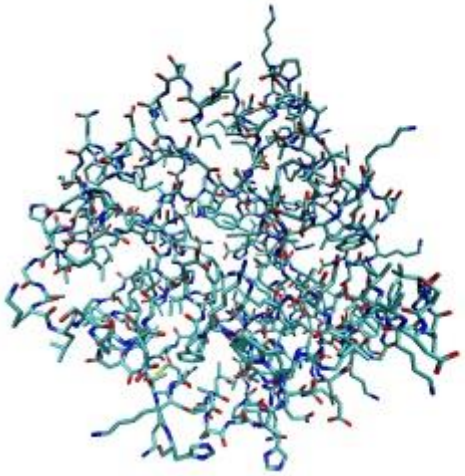
