CONCEPT: PEPTIDE GROUP

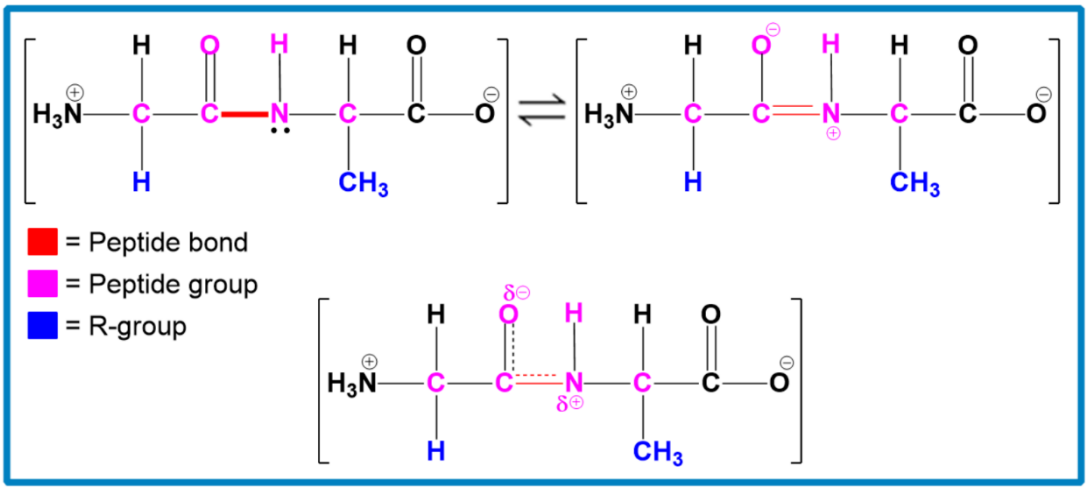
●Atoms around the peptide bonds exhibit special characteristics critical to the overall _____ of a protein.

□ These atoms are part of the _____ group.

●*Peptide group*: the _____ peptide-bond atoms & their _____ neighbors (6 atoms total).

□ Includes atoms of the C=O, the N-H, & the _____ adjacent α-carbons.

EXAMPLE: Circle all the α-carbons & draw resonance arrows for the peptide group.



PRACTICE: Which atoms are not part of the peptide group?

a) Carbonyl group atoms b) First R-group atom c) Amide group atoms d) α-carbons

Conformations of the Peptide Group

●Partial _____-bond nature of the peptide bond is responsible for two things:

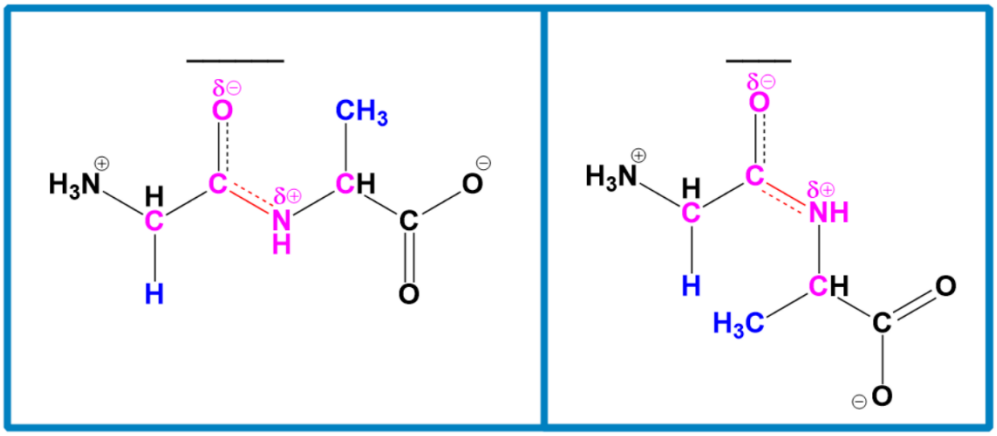
1) Keeping atoms of a peptide group in the same _____ by *limiting* peptide bond rotation.

2) Restricting the peptide group to either a _____ or _____ conformation.

□ *Most* peptide groups in proteins are in the _____ conformation.

□ Cis conformation is normally _____ favorable than the trans due to steric hindrance between R-groups.

EXAMPLE: Label the Peptide Group Conformations.



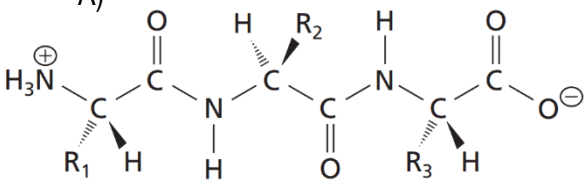
CONCEPT: PEPTIDE GROUP

PRACTICE: Why are atoms of the peptide group planar?

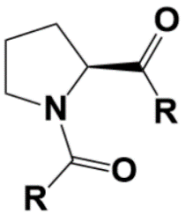
a) Bulky side chains prevent the trans conformation & free rotation around a peptide bond.
b) Peptide bonds are double bonds that prevent bond rotation.
c) Hydrogen bonding between the N-H and C=O groups stabilizes cis conformation & limits bond rotation.
d) Peptide bonds contain partial double bond character, preventing free bond rotation.

PRACTICE: For each figure, highlight each bond with limited rotation & determine the conformation of each peptide group.

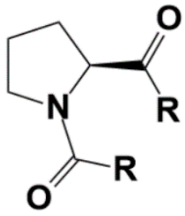
A)



B)



C)



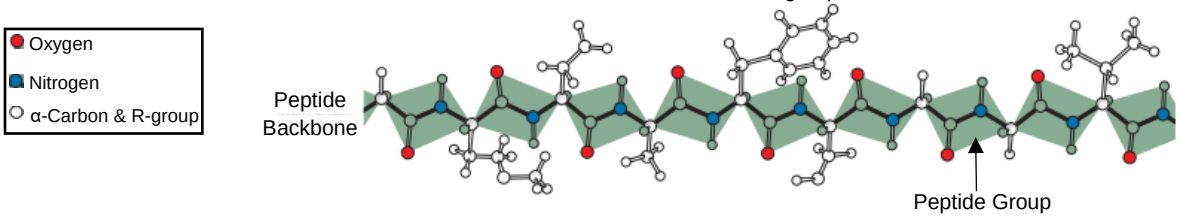
Limited Flexibility of the Peptide Backbone

●Each internal amino acid residue is _____ with a *peptide group*.

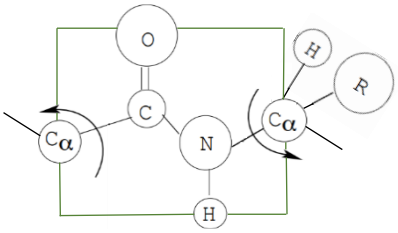
□ Together all the peptide groups make the protein _____.

□ Collectively, double-bond nature of all peptide bonds _____ flexibility of the backbone & peptide structure.

EXAMPLE:



PRACTICE: In the diagram below, the square plane drawn behind the protein molecule indicates the:



a) Plane of the peptide group due to absence of rotation & partial double-bond nature of the C_α-N bond.
b) Region of steric hindrance determined by the large C = O group.
c) Absence of rotation around the C-N bond because of its partial double-bond character.
d) Region of the peptide bond that contributes to a Ramachandran plot.