

بسمه تعالی



بیوشیمی عمومی

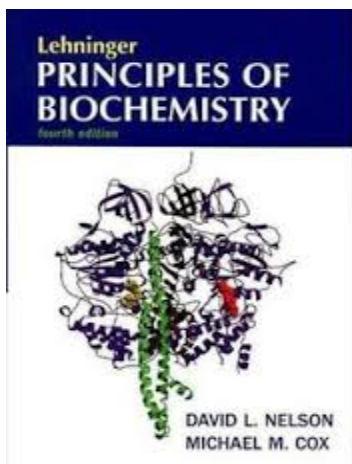
مقدمہ

ابراہیم قاسمی

مقدمه



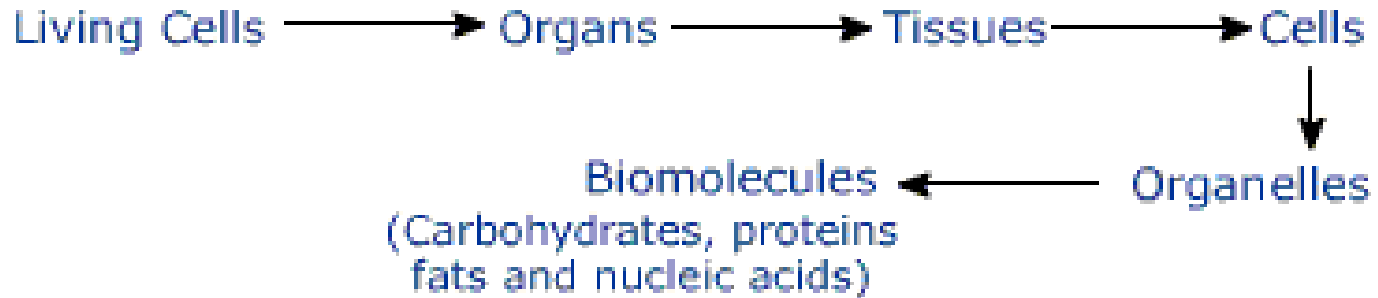
منابع □





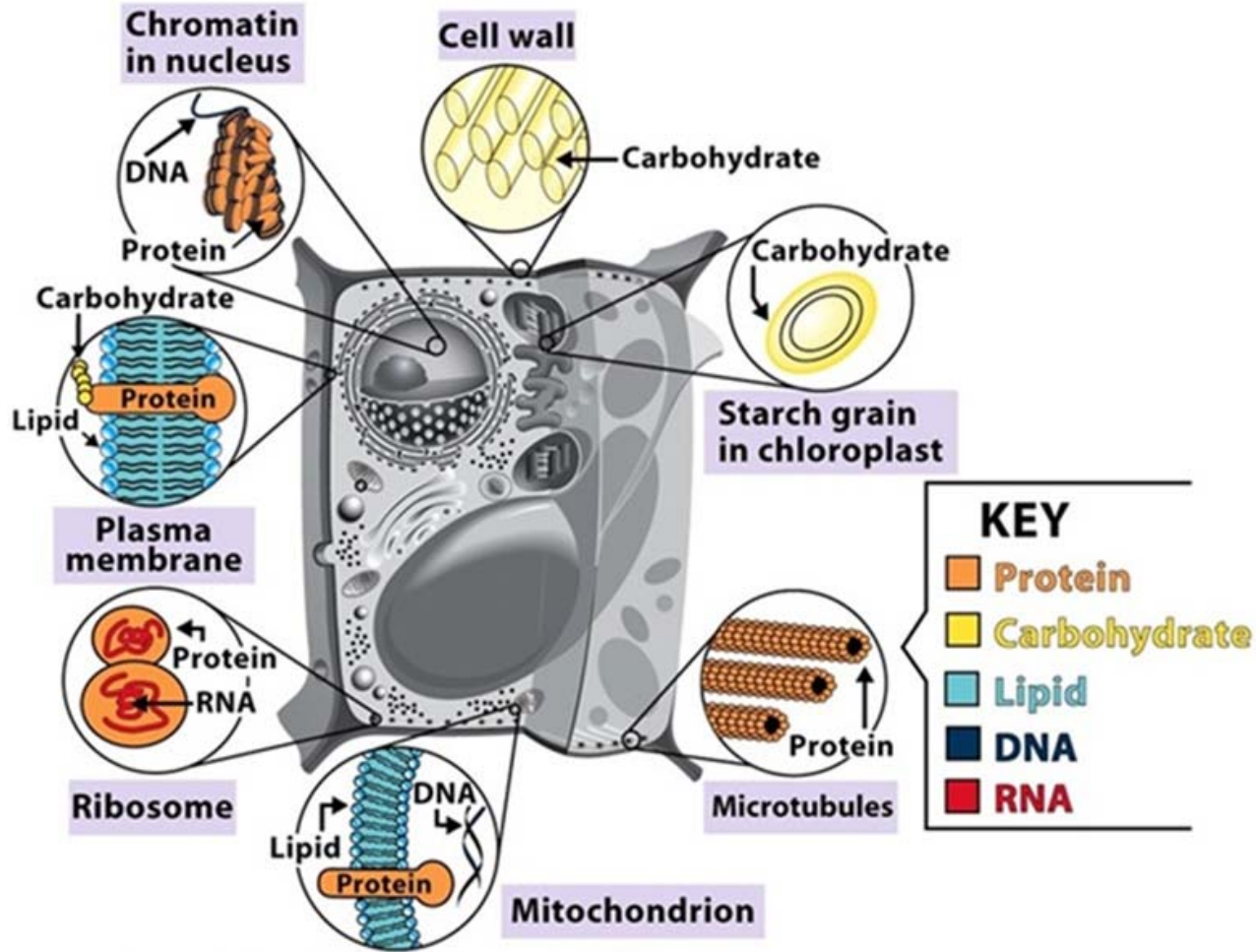
اهمیت بیوشیمی □

■ پایه مولکولی موجودات





بیومولکول ہا





□ واحدهای مونومری - سلول

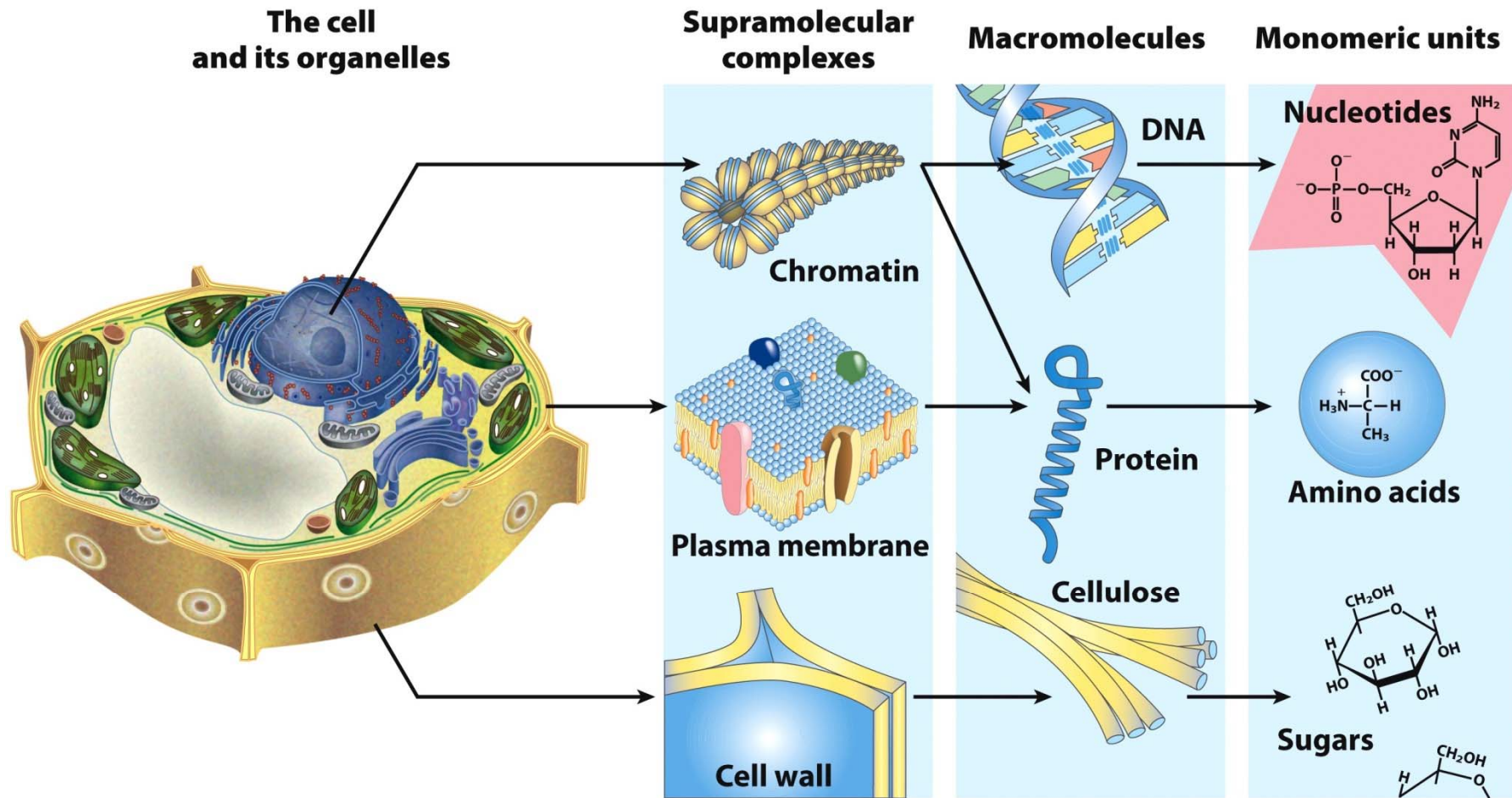
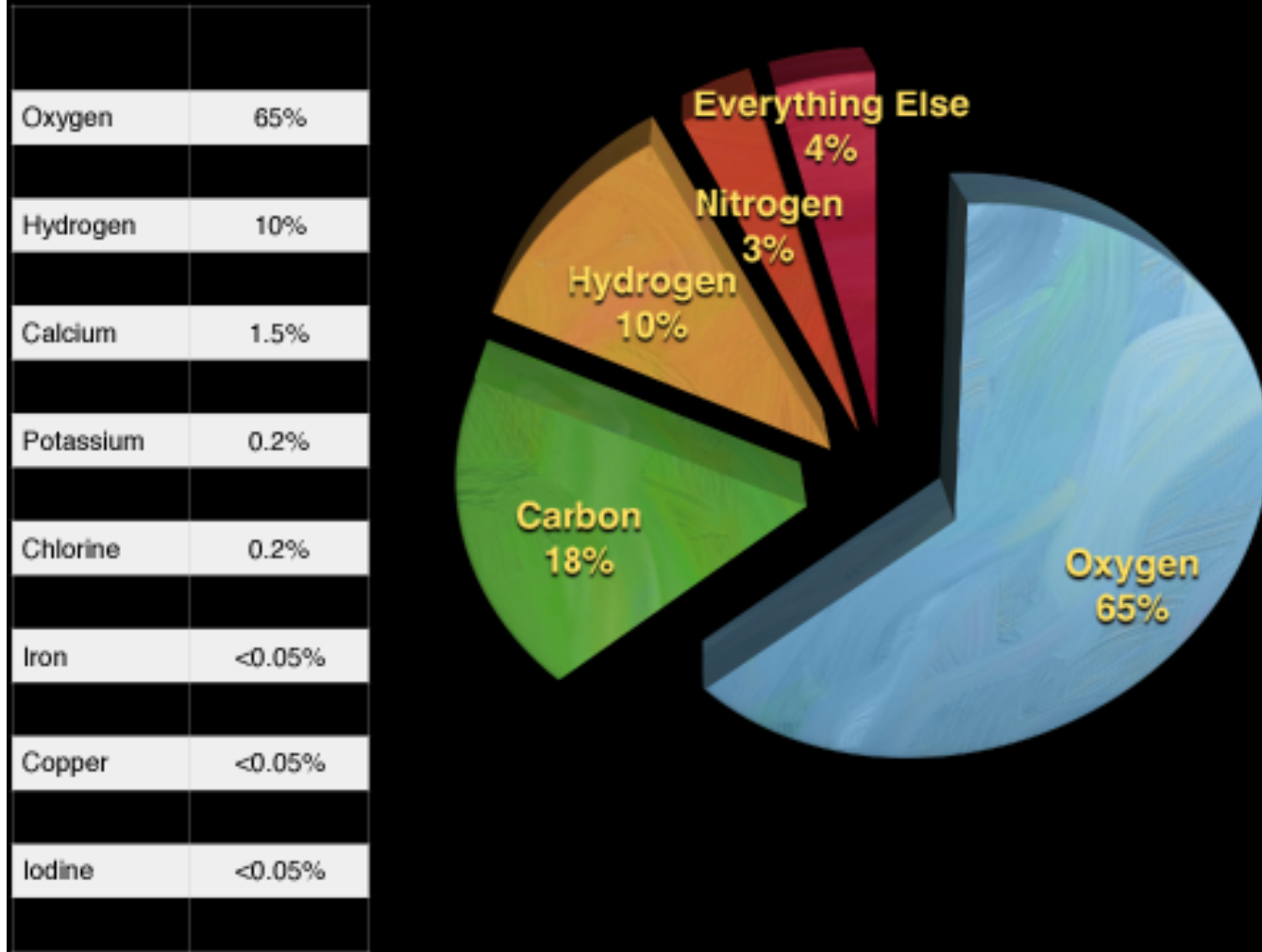


