생유기화학
(Bioorganic Chemistry)

Amino Acids, Peptides, and Proteins-III
(아미노산, 펩타이드, 단백질-3)

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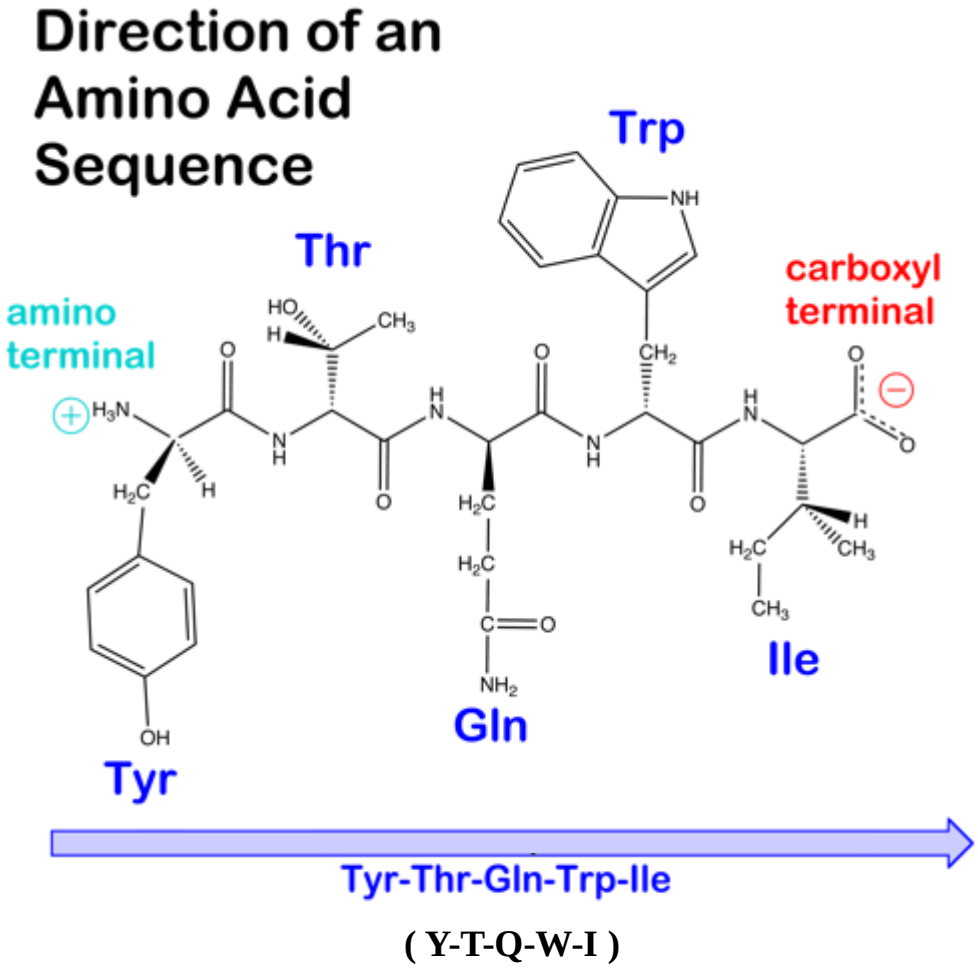
순천향대

나노화학공학과

임 정 균 교수

9~10. Proteins, Structures



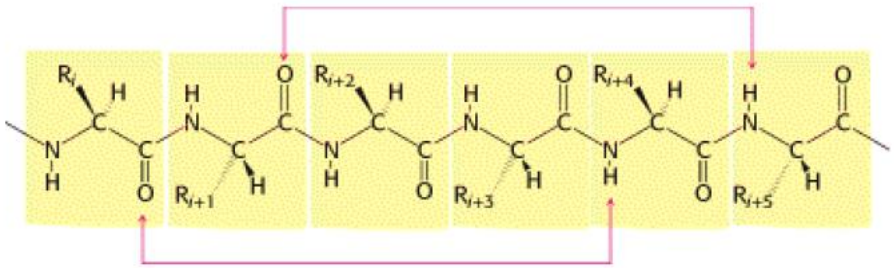
(Y-T-Q-W-I)

