

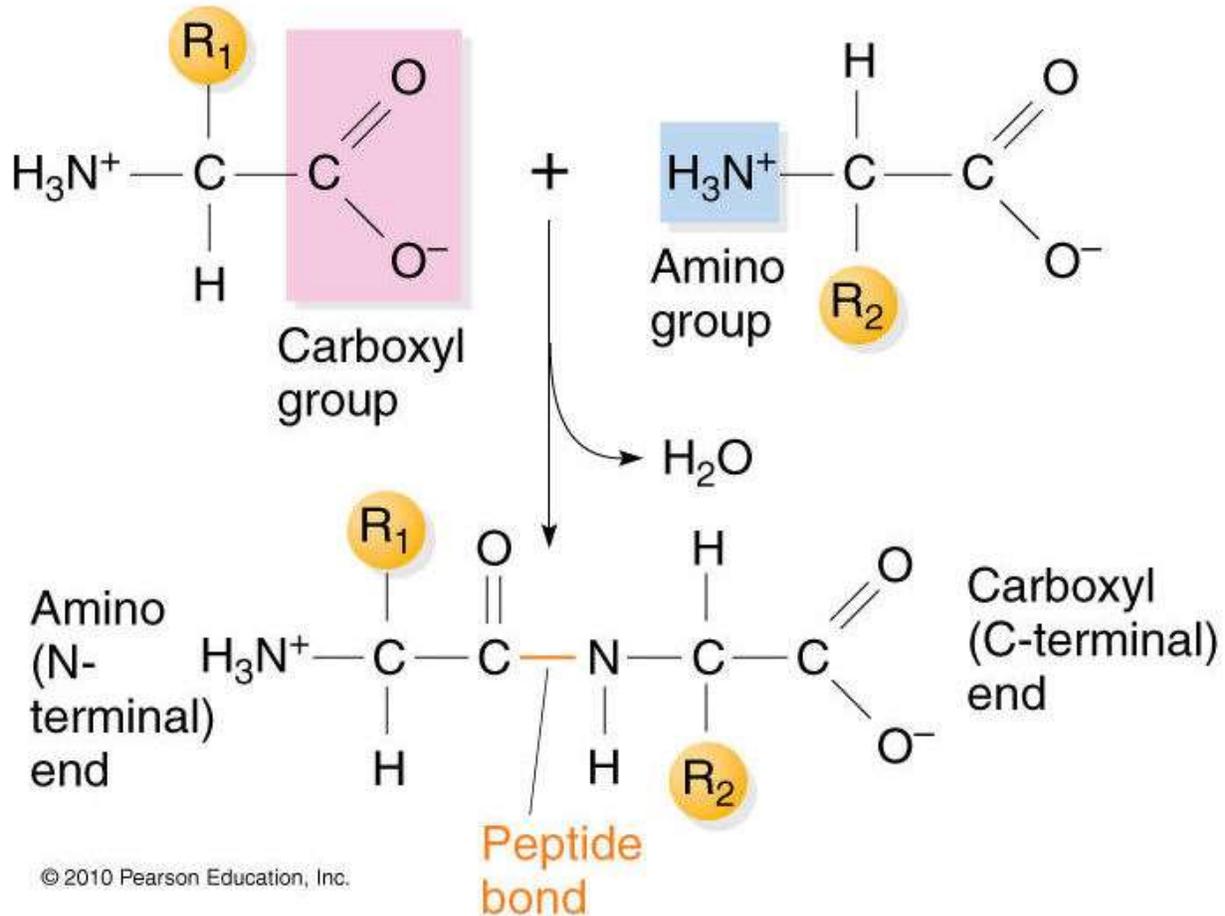
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(Study Notes on
Peptide Bond and
Ramachandran Plot)