Figure 1-11
 Lehninger Principles of Biochemistry, Sixth Edition
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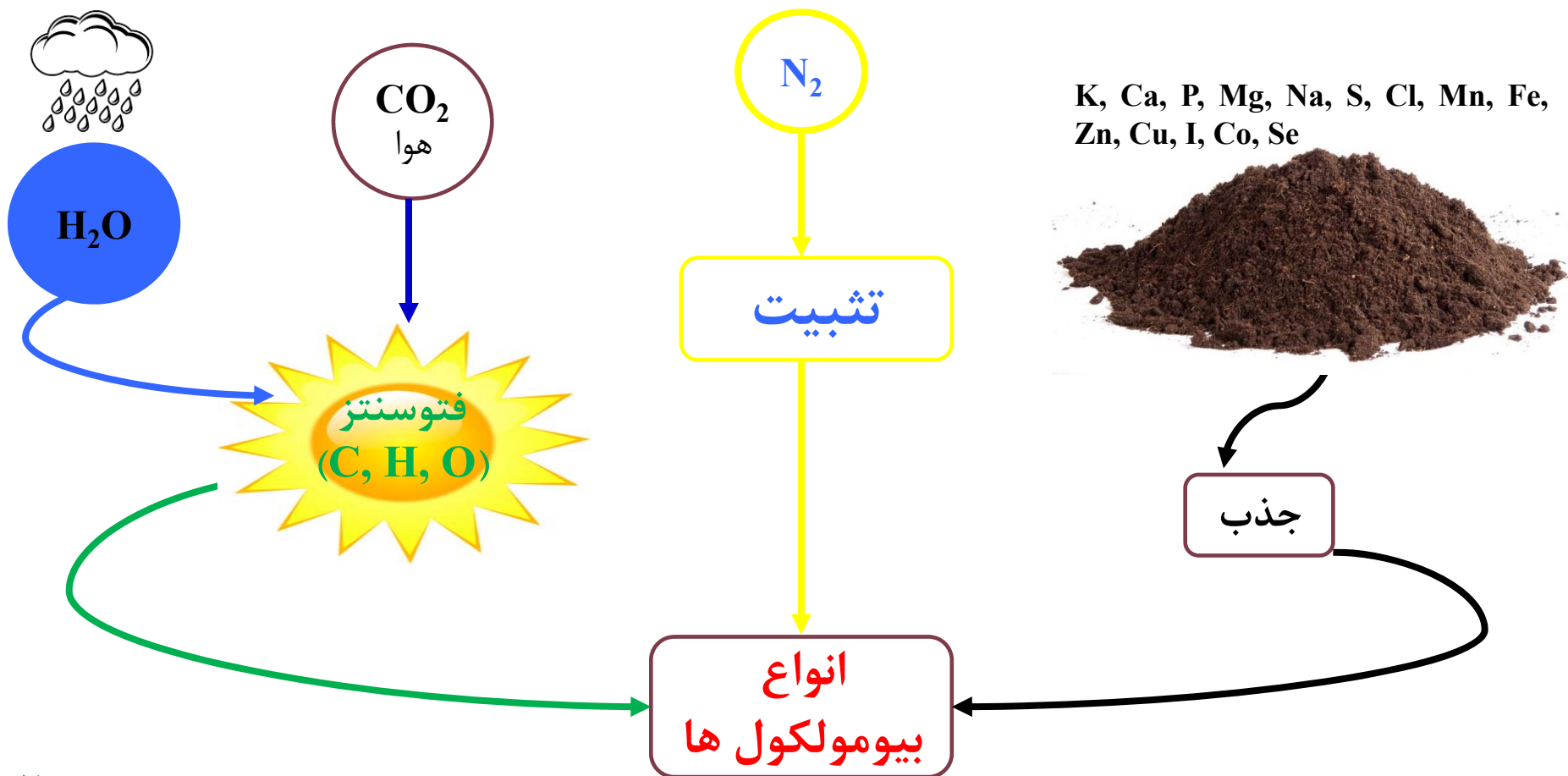


ترکیب عناصر موجودات □





منشاء عناصر در موجودات □





پیوندهای شیمیایی در بیومولکول ها □

Table 2-1 Bond Energies in Biomolecules

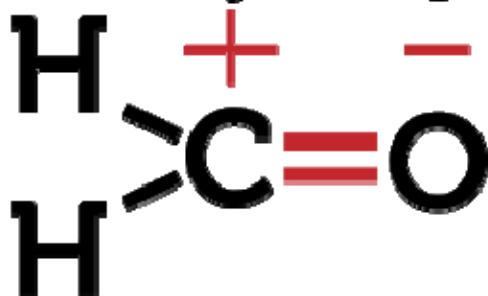
Type of Bond	Example	Bond Strength (kJ · mol ⁻¹)
Covalent	O — H	460
	C — H	414
	C — C	348
Noncovalent		
Ionic interaction	—COO ⁻ ... ⁺ H ₃ N—	86
van der Waals forces		
Hydrogen bond	—O—H...O	20
Dipole-dipole interaction	>C=O...<C=O	9.3
London dispersion forces	$ \begin{array}{c} \text{H} & & \text{H} \\ & & \\ -\text{C}-\text{H} \cdots \text{H}-\text{C}- \\ & & \\ \text{H} & & \text{H} \end{array} $	0.3



□ ترکیبات کووالانسی قطبی و غیر قطبی

Element	Pauling scale
F	4.0
O	3.5
Cl	3.0
N	3.0
S	2.5
C	2.5
H	2.1
B	2.0
Na	0.9

Formaldehyde (CH₂O)



Formaldehyde is a polar compound. One end of the molecule has a slightly positive charge. The other end has a slightly negative charge.

Carbon Dioxide (CO₂)



Carbon dioxide is a nonpolar compound. Both ends of the molecule are slightly negative in charge.

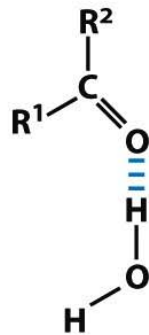


پیوند هیدروژنی

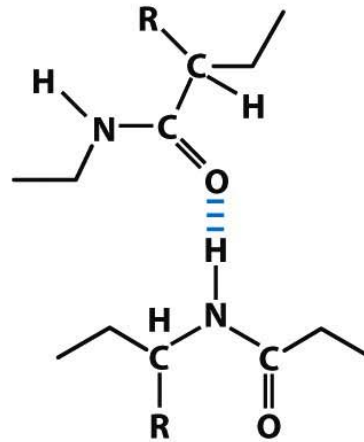
Between the hydroxyl group of an alcohol and water



Between the carbonyl group of a ketone and water



Between peptide groups in polypeptides



Between complementary bases of DNA

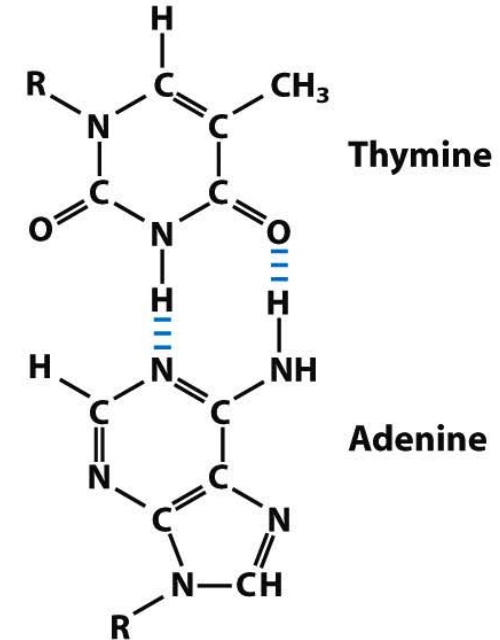
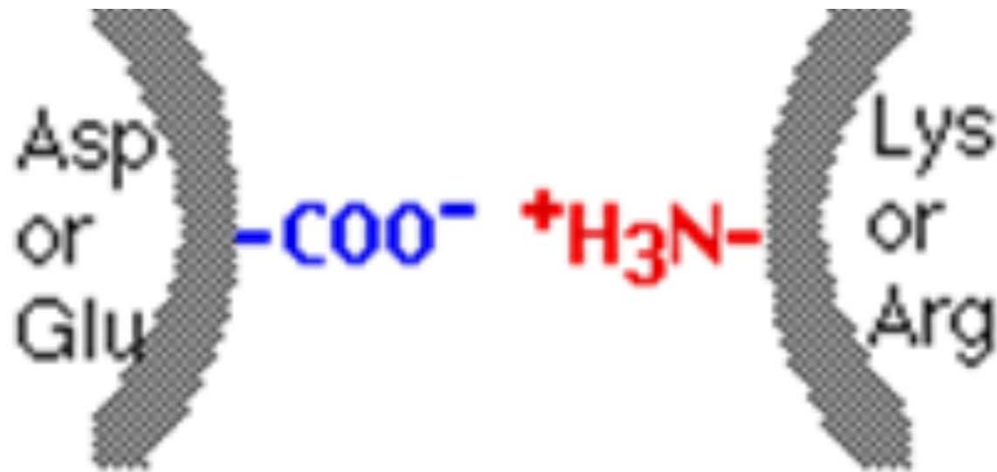
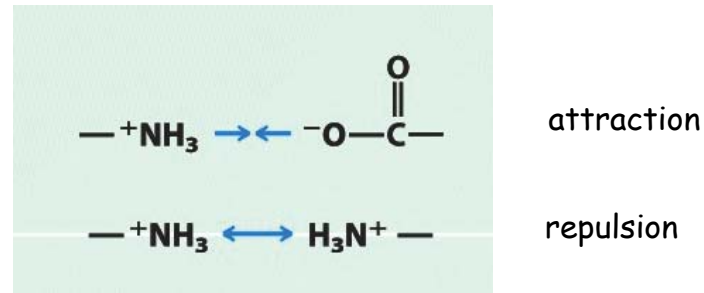


Figure 2-4
Lehninger Principles of Biochemistry, Fifth Edition
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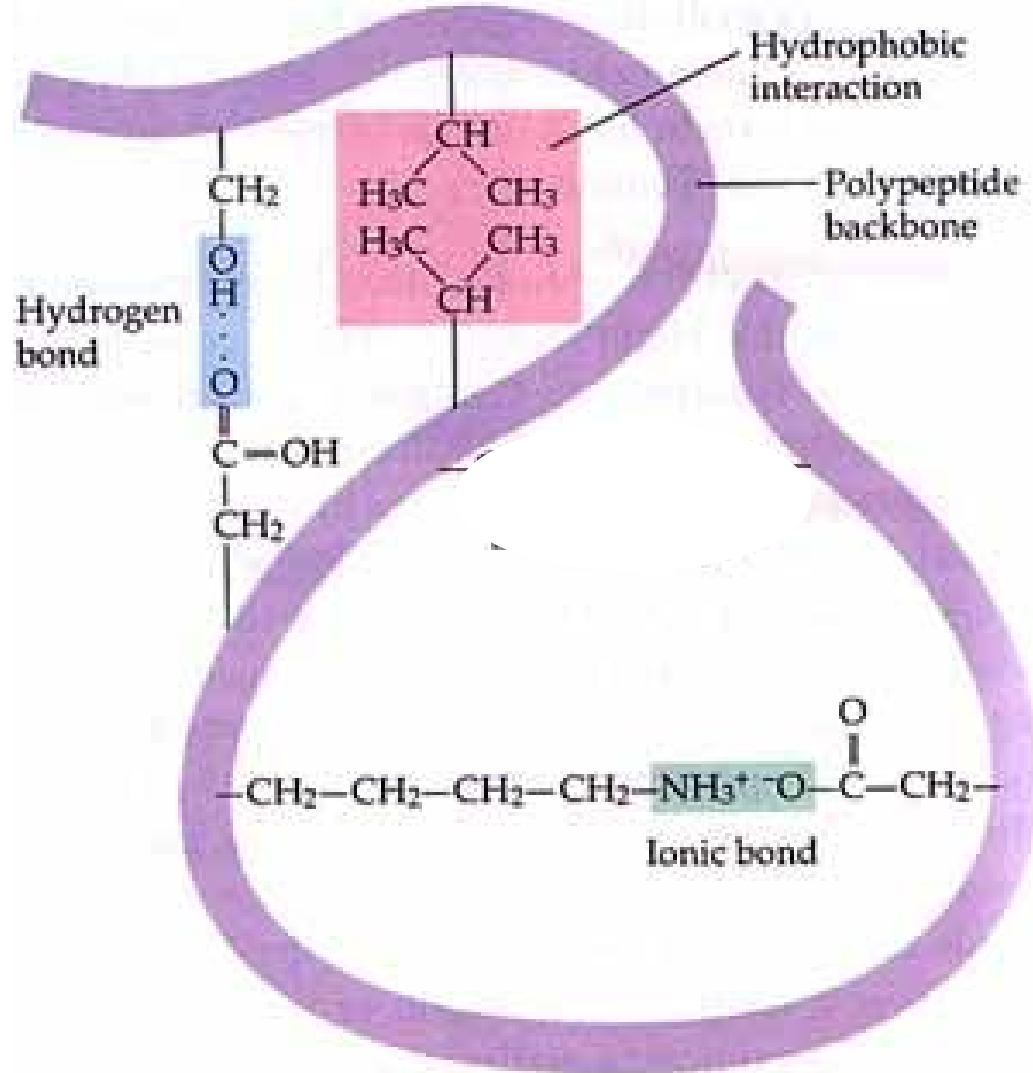
□ تقابلات یونی



Ionic Interactions



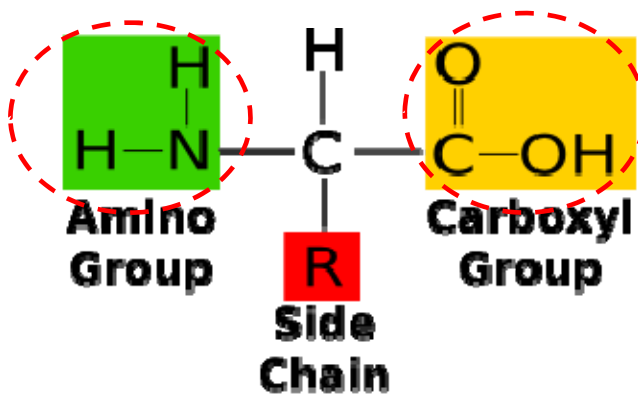
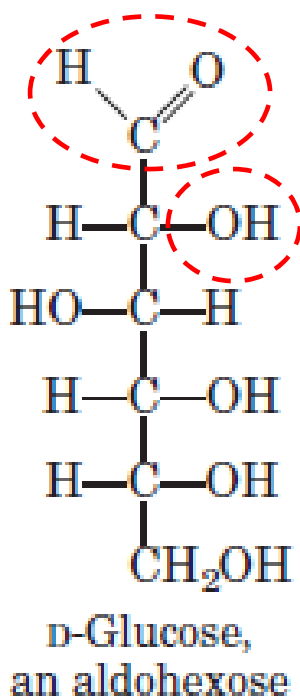
□ پیوند غیر کووالانسی داخل مولکولی



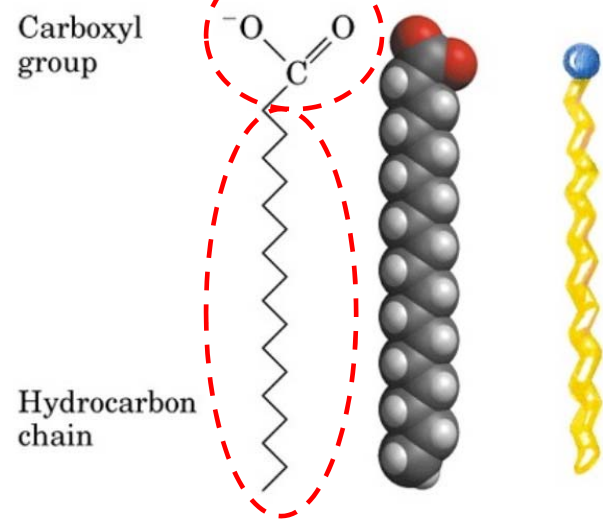


□ گروه های عامل

— طبقات مختلف بیومولکول ها (کربوهیدرات، پروتئین و ...)