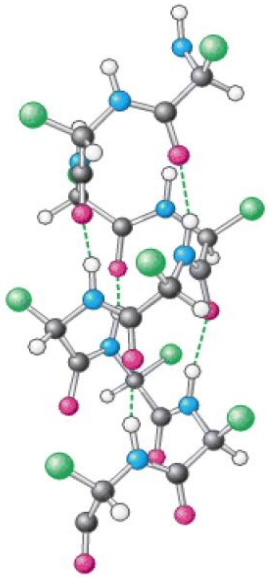
Primary structure

the sequence of amino acids in the peptide chain

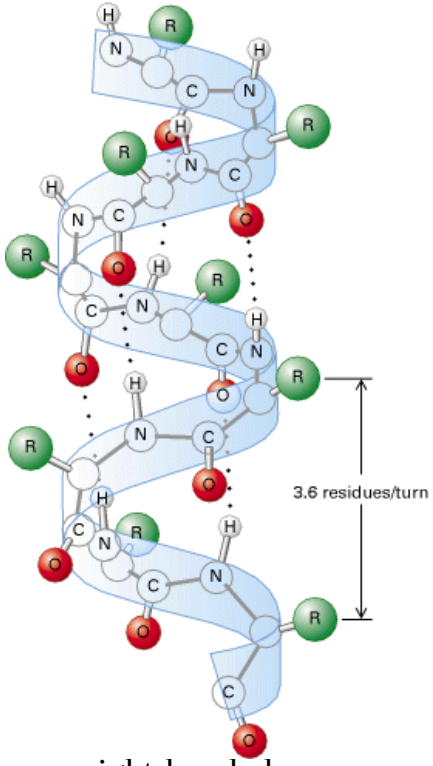
Alpha helix

a coiled structure stabilized by ( ) hydrogen bonds



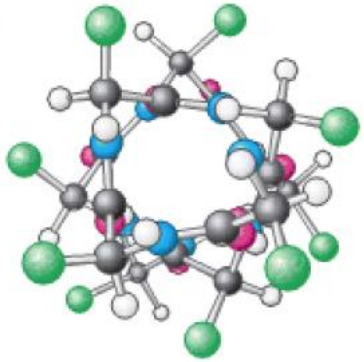


Hydrogen bonding between n and n+4 residue



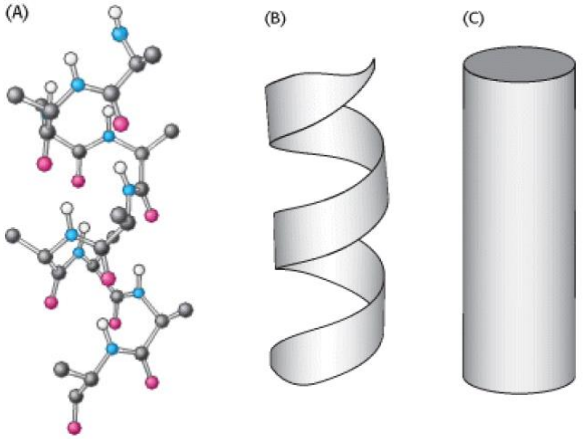
right-handed

top view



R groups are pointing out

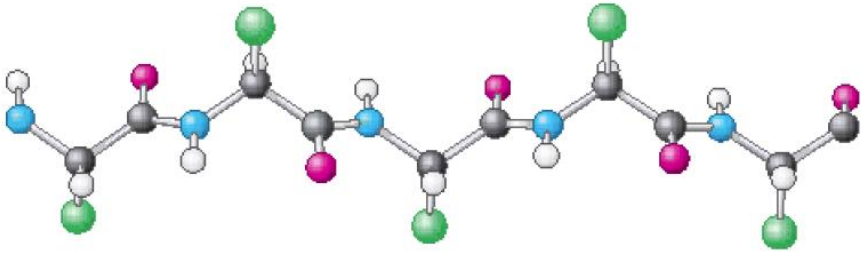
단백질에 따라서 α-helix의 분포는 0%에서 100%까지 다양하다.



