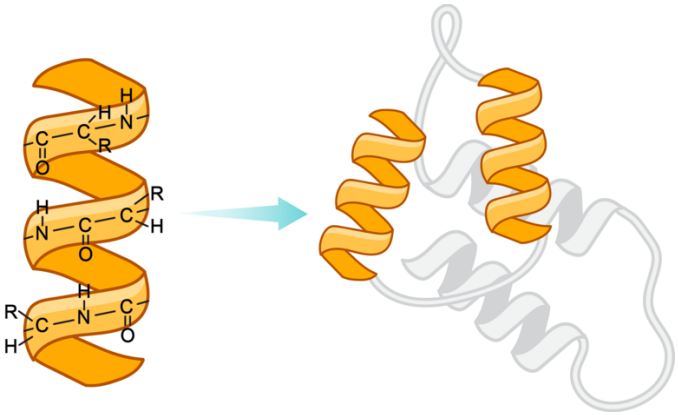


Alpha-Helix

- Secondary structures give rise to 2 types of repeating patterns.
- The backbone of a single protein chain _____ into a spiral-like staircase.
  - □ Stabilized by _____-bonding between *distant* amino acids on the *same* chain.



EXAMPLE: Determine which of the following statements represents a 2º structure for a protein.

a) Creation of peptide bonds.

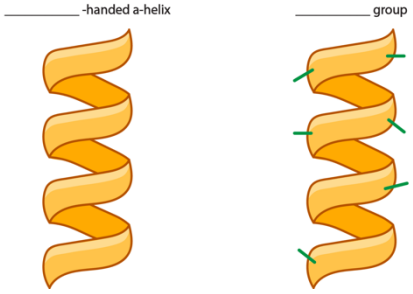
b) The attractive force between the H atom of a peptide bond and the O atom of a peptide bond.

c) Amide bond formation in the creation of an amino acid chain.

d) Ionic bond formation between the R side chains of alanine and valine.

Alpha Helix Spiral Shape

- The spiral-like staircase adopts a right-handed (_____) shape.
  - □ The hydrogen bonds lie _____ the helix and the amino acid **R** groups lie _____ the helix because of spacing.



- The hydrogen bonding of the amide hydrogen with the carbonyl oxygen happens ____ residues further on the helix.
  - □ The result is every ____ turn of the helix contains on average ____residues

EXAMPLE: What is the maximum number of turns for an alpha helix that contains 72 residues?

a) 15 turns b) 18 turns c) 72 turns d) 20 turns e) 6 turns

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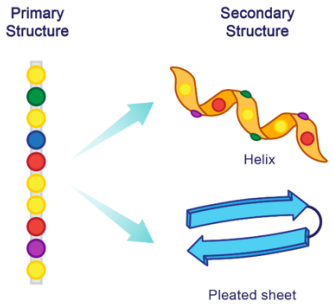
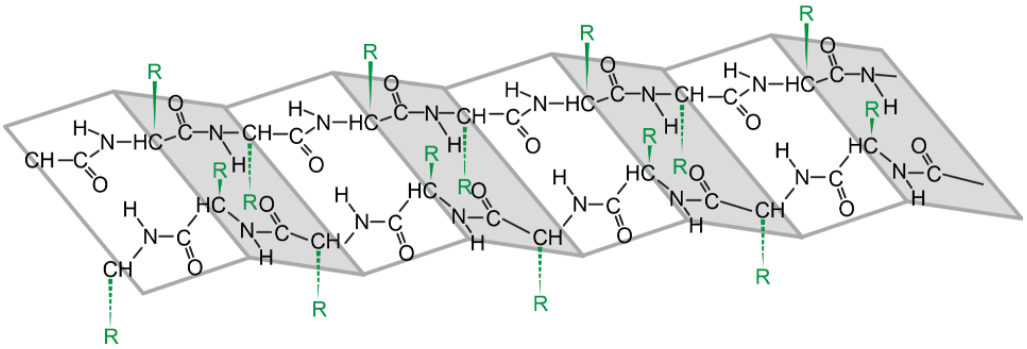


Beta-Pleated Sheet

- Secondary structure consisting of _____ or more β-strands oriented side by side.
  - □ Named "pleated" because of their _____-_____ structure.
  - □ **R** side chains extend _____ or _____ to the β-sheet.



EXAMPLE: Which of the following statements is true of β-sheets?

a) Interchanging between an α-helix and a β-sheet is a key feature of a primary structure.

b) Their interior is characterized by hydrogen bonding between amide hydrogens and carbonyl oxygens.

c) Their interior is characterized by R side chains interactions.

d) The R side chains extend inward to ensure greater packing of the peptides.

PRACTICE: Which of the following statements is true in regard to the peptide strand shown?

a) The β-sheet defines the primary structure of the peptide strand.

b) The C-Terminal end possesses an α-helix.

c) Along with its α-helix counterpart, the β-sheet is mainly stabilized by backbone hydrogen bonds.

d) The α-helix and the β-sheet are connected together through an ionic bond.