Fatty Acid Structure





□ گروه های عامل هیدروکربنی

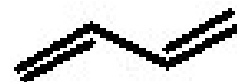
■ هیدروکربن های آلیفاتیک



Alkane



Alkene

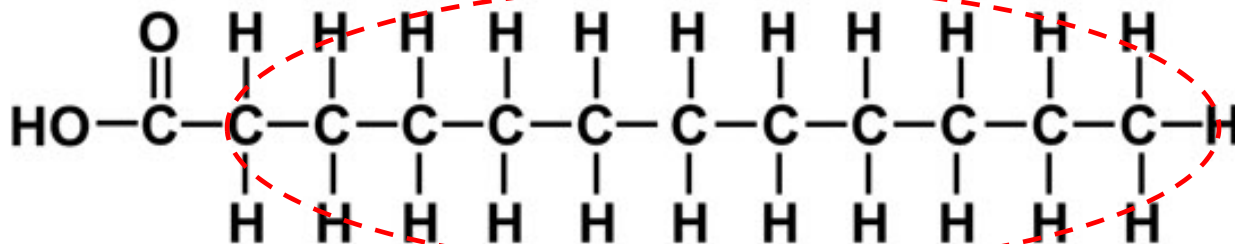


Conjugated
Alkene

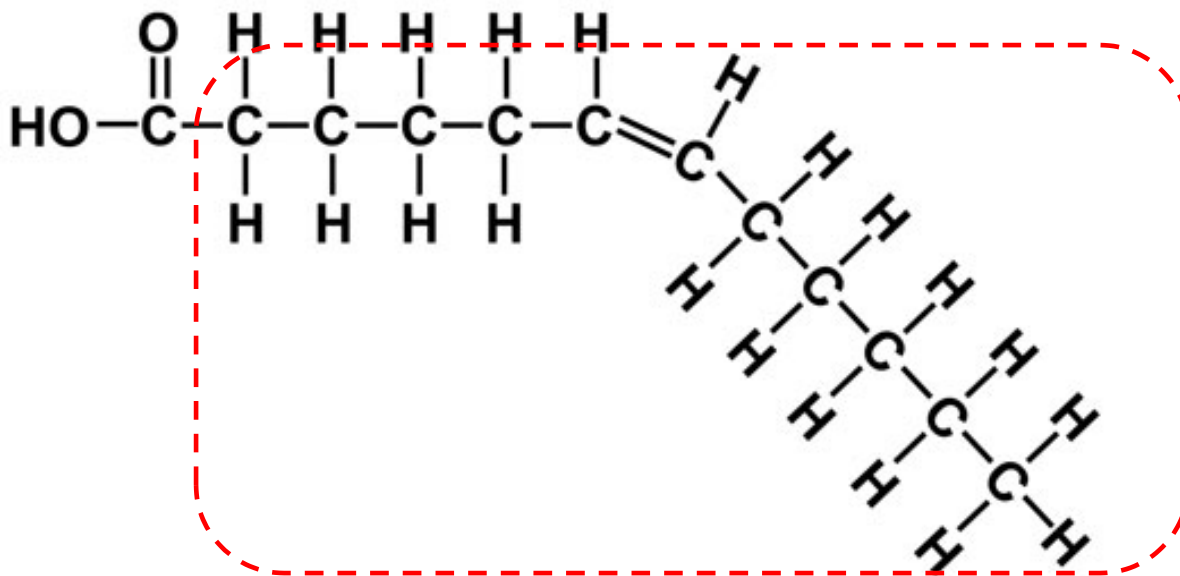


□ ... گروه های عامل

Saturated Fatty Acid



Unsaturated Fatty Acid





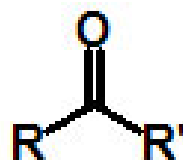
□ گروه های عامل اکسیژن دار



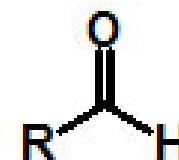
Alcohol



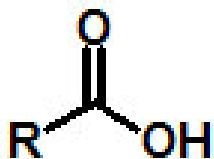
Ether



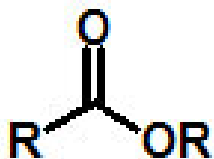
Ketone



Aldehyde



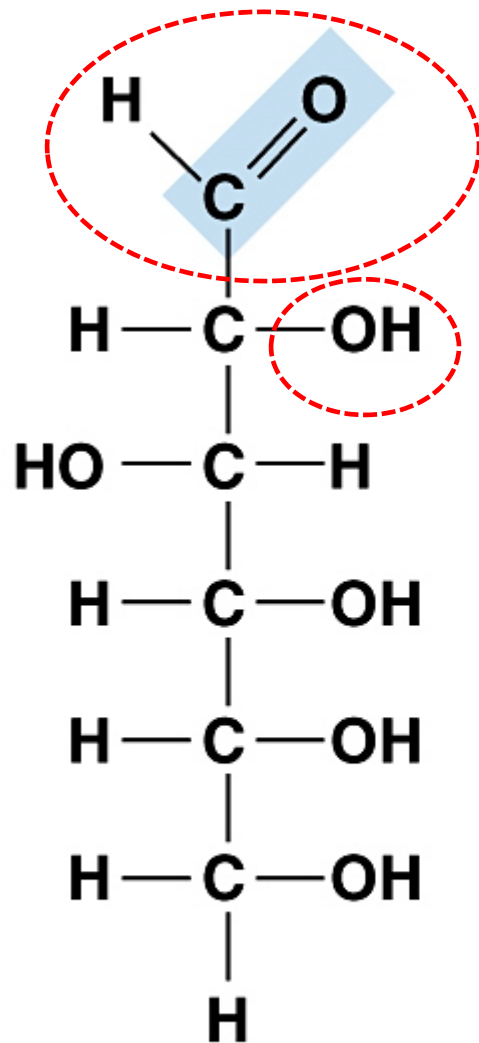
Carboxylic
Acid



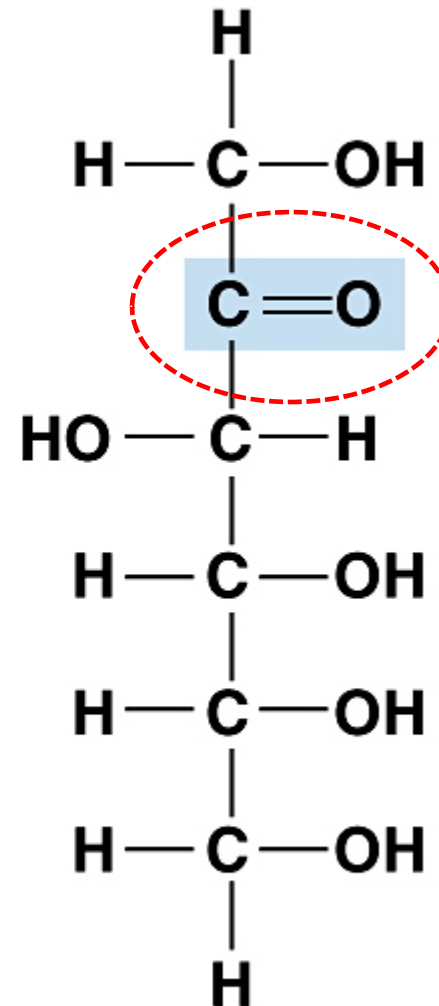
Ester



... گروه های عامل □



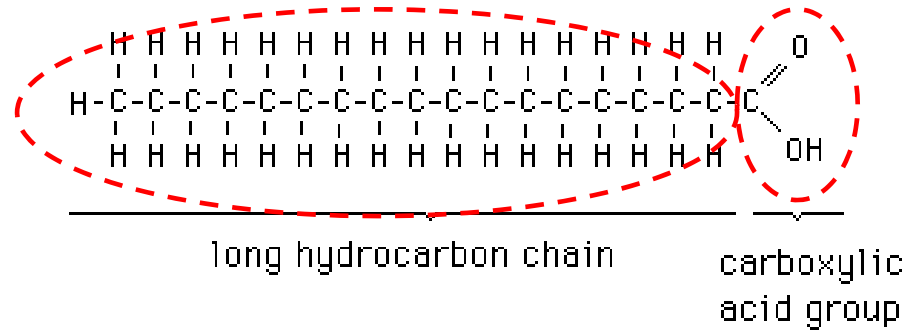
Glucose



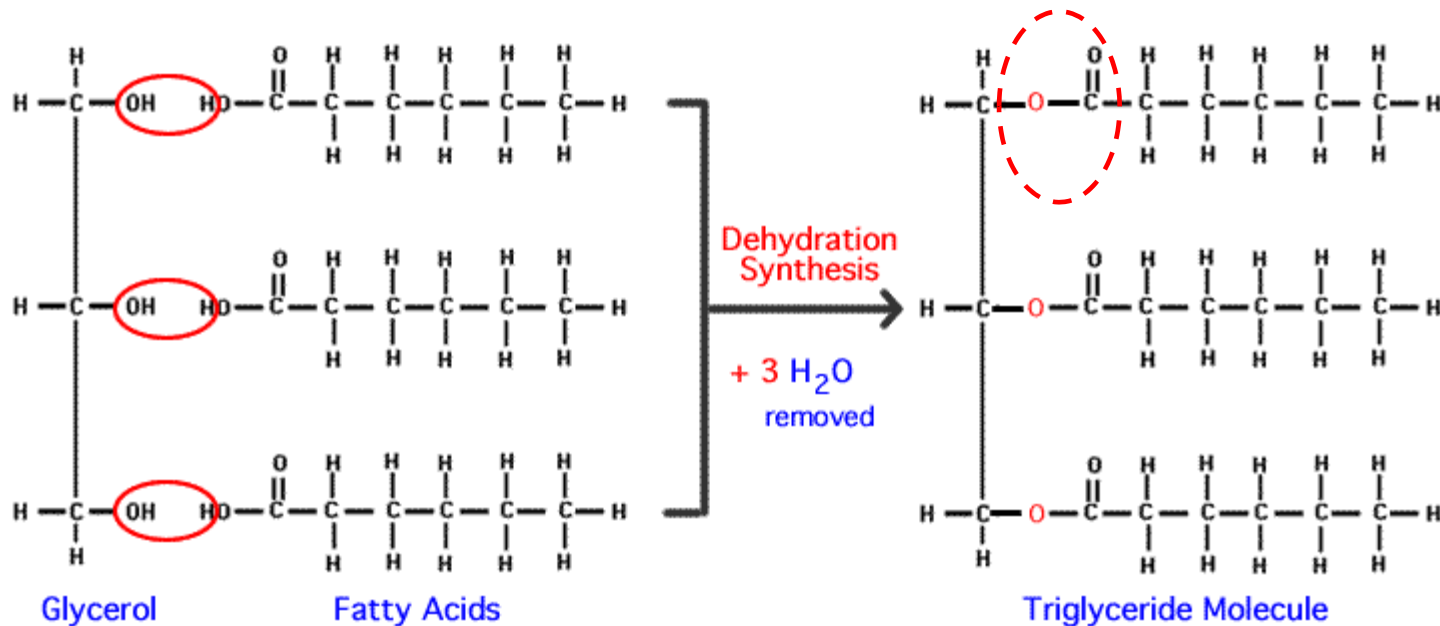
Fructose



□ ... گروه های عامل

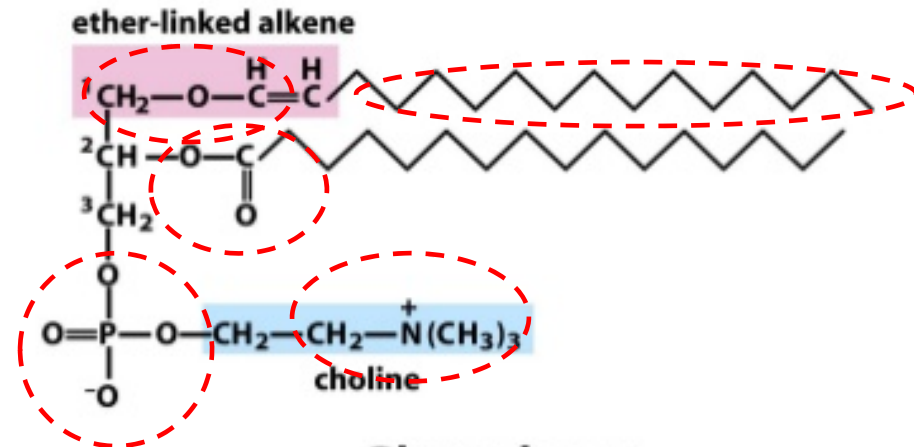


Essential features of a fatty acid

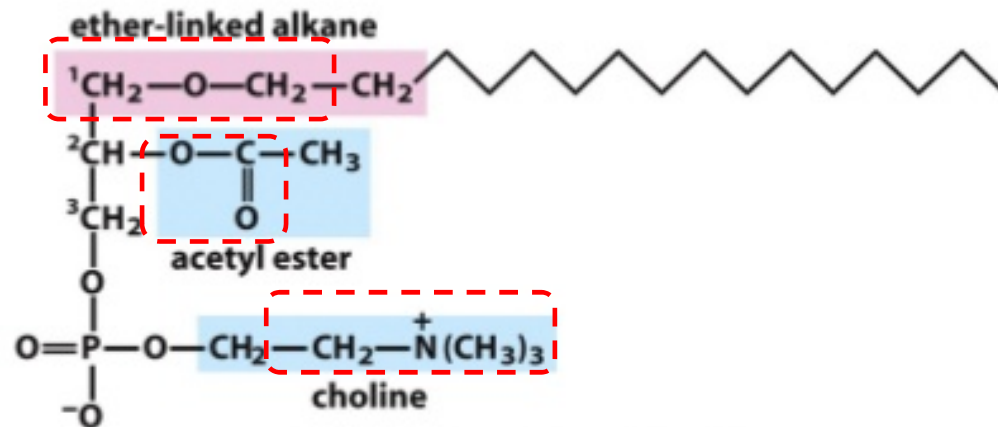




... گروه های عامل □



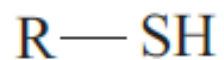