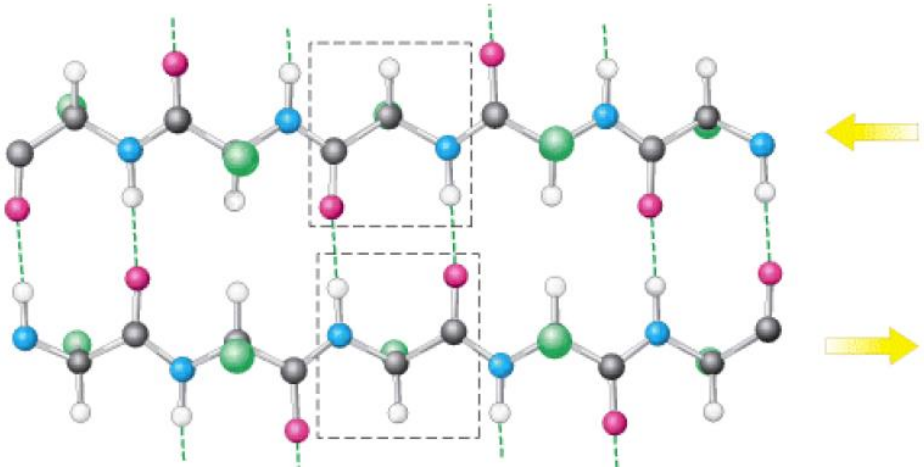
Schematic view of alpha helix: (a) ball-stick model, (b) ribbon, (c) cylindrical shape

Beta sheet

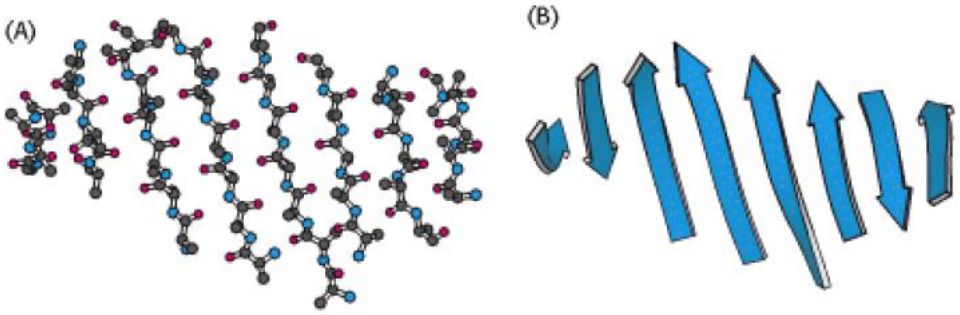
- stabilized by ( ) hydrogen bondings
- beta strand는 coil의 형태가 아닌 extended structure 를 갖고있음



