

# STUDY NOTES

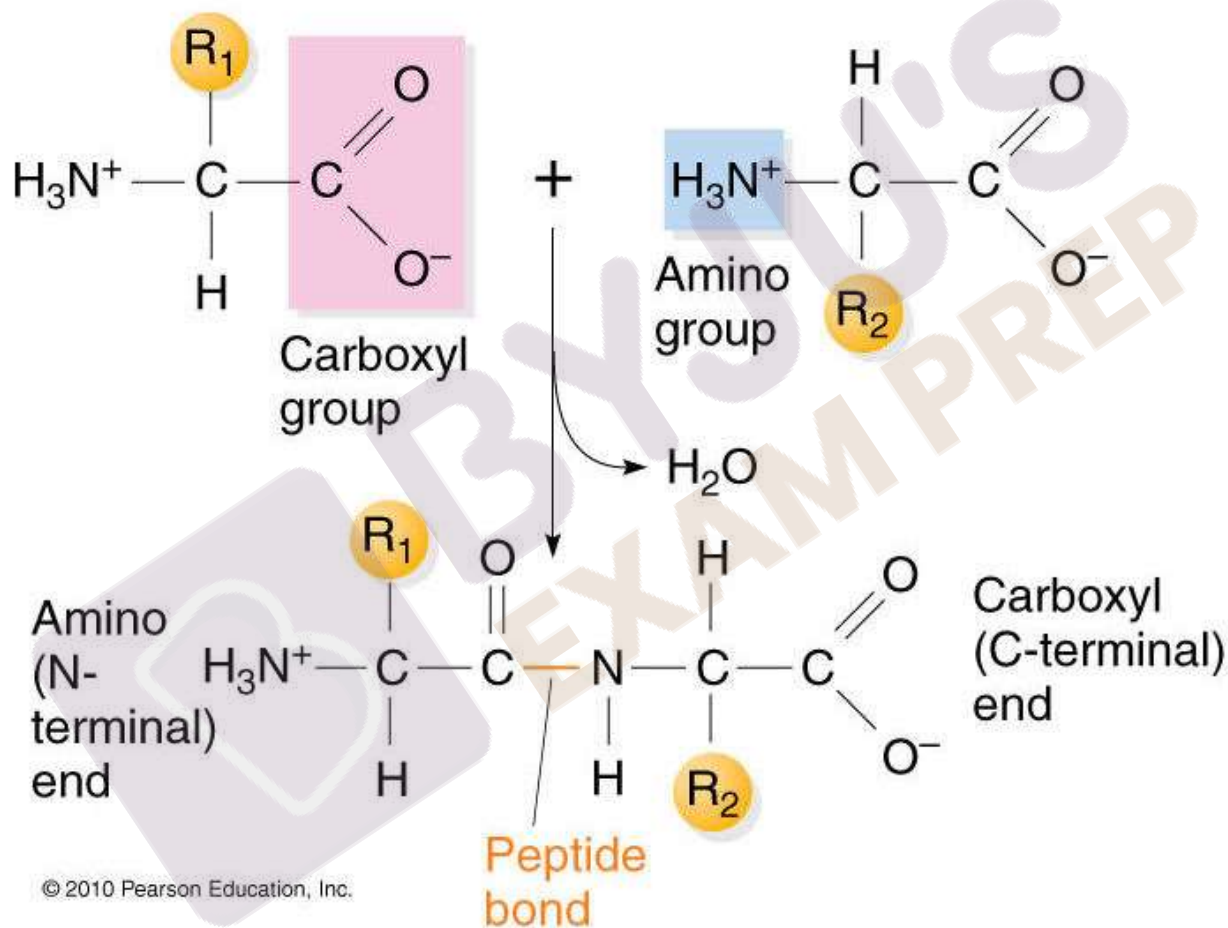
## On

# Peptide Bond & Ramachandran Plot

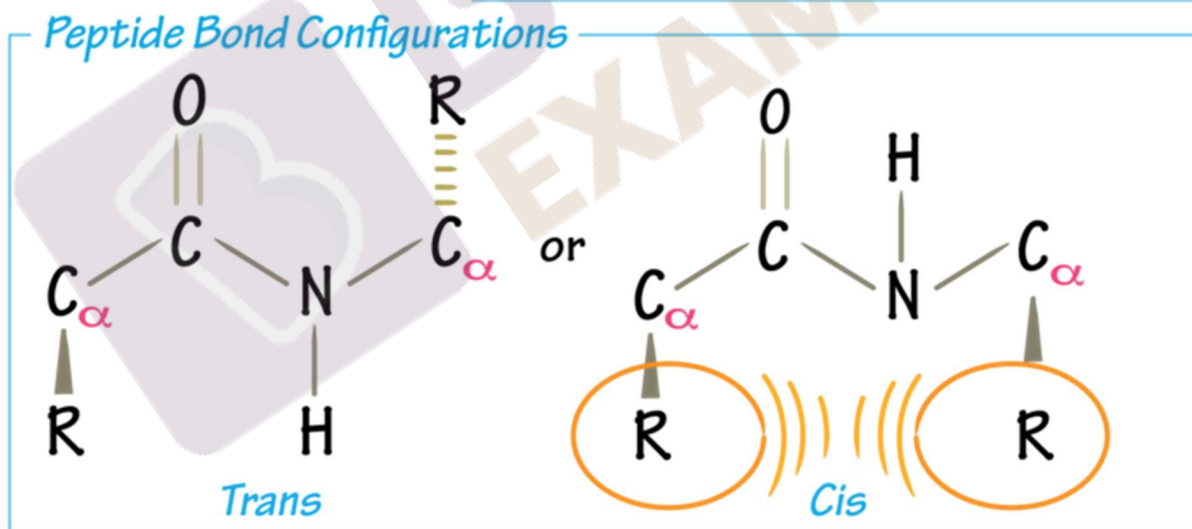
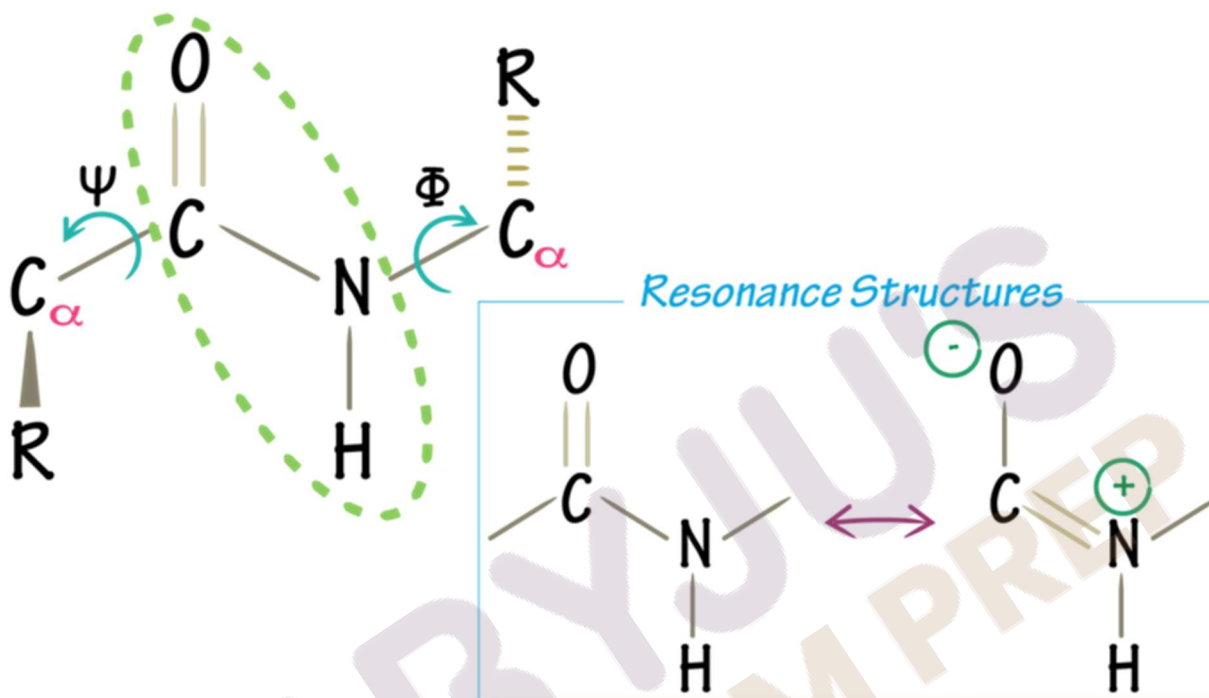


## Peptide Bond and Ramachandran Plot

A **peptide** is a compound consisting of **two or more amino acids**. When two amino acid molecules are linked, through peptide bond then the product is called a dipeptide.



- Peptides and polypeptides are mostly linear and unbranched polymers composed of amino acids linked together by peptide bonds.
- Peptide bonds are amide linkages formed between an alpha-amino group of one amino acid and the alpha carboxyl group of another.
- The reaction is a dehydration reaction in which a water molecule is removed and the linked amino acids are referred to as amino acid residues.
- The peptide C-N Bond has a partial double bond character. Due to the partial double bond character, two possible configurations, cis and trans, are observed for a peptide bond in polypeptides.