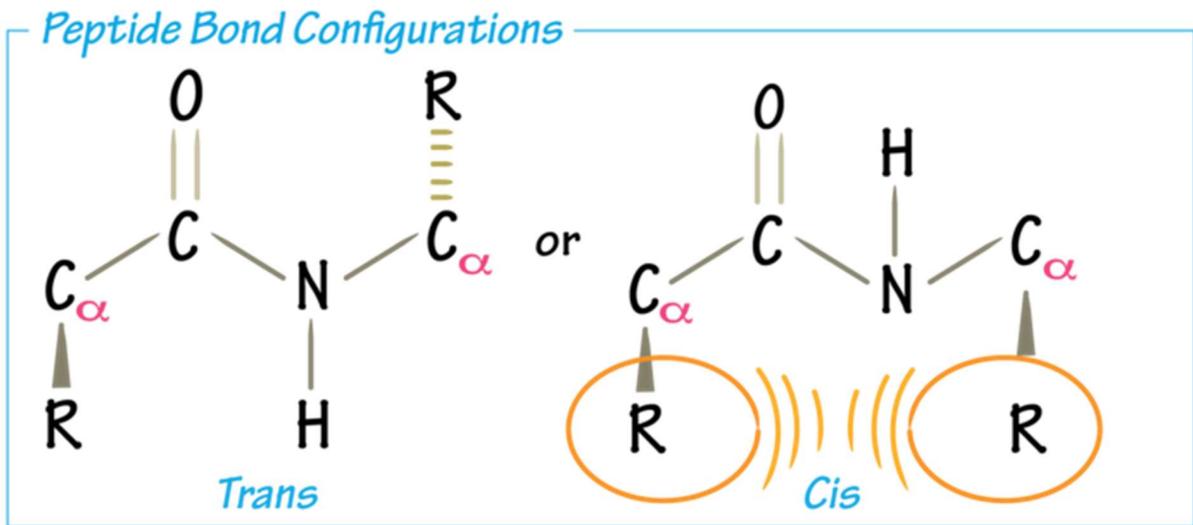
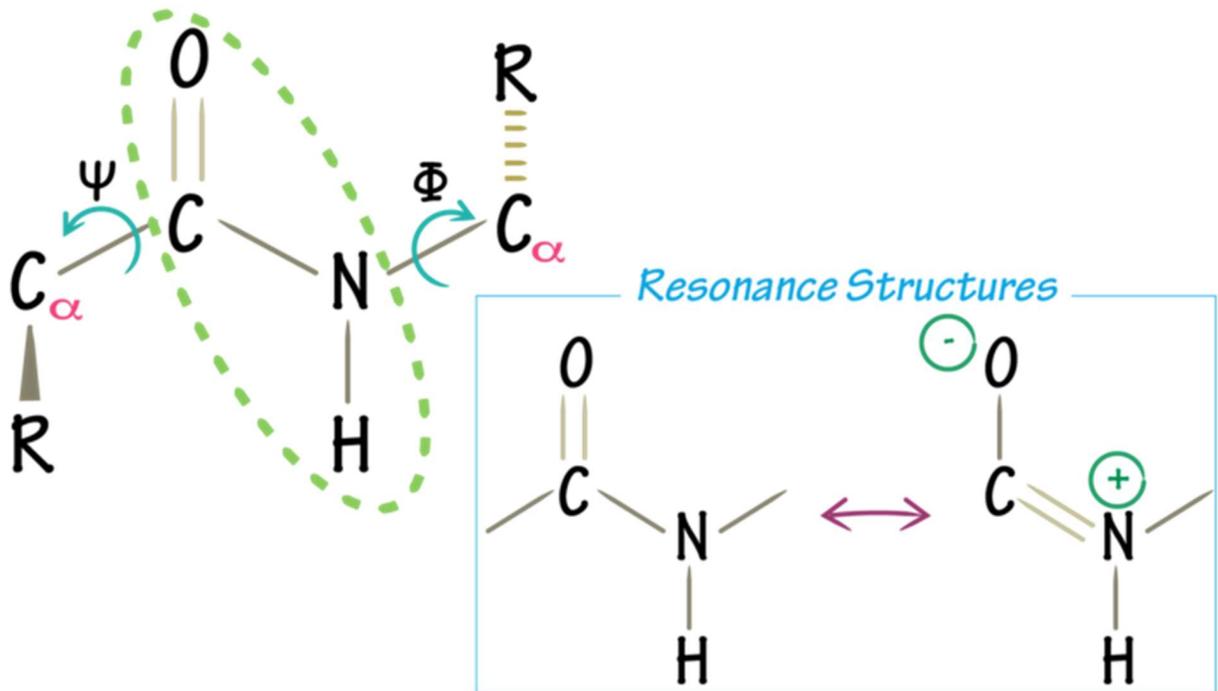


Peptide Bond and Ramachandran Plot

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_{α}) 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, ϕ and ψ). In fact, most **Phi and Psi angle** combinations are impossible because two atoms cannot occupy the same space.