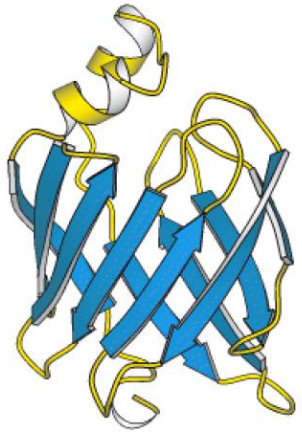
residue는 peptide plane에서 90°



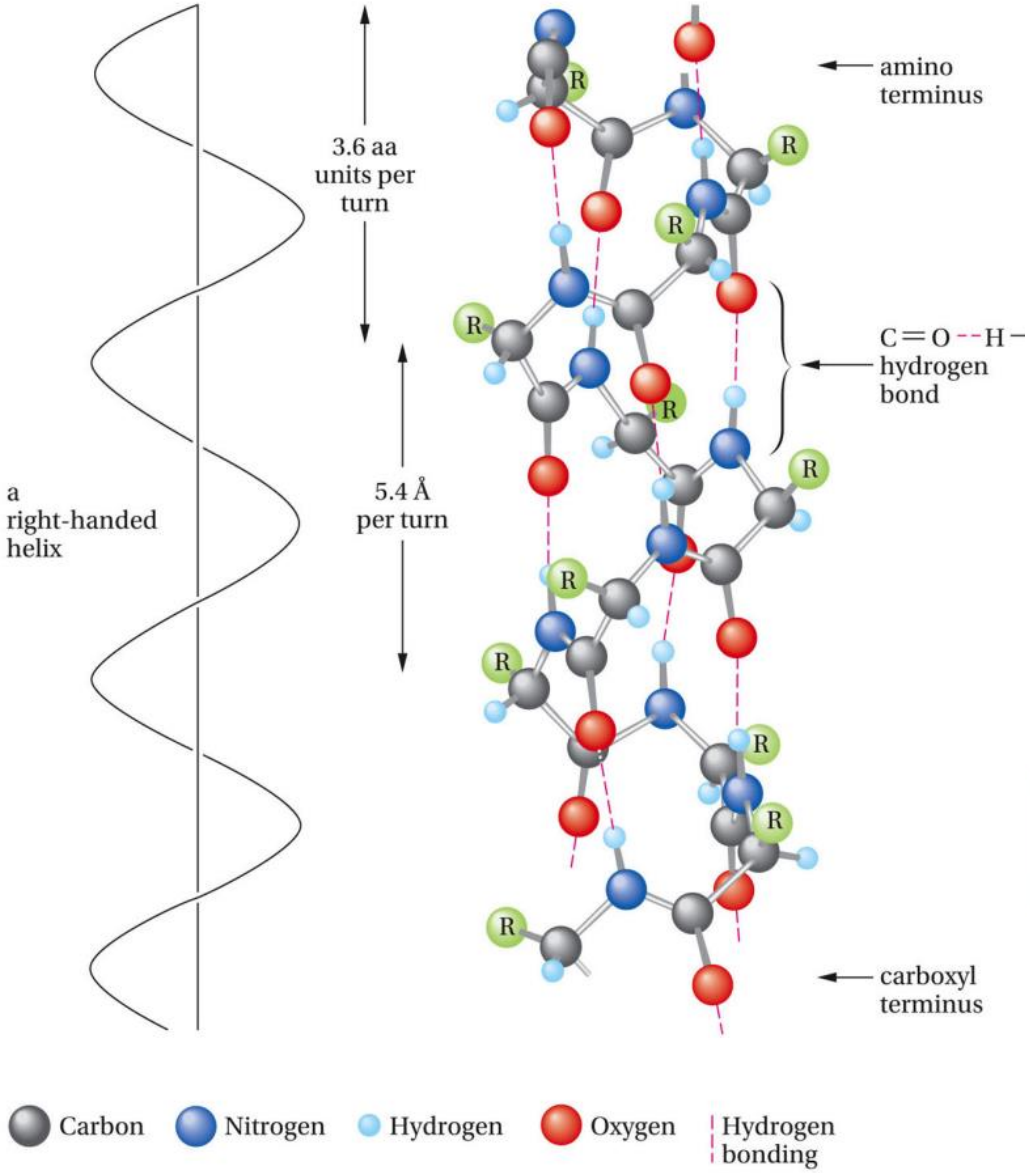
antiparallel beta sheet
(parallel beta sheet도 가능)



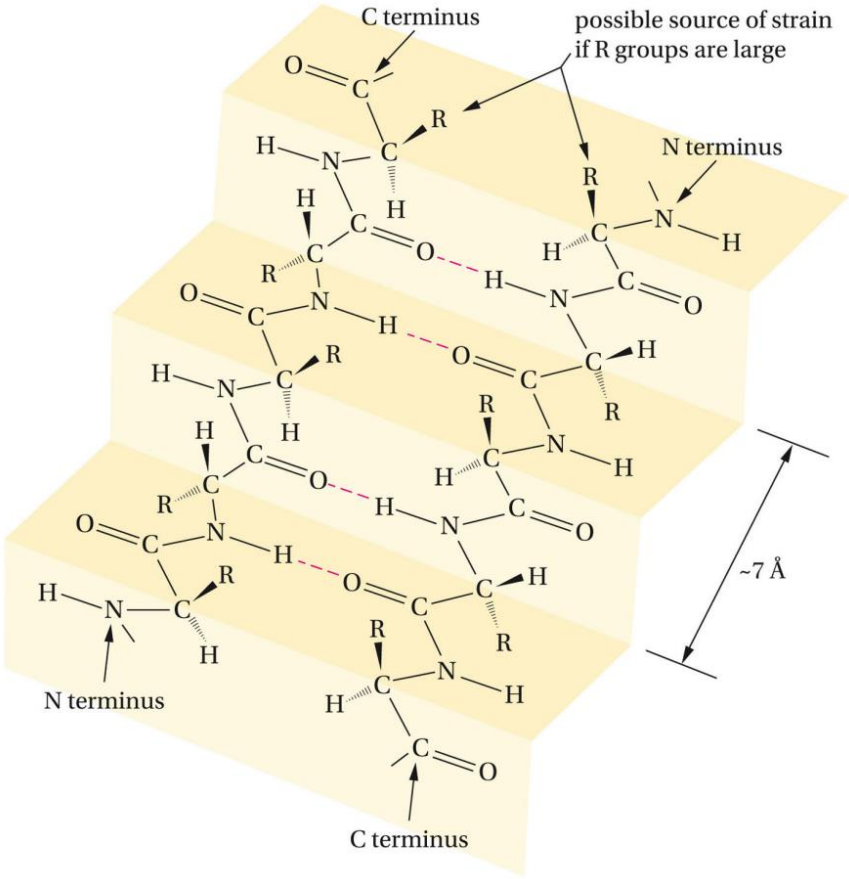
Schematic view of beta sheets: (a) ball-stick model, (b) schematic model