Plasmalogen



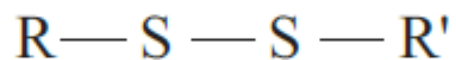
Platelet-activating factor



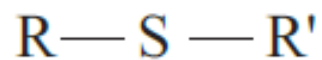
□ گروه عامل سولفور دار



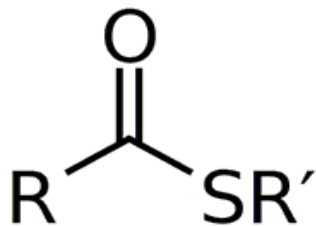
Thiol



Disulfide

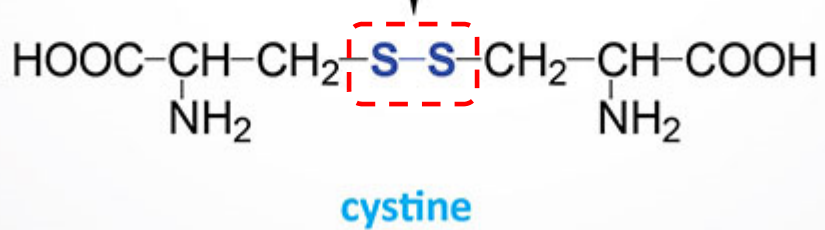
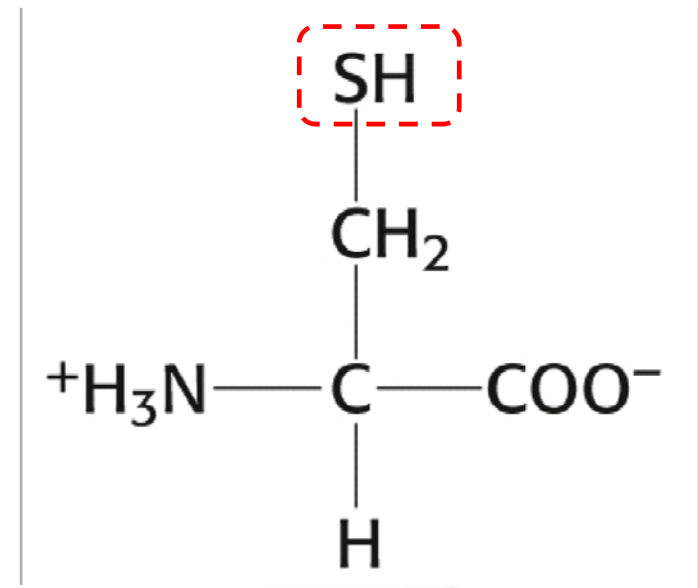
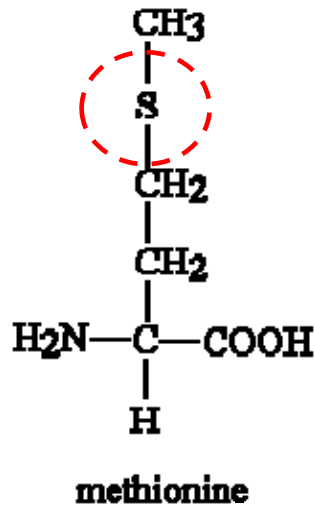


Thioether



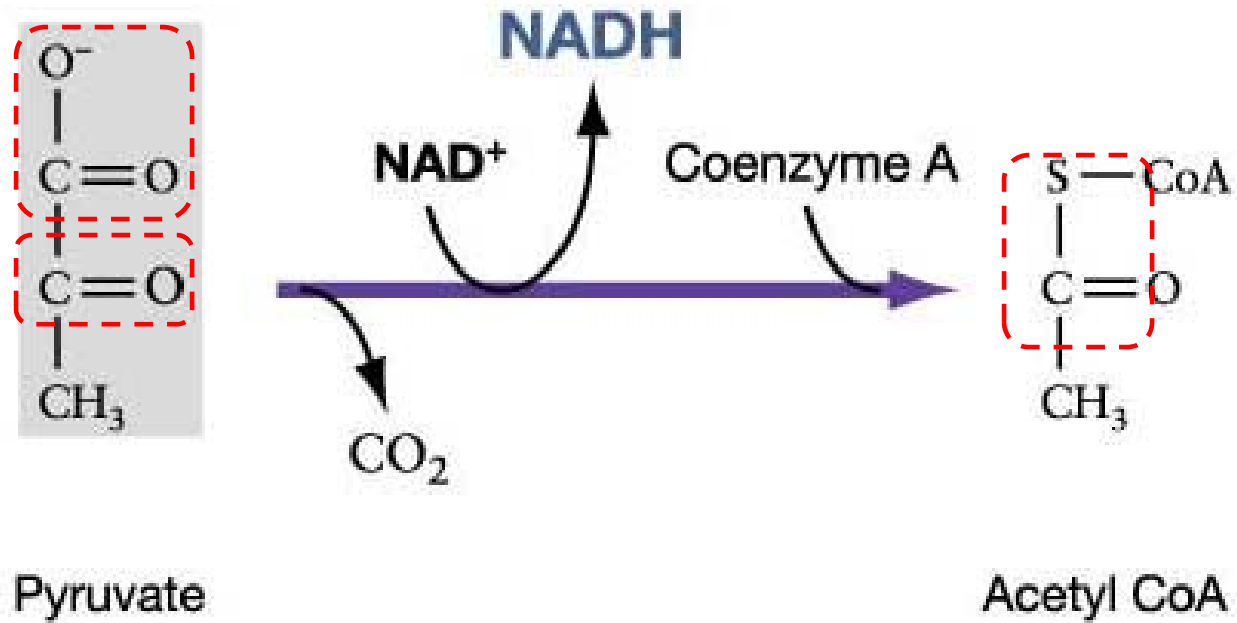


□ ... گروه های عامل



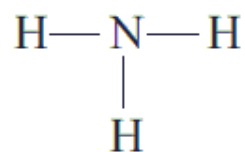


□ ... گروه های عامل

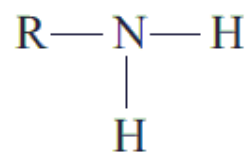




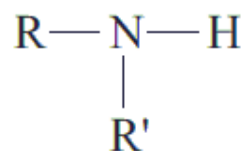
□ گروه عامل نیتروژن دار



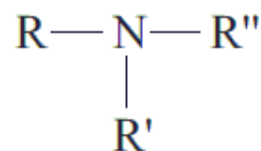
Ammonia



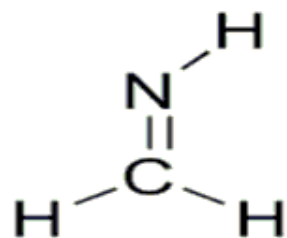
Primary amine



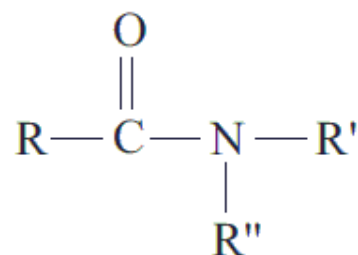
Secondary amine



Tertiary amine



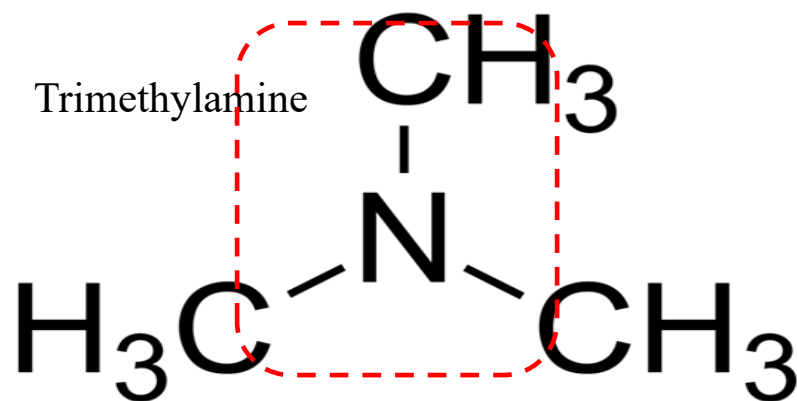
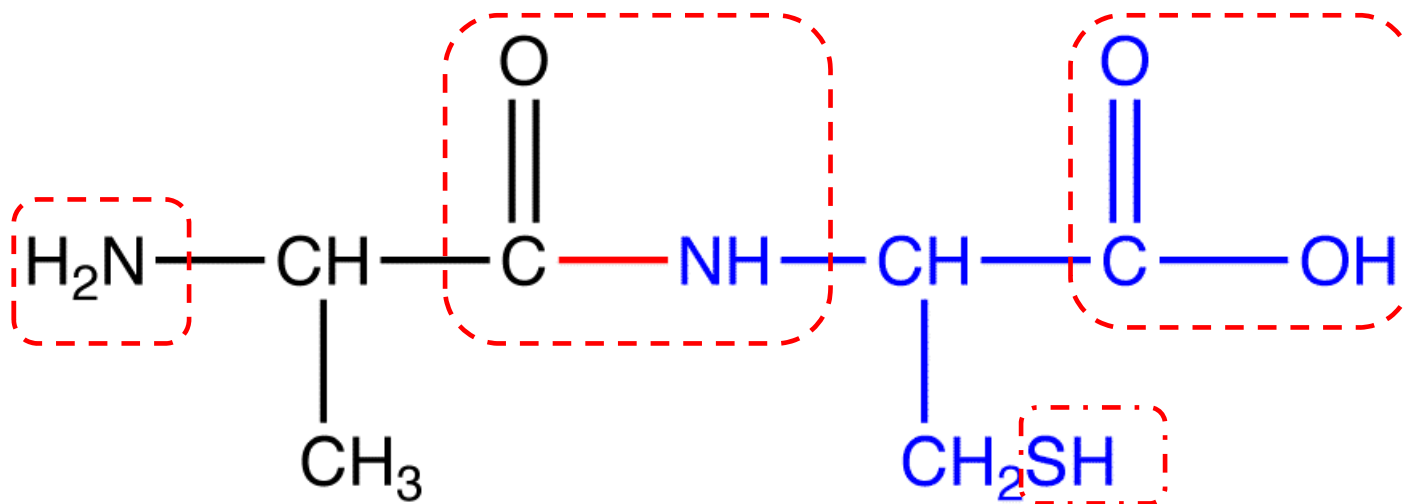
Imine



Amide

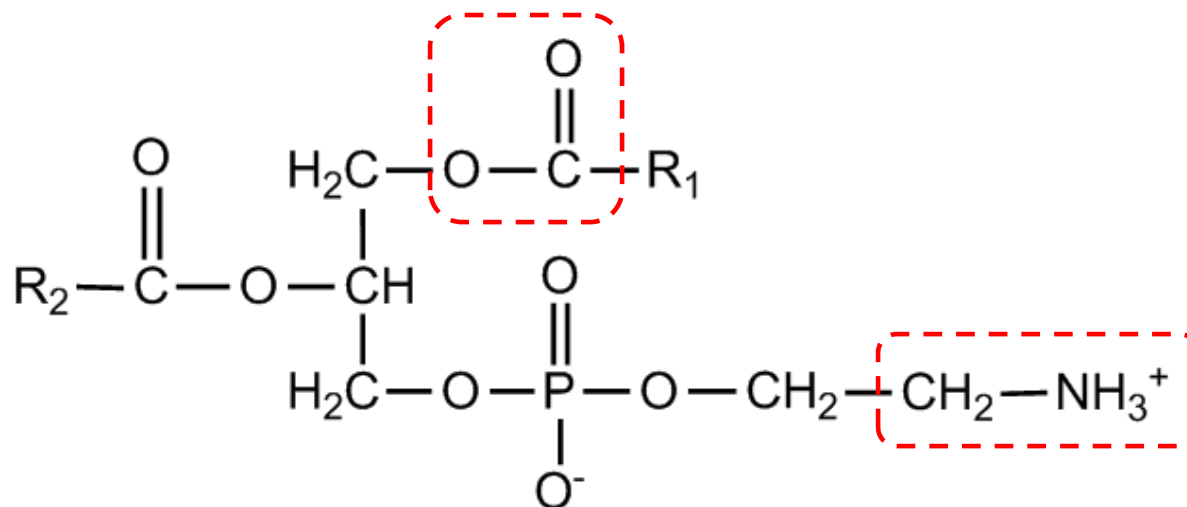
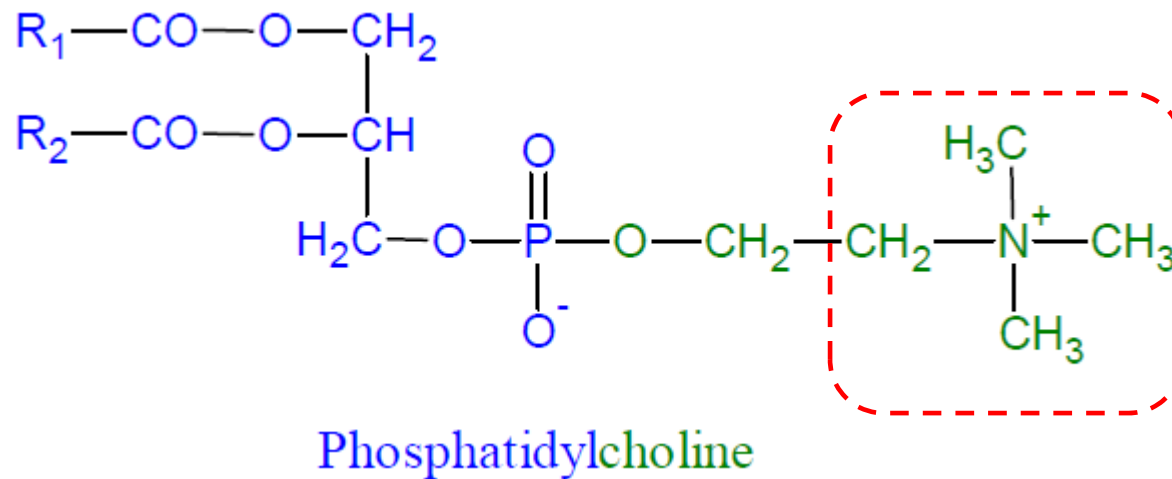