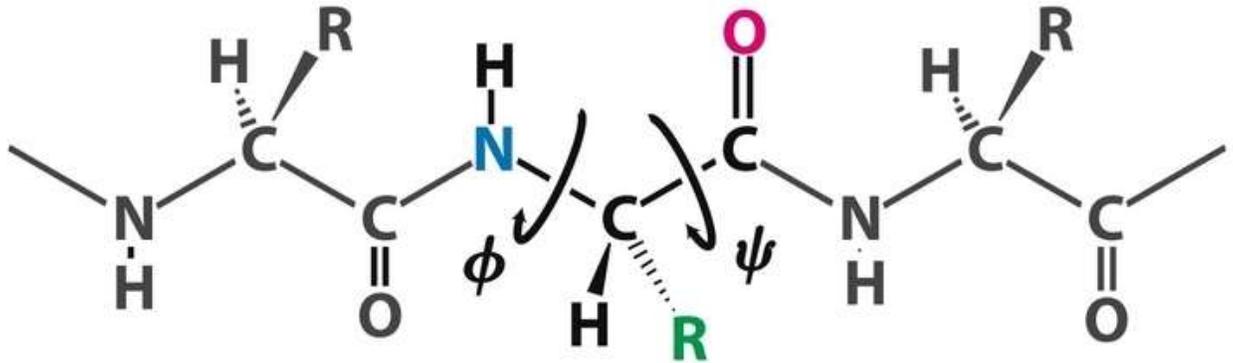
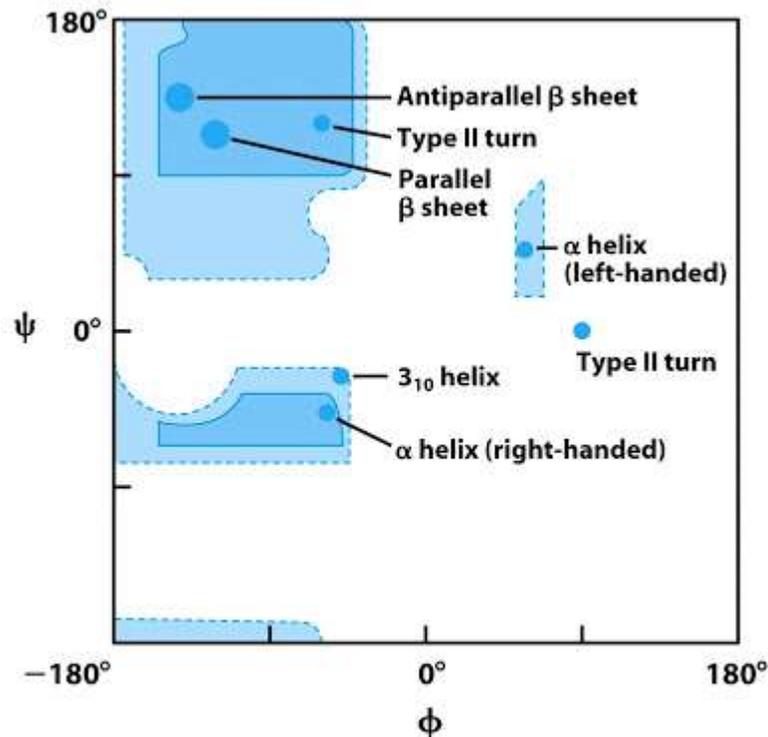


Figure 2.22a

Biochemistry, Seventh Edition

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- Most values of ϕ and ψ are not allowed due to steric interference between atoms in the polypeptide backbone and amino acid side chains.
- The combination of ϕ and ψ 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 (ϕ) and psi (ψ) - 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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