A protein rich in β sheets



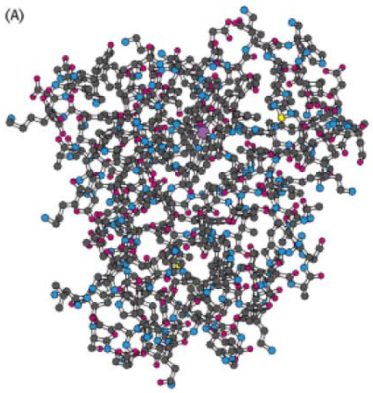
(α-helix)

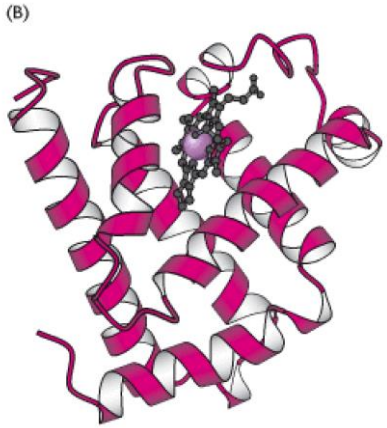


(β-sheet)

Tertiary structure

Folding into compact structures





Myoglobin(oxygen carrier in muscle)의 구조

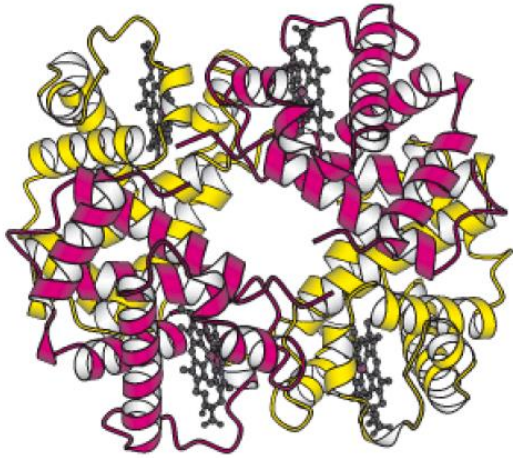
Protein의 안쪽은 대부분 nonpolar residue 존재, 바깥 부분은 대부분 polar residue들이 존재 → driving force for protein folding