□ ... گروه های عامل





□ ... گروه های عامل

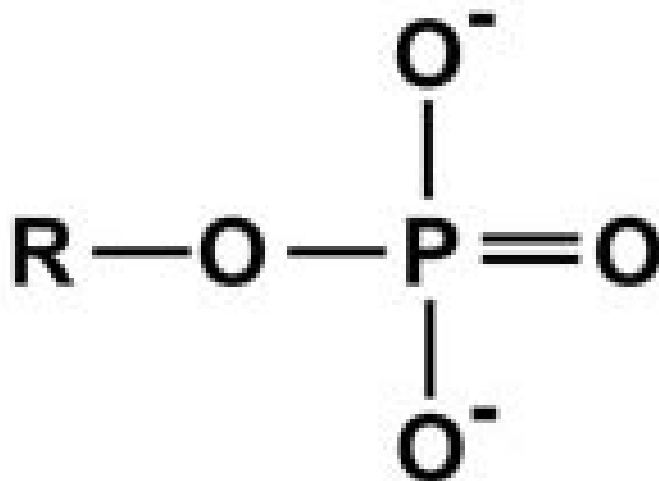




□ گروه های عامل فسفر دار

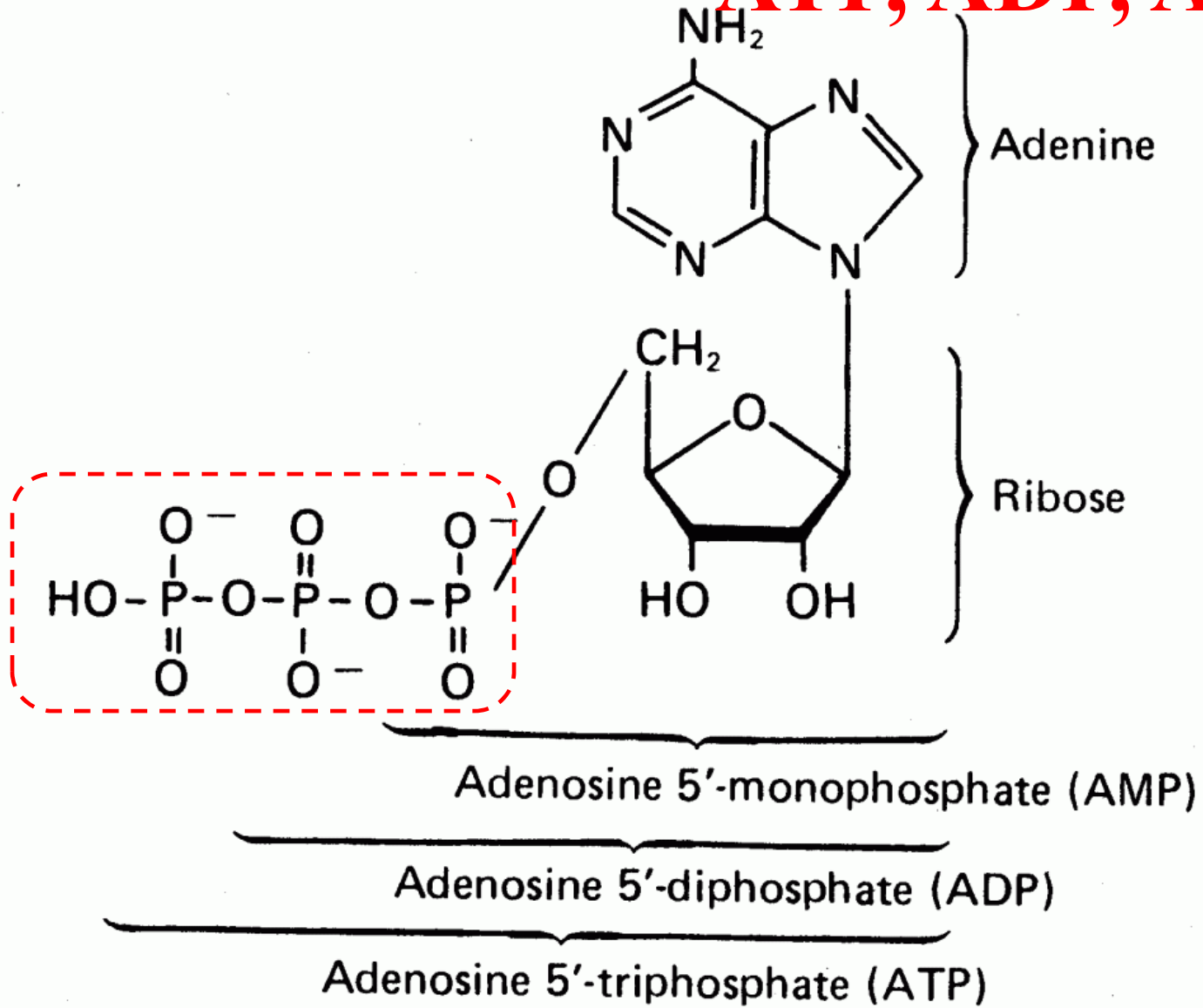
■ فسفات (شکل یونیزه اسید فسفریک)

Phosphate Group



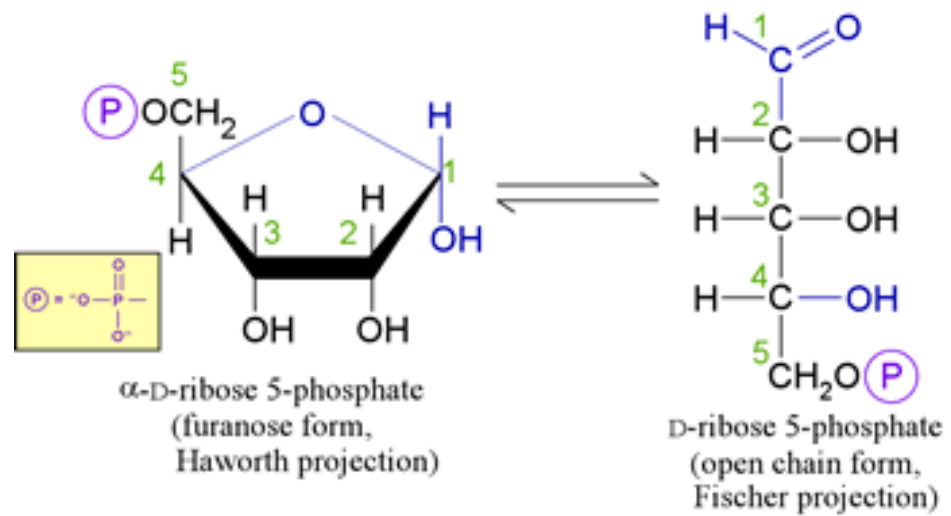
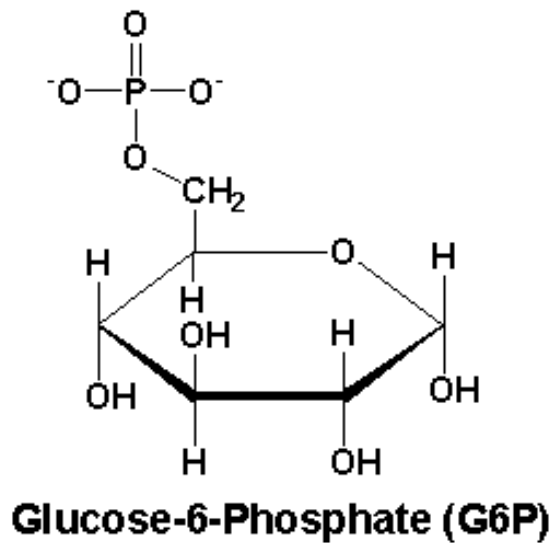


ATP, ADP, AMP □



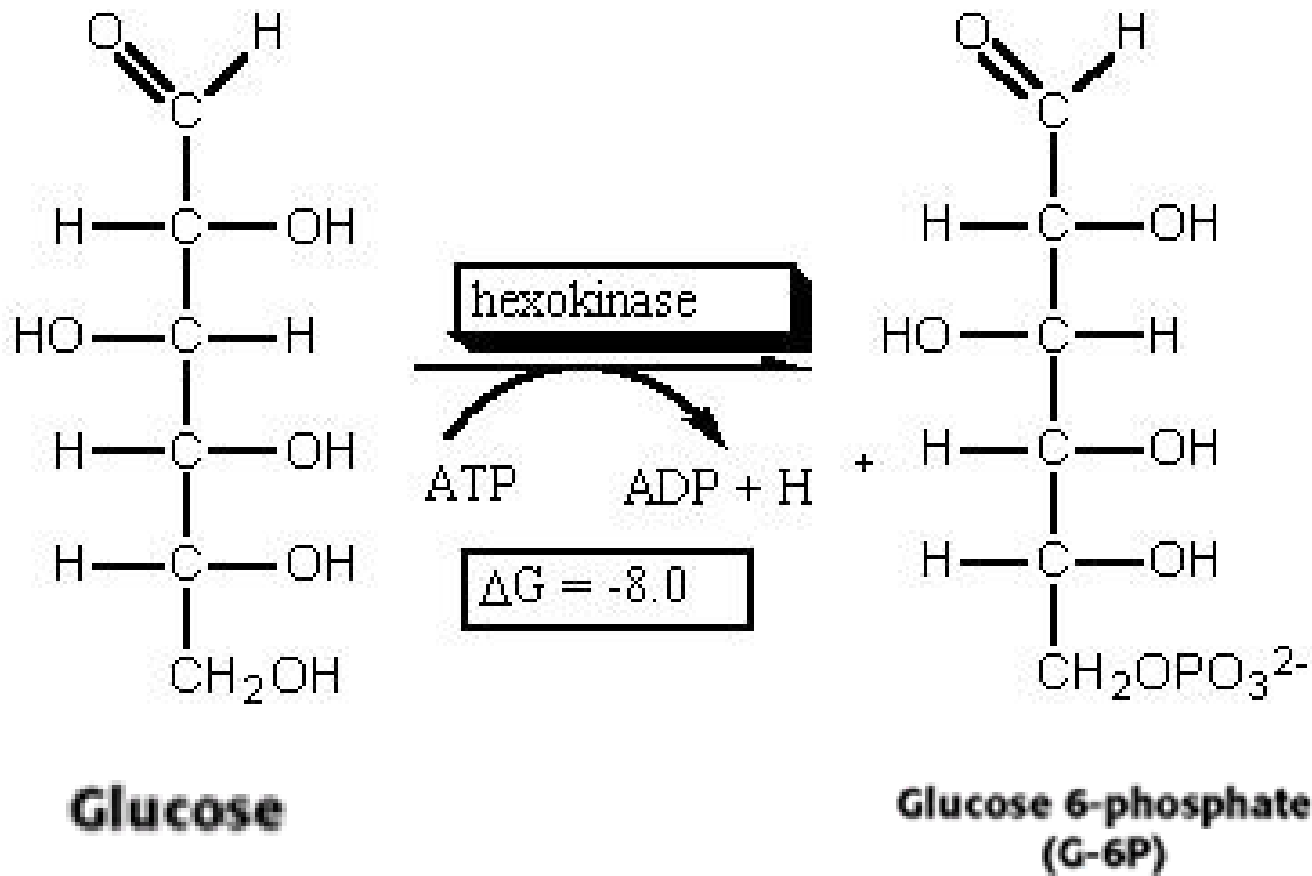


□ ... گروه های عامل



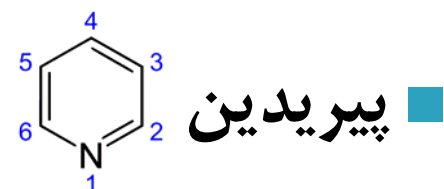
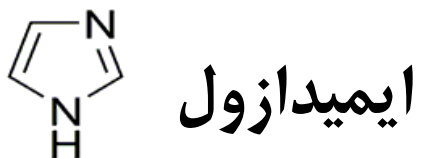
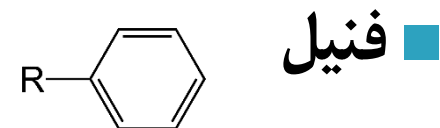
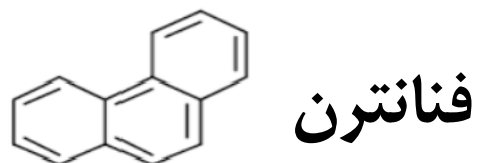


□ ... گروه های عامل





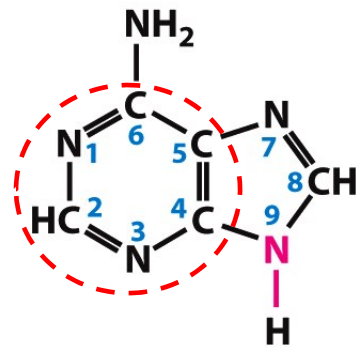
ترکیبات حلقوی



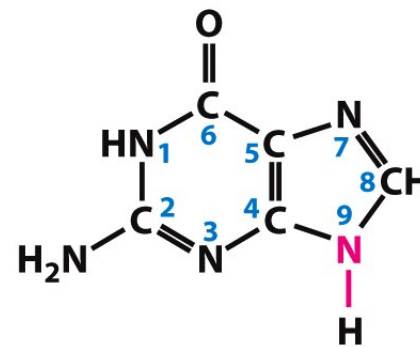


□ ... گروه های عامل

PURINES

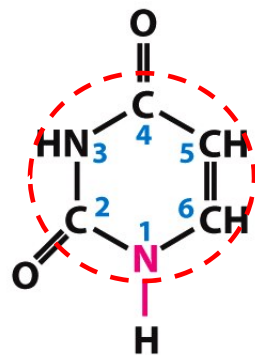


Adenine (A)