- The alpha carbon ( $C_{\alpha}$ ) in the centre of each amino acid is held in the main chain by two rotatable bonds. The dihedral (torsion) **angles** of these bonds are called **Phi and Psi** (in Greek letters,  $\phi$  and  $\psi$ ). In fact, most **Phi and Psi angle** combinations are impossible because two atoms cannot occupy the same space.

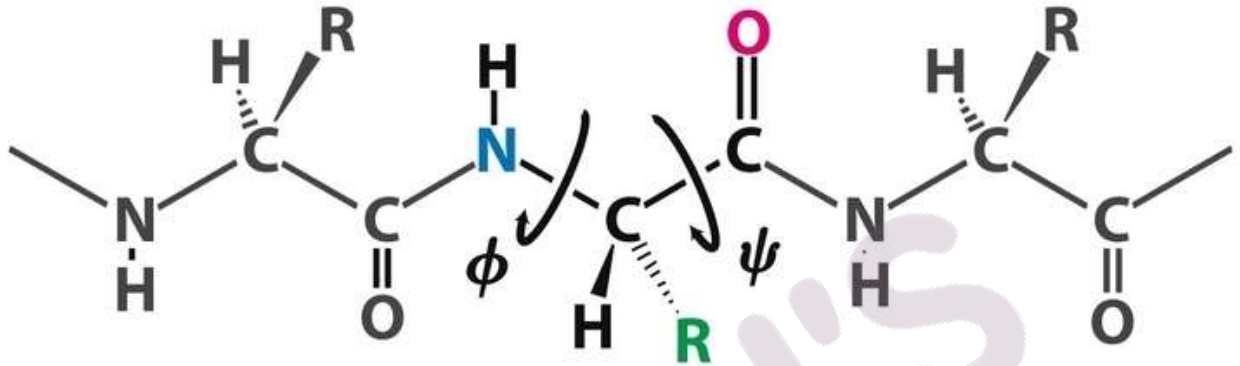


Figure 2.22a  
Biochemistry, Seventh Edition

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- Most values of  $\phi$  and  $\psi$  are not allowed due to steric interference between atoms in the polypeptide backbone and amino acid side chains.
- The combination of  $\phi$  and  $\psi$  values that are permitted in peptide backbone or that are not permitted due to steric constraints were first determined by G.N Ramachandran.
- These permitted values can be visualized on a two-dimensional plot called a Ramachandran plot.

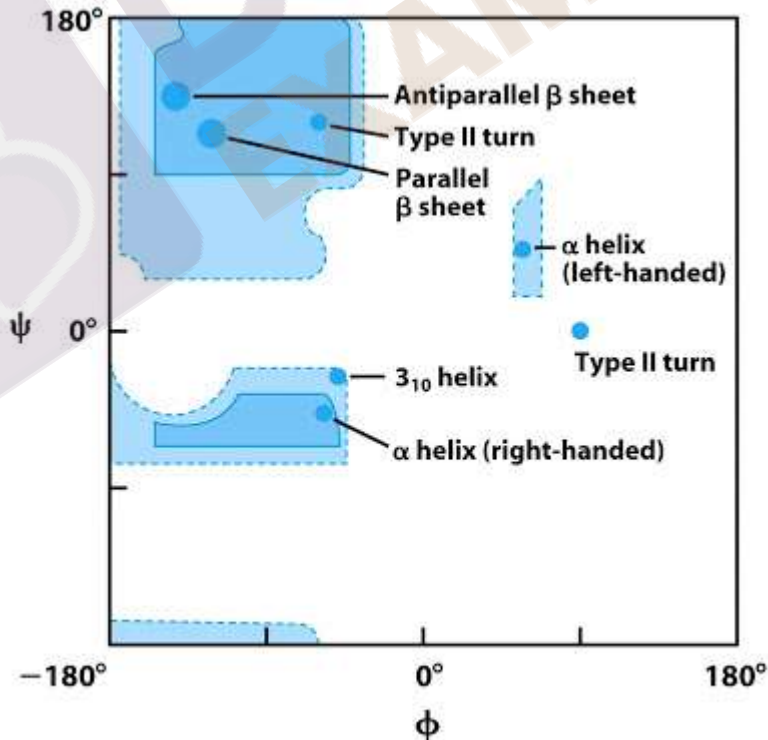


Figure 4-9a Principles of Biochemistry, 4/e  
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- The **Ramachandran plot** is a **plot** of the torsional angles - phi ( $\phi$ ) and psi ( $\psi$ ) - of the residues (amino acids) contained in a peptide.
- By making a **Ramachandran plot**, protein structural scientists can determine which torsional angles are permitted and can obtain insight into the structure of peptides.

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