polar residue들은 hydrogen bonding, nonpolar residue들은 van der Waals attraction

Quaternary structure

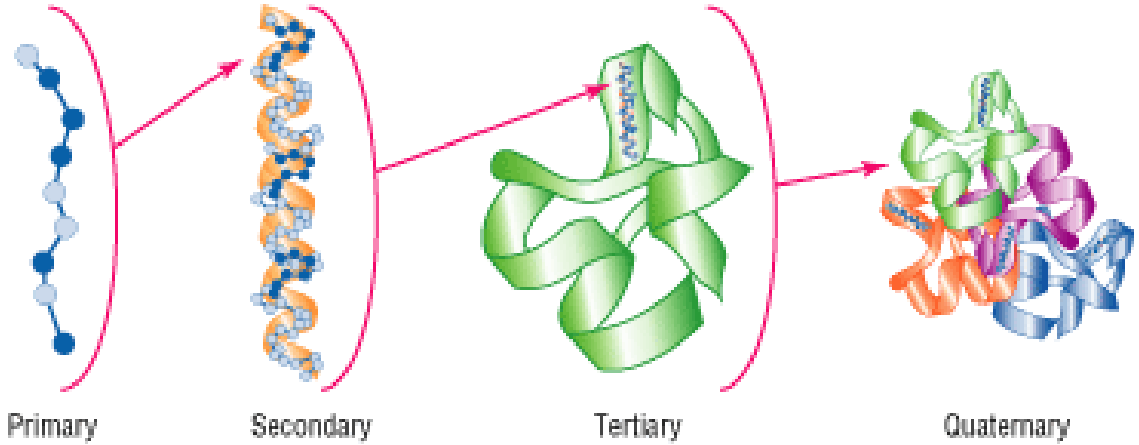
Spatial arrangement of subunits

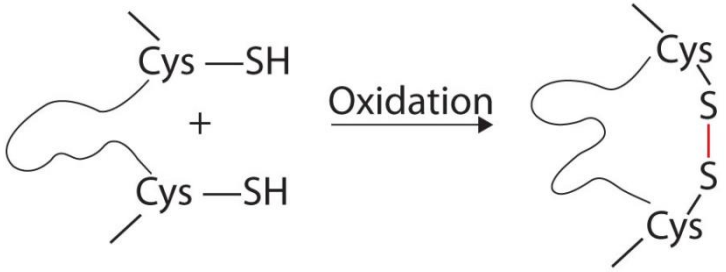
heme group은 검은색

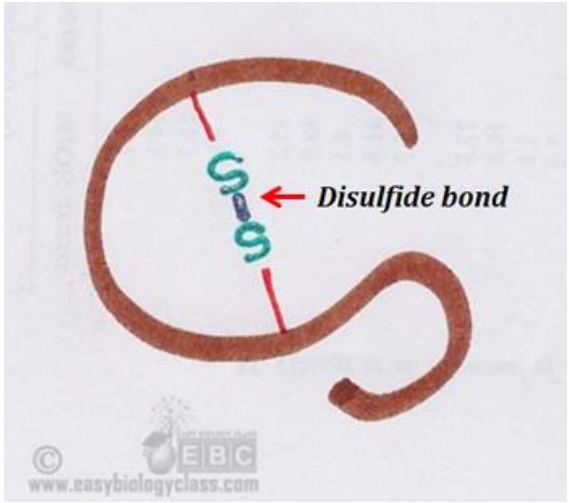


$\alpha_2\beta_2$ tetramer

Hemoglobin (Hb)


Primary
Secondary
Tertiary
Quaternary


Cys —SH
+
Cys —SH
Oxidation
Cys
S
S
Cys


Disulfide bond
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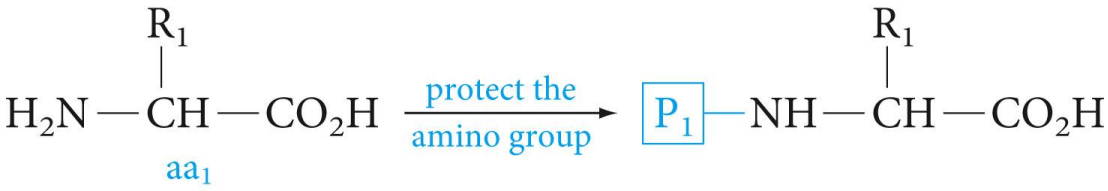
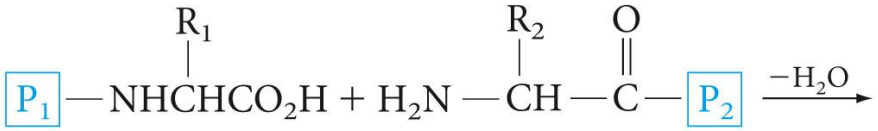
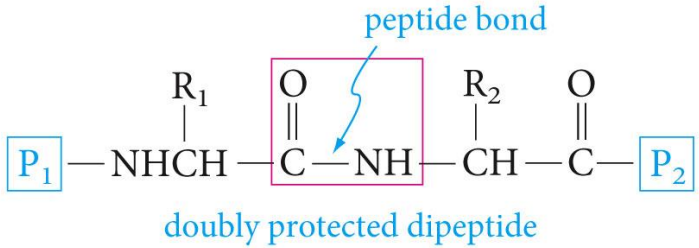
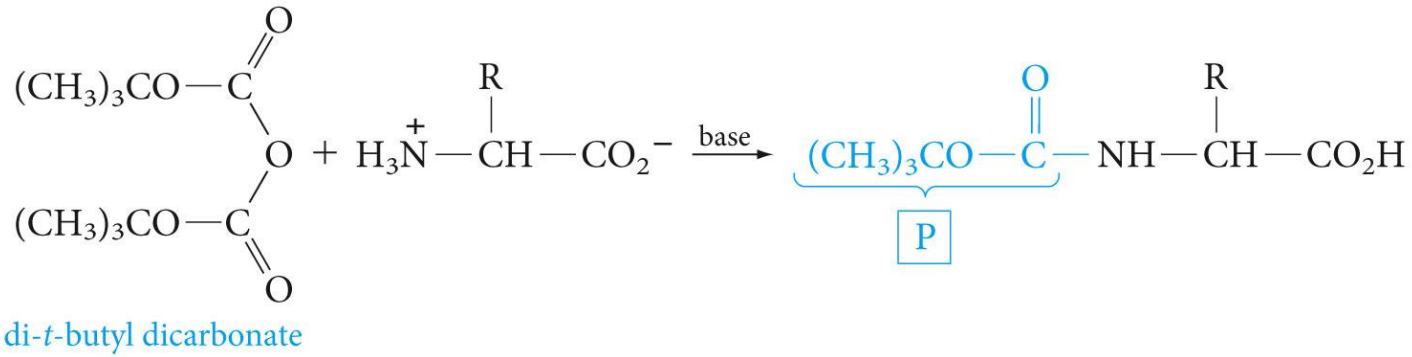
12. Peptide Synthesis