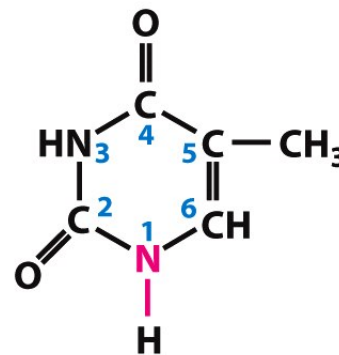


Guanine (G)

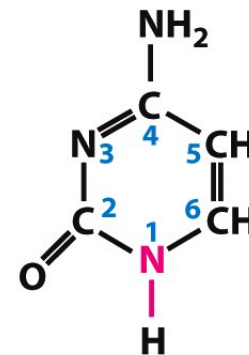
PYRIMIDINES



Uracil (U)



Thymine (T)

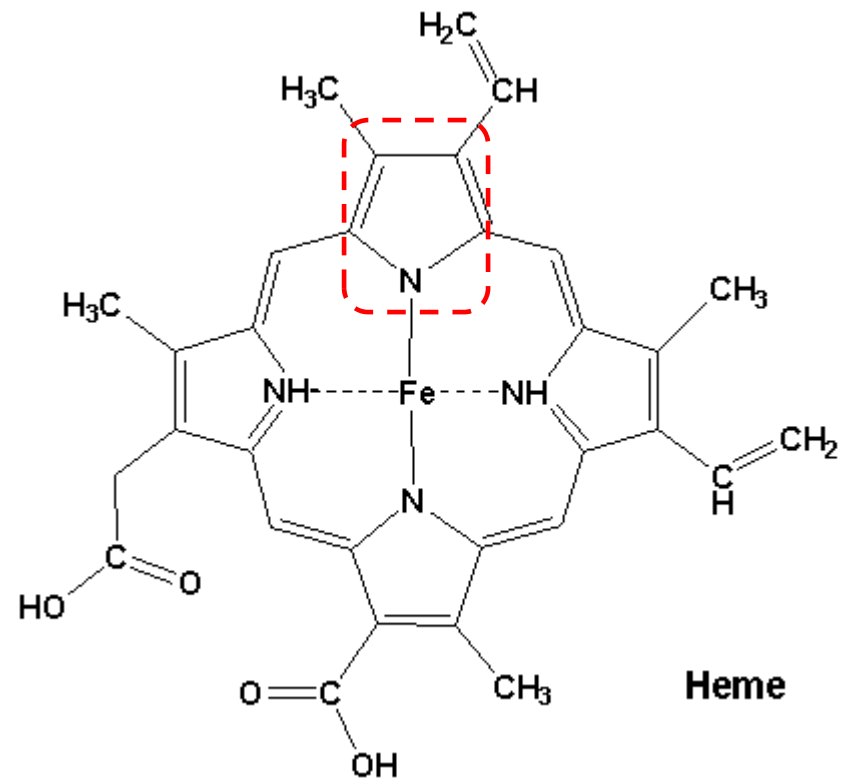
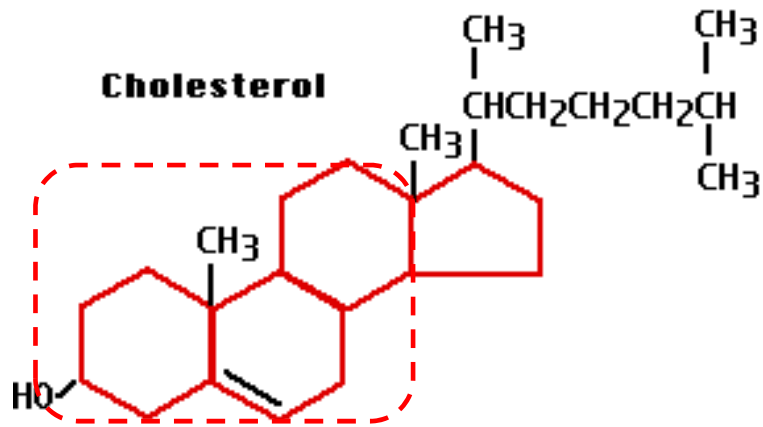


Cytosine (C)

Figure 2-17
Molecular Cell Biology, Sixth Edition
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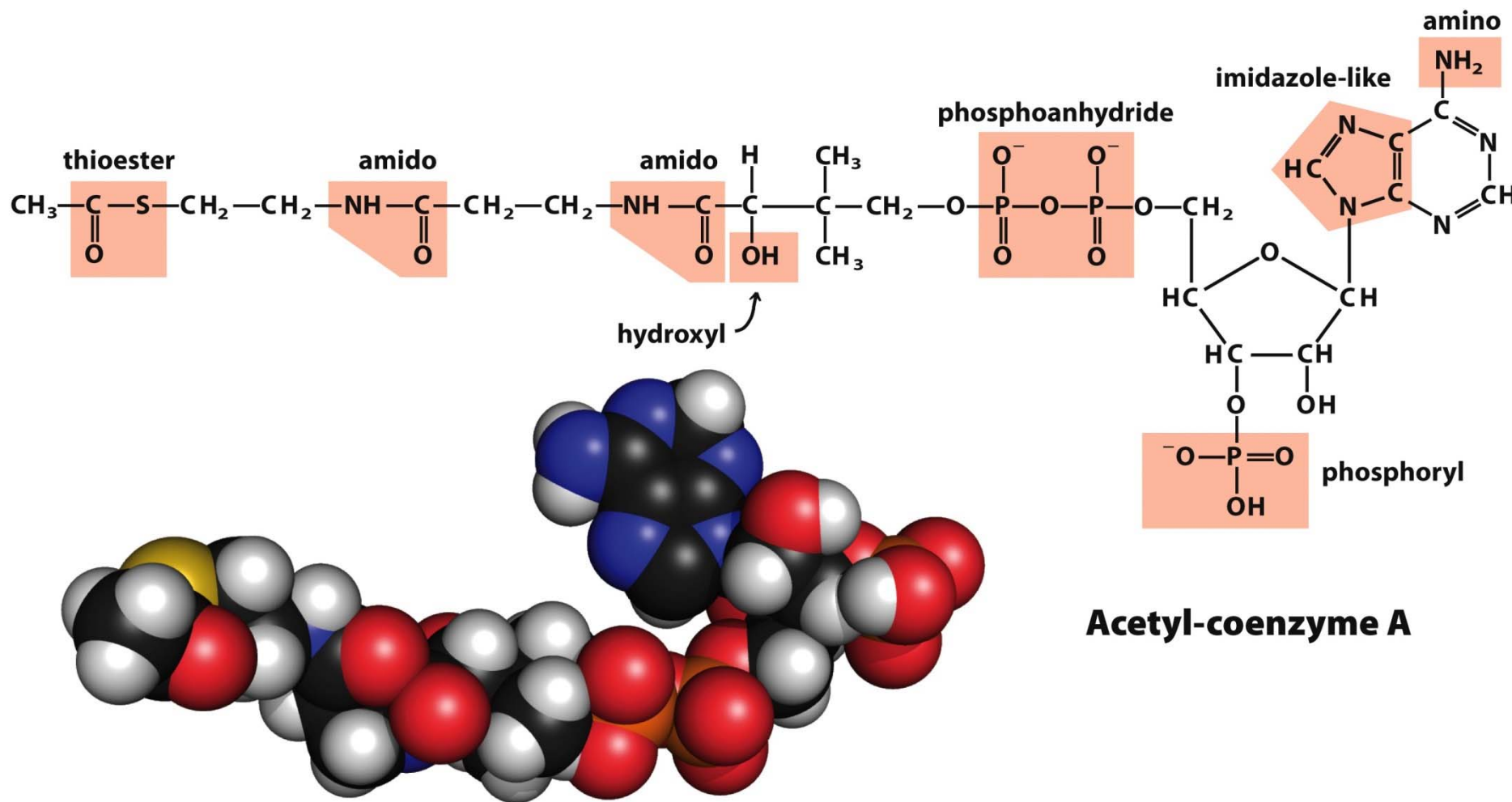


□ ... گروه های عامل





□ کوآنزیم آ و گروه های عامل



Acetyl-coenzyme A

Figure 1-17

Lehninger Principles of Biochemistry, Sixth Edition

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□ مهمترین واکنش ها در بیوشیمی

■ تراکم و هیدرولیز

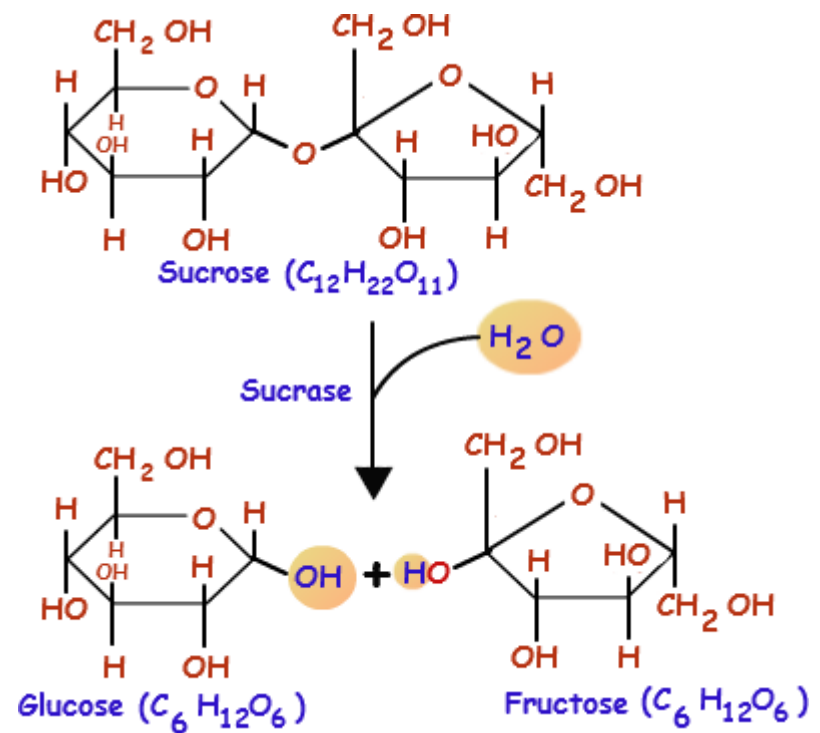
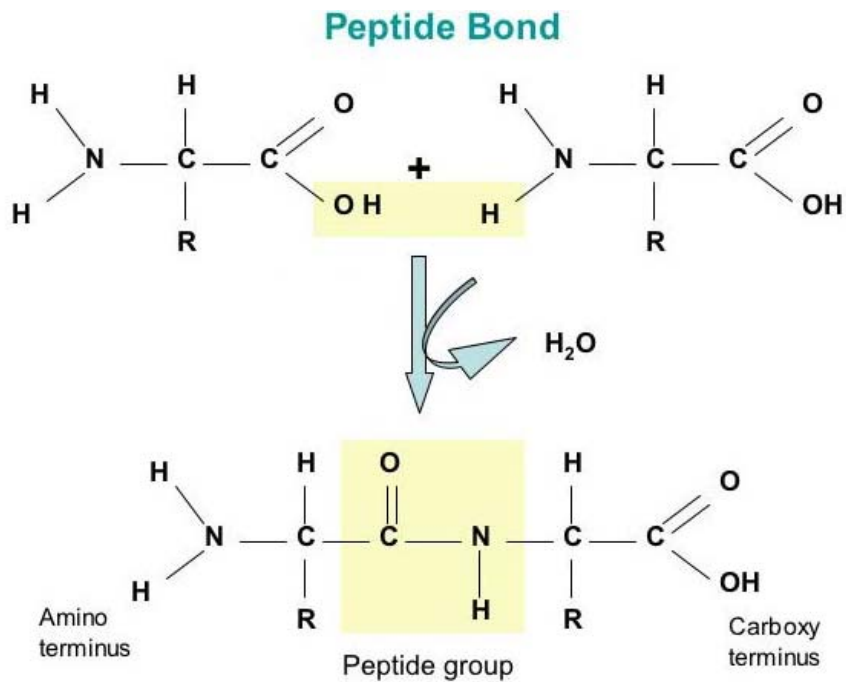
■ اکسیداسیون و احیاء

■ افزایشی و حذف

■ ایزومراسیون

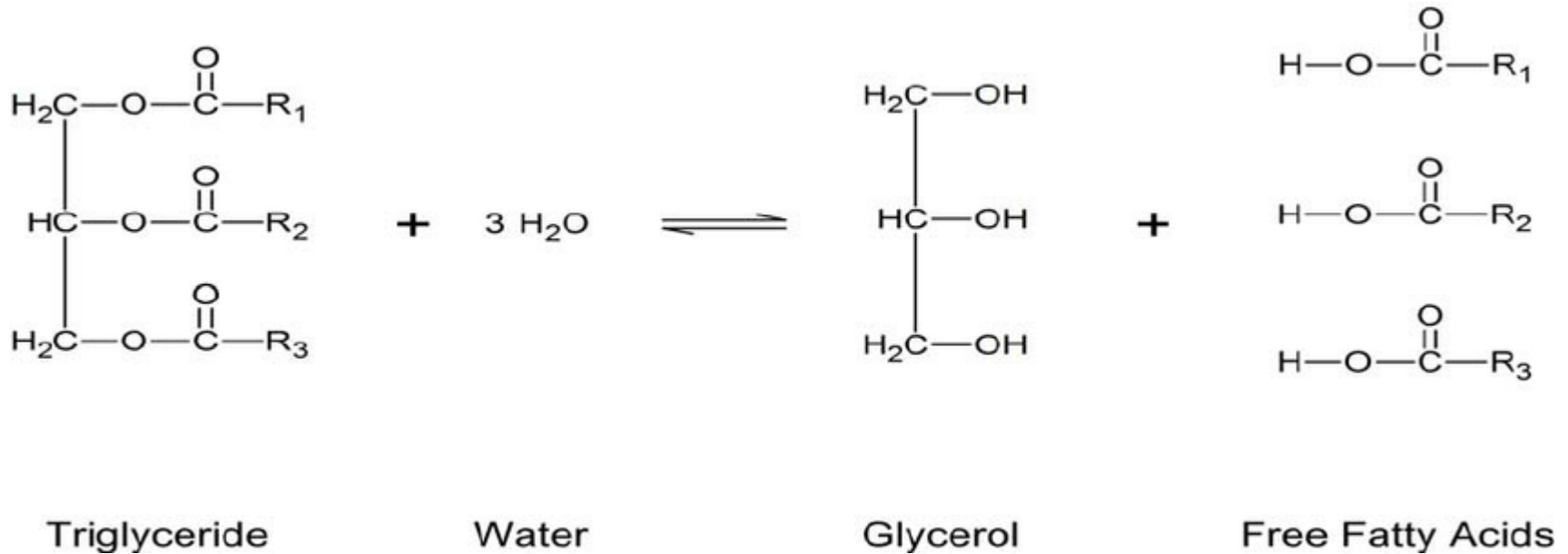


هیدرولیز و تراکم □



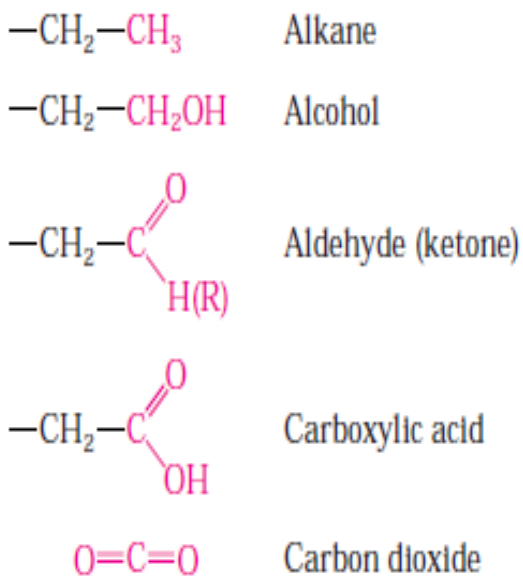
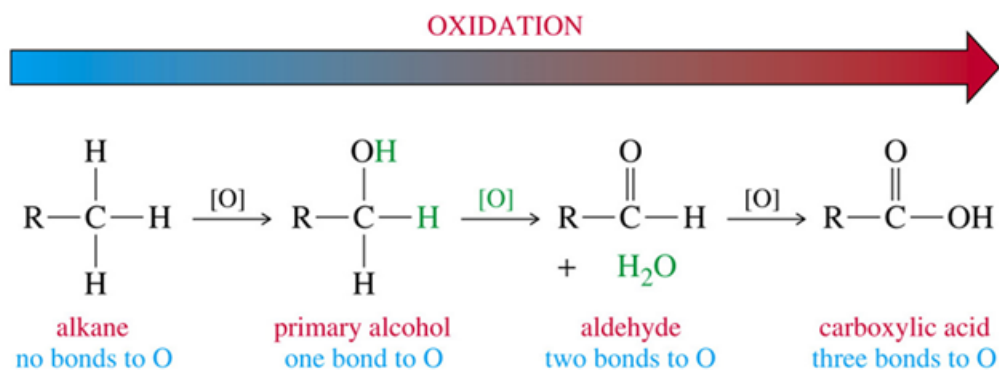


□... واکنش ها



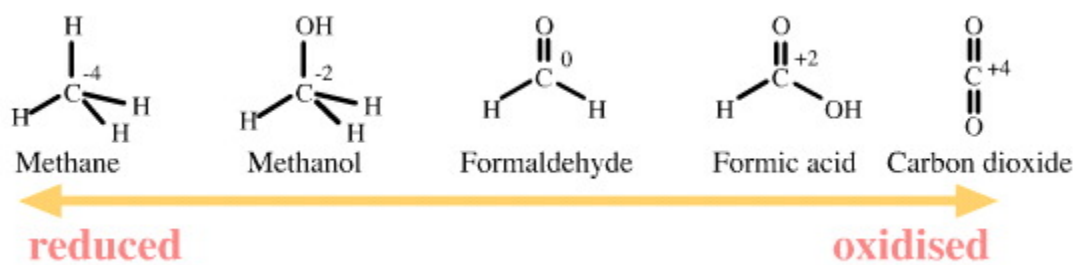


اکسیداسیون و احیاء □





عدد اکسیداسیون □

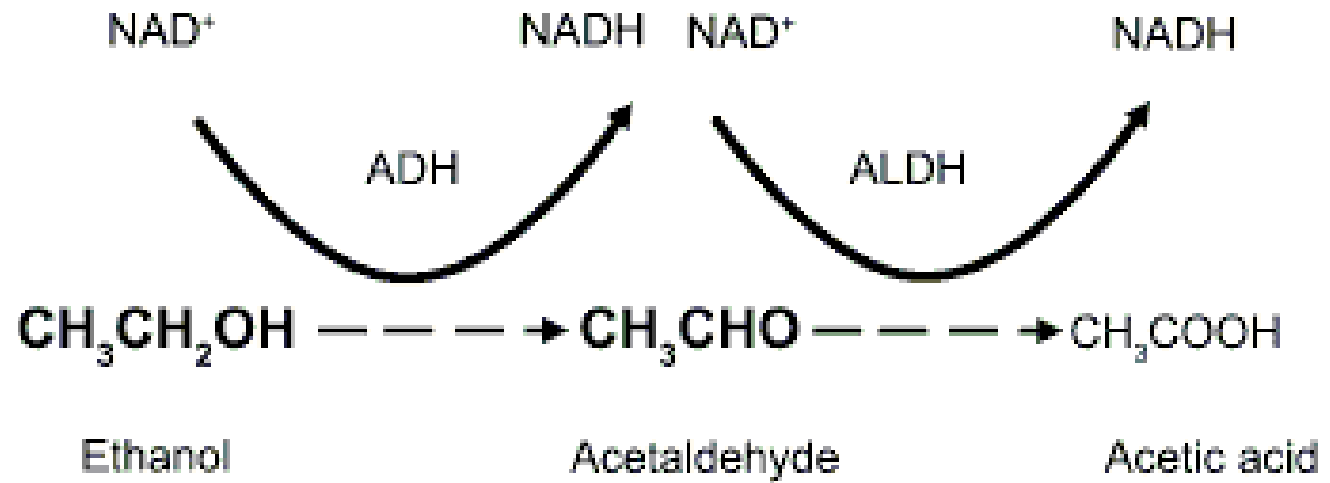


	OXIDATION →				
Functional group:	H ₃ C—H	H ₃ C—OH	H ₂ C=O	HCO ₂ H	O=C=O
	Alkane	Alcohol	Carbonyl	Carboxylic acid	Carbon dioxide
Oxidation state of carbon:	-4	-2	0	+2	+4
	← REDUCTION				



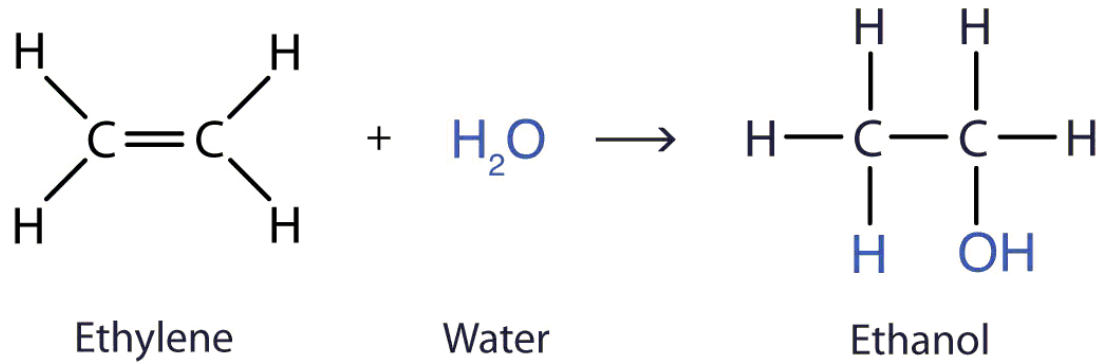


□ ... واکنش ها



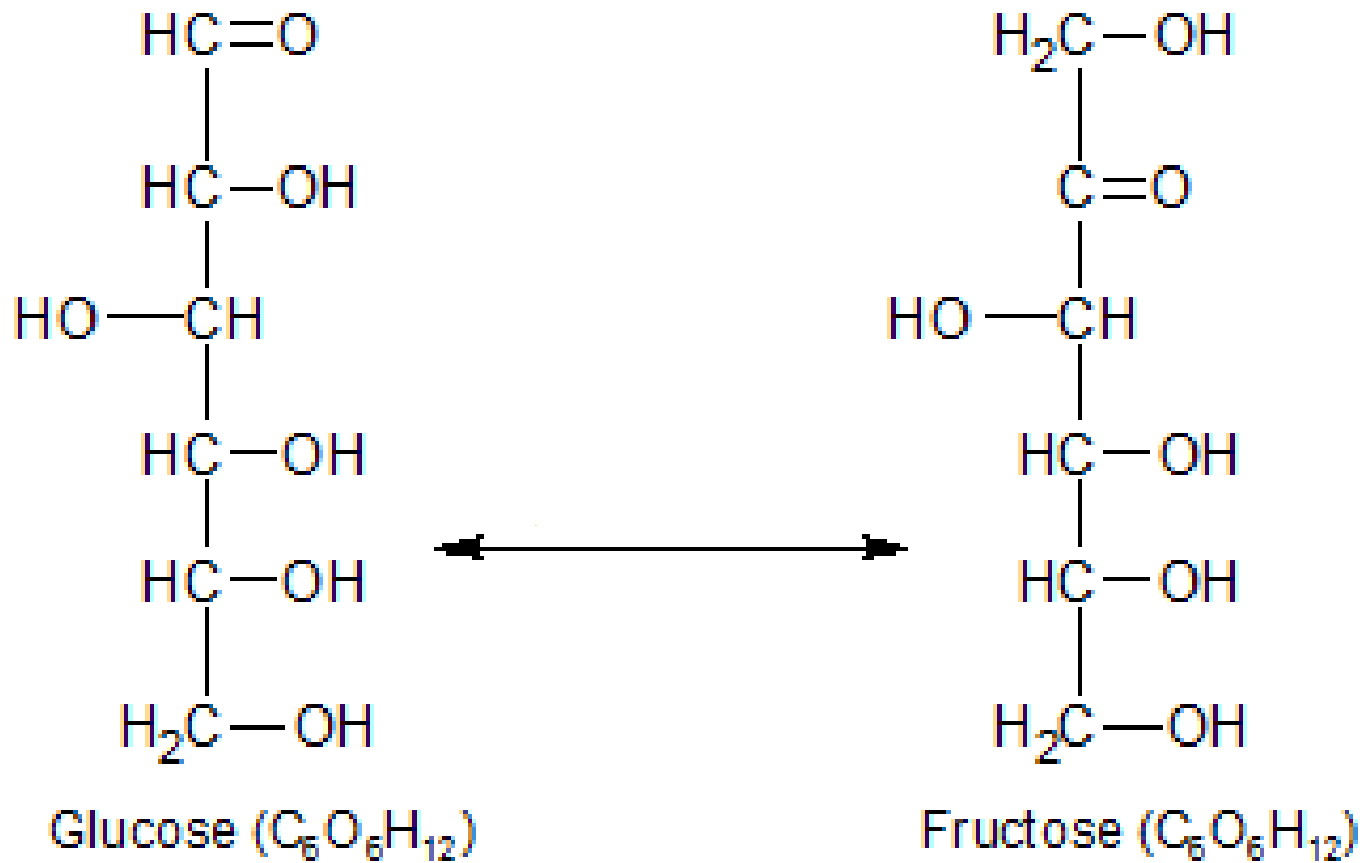


□ ... واکنش ها



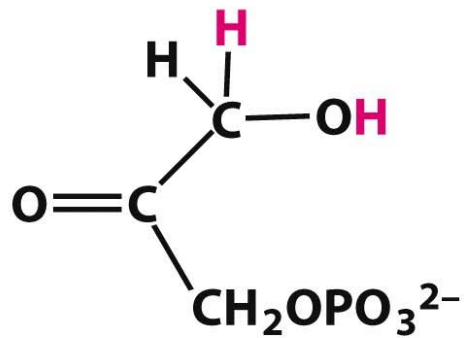


□ ... واکنش ها

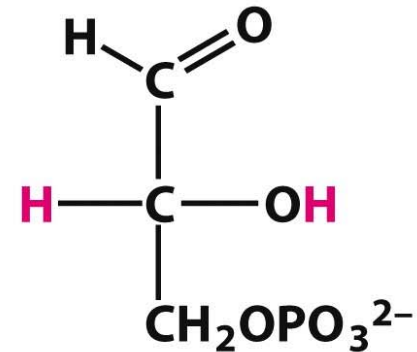




□ ... واکنش ها



**Dihydroxyacetone
phosphate**

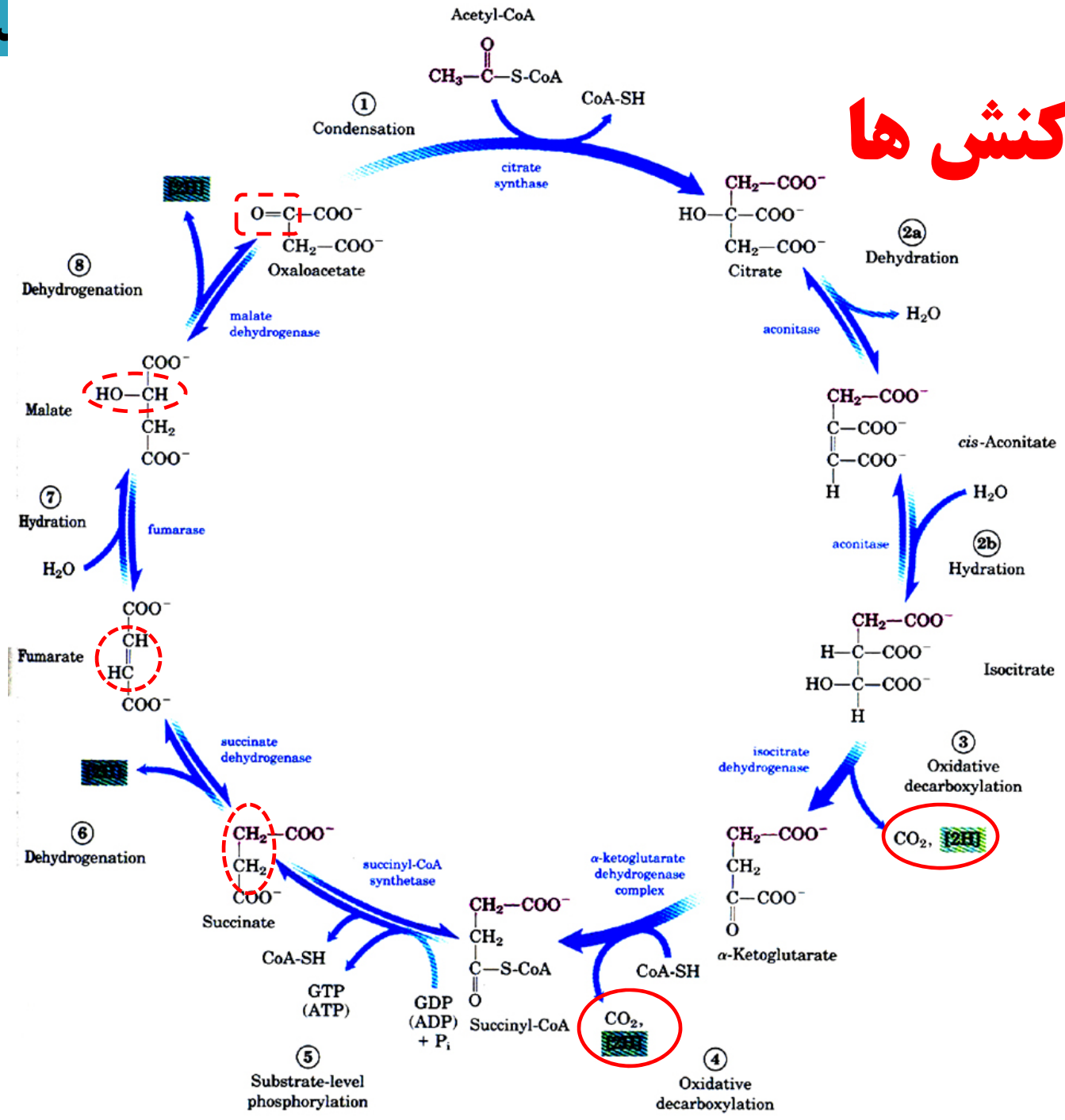


**Glyceraldehyde
3-phosphate**

Unnumbered 16 p458c
Biochemistry, Seventh Edition
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...واکنش ها



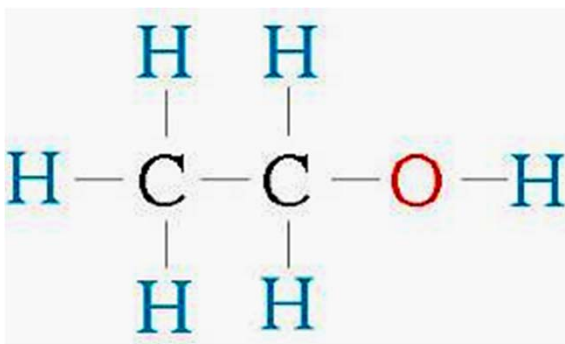


□ ایزومری در بیومولکول ها

■ فرمول مولکولی



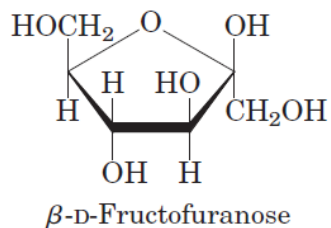
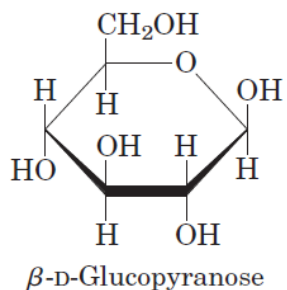
■ فرمول ساختاری





□ ...ایزومری در بیومولکول ها

■ ایزومر ساختمانی:



■ ایزومر فضایی:



□ کونفیگوراسیون

1. ایزومر هندسی یا سپس-ترانس
2. ایزومری کایرال (کربن نامتقارن)



ایزومری سیس و ترانس

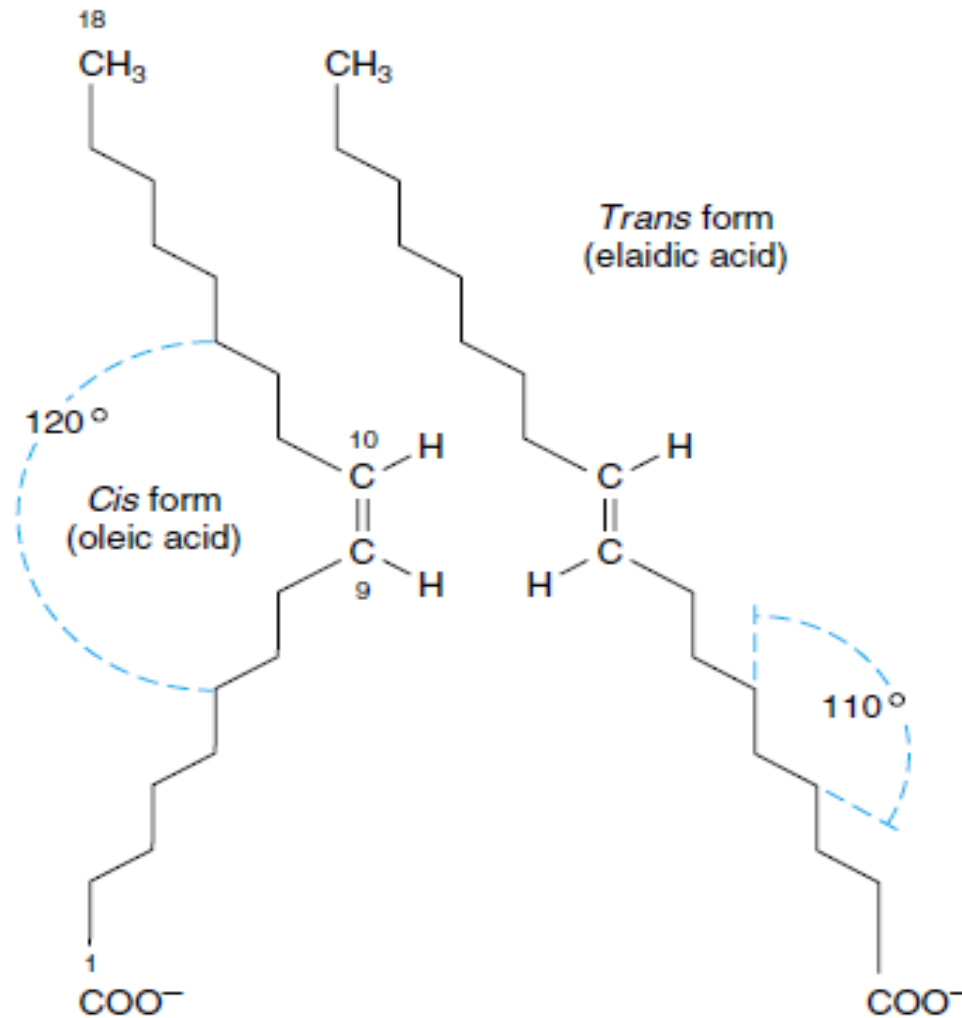
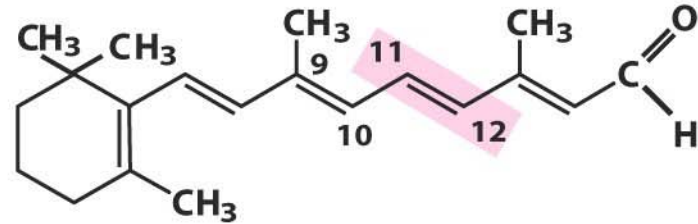
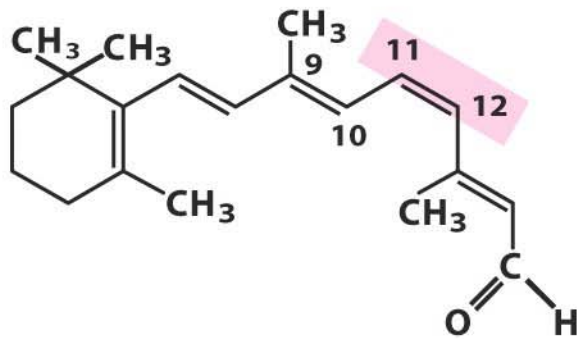
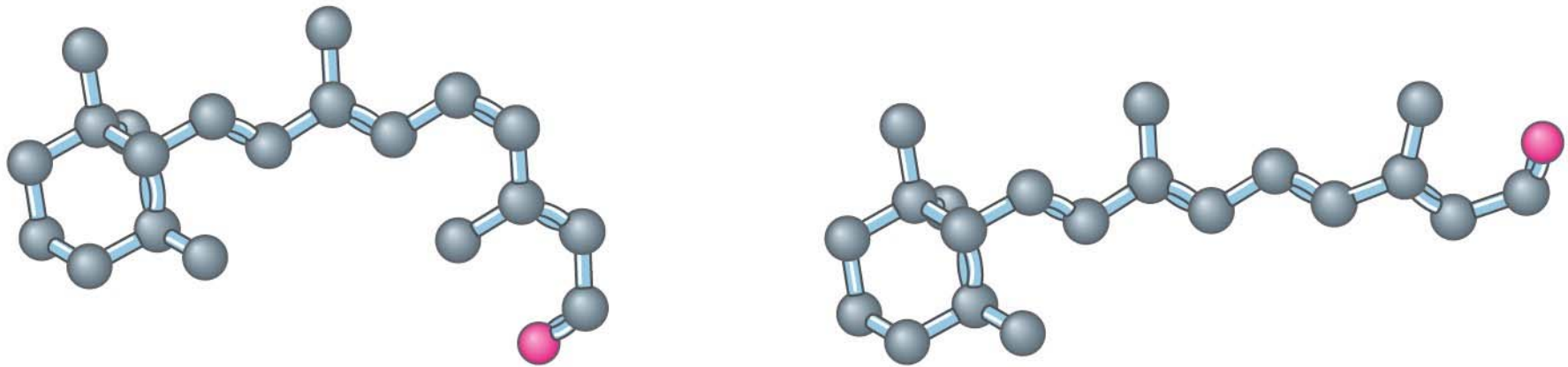


Figure 14-5. Geometric isomerism of Δ^9 , 18:1 fatty acids (oleic and elaidic acids).

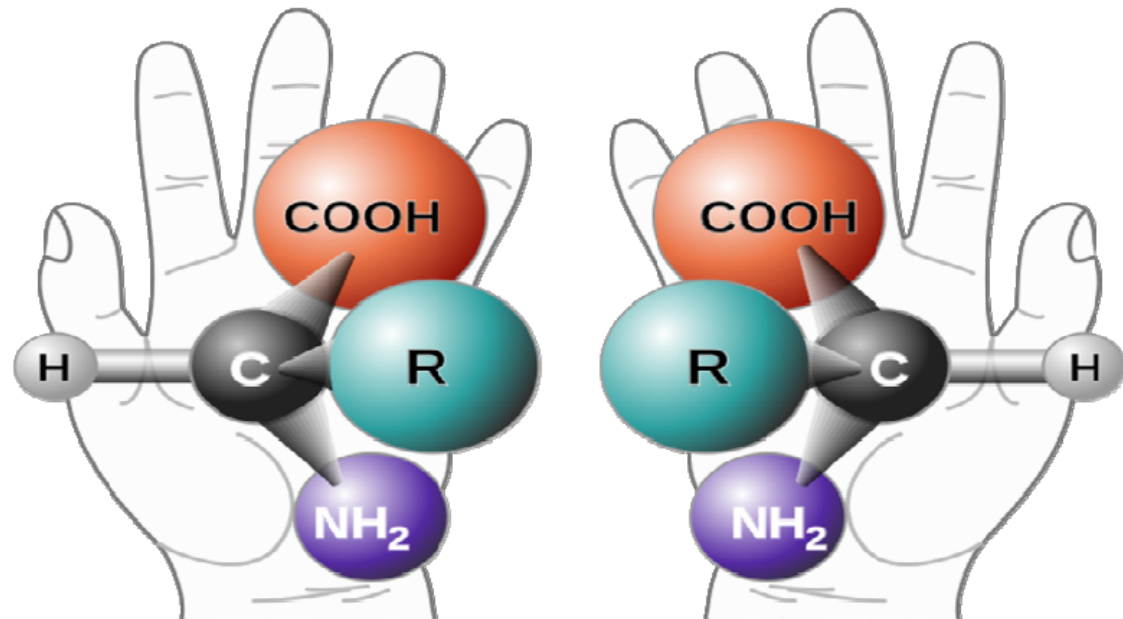
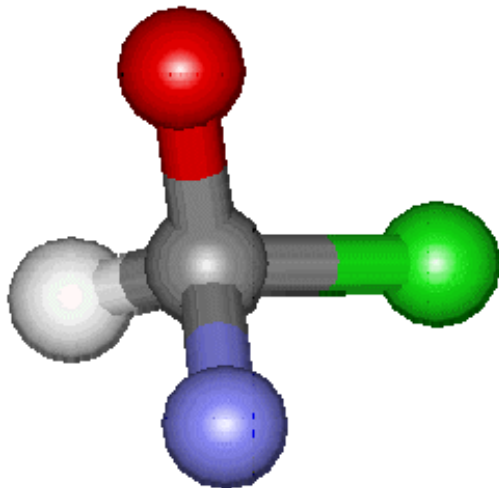


□ سپس و ترانس



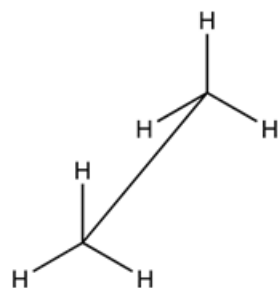


□ ایزومری کربن کایرال

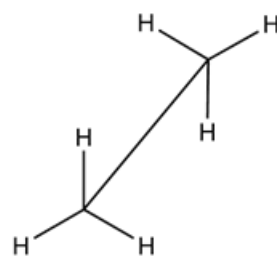




□ کونفورماسیون



eclipsed conformation



staggered conformation



boat conformation



chair conformation