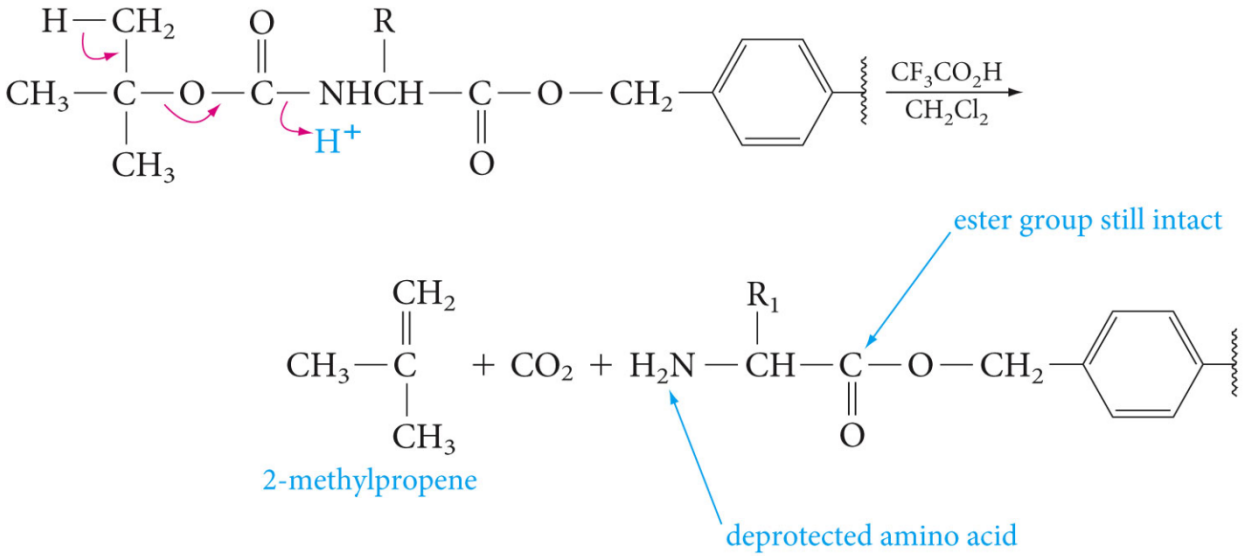








펩타이드 합성에 있어서 가장 많이 쓰이는 N-protecting group은 t-butoxycarbonyl (Boc) group이다.



Boc 보호기 제거는 산 조건 하에서 가능하다.

두가지 by products는 모두 가스이기 때문에 따로 정제과정이 필요없다.

펩타이드 연결반응(peptide coupling)시 가장 많이 쓰이는 coupling agent로서 DCC (dicyclohexylcarbodiimide)가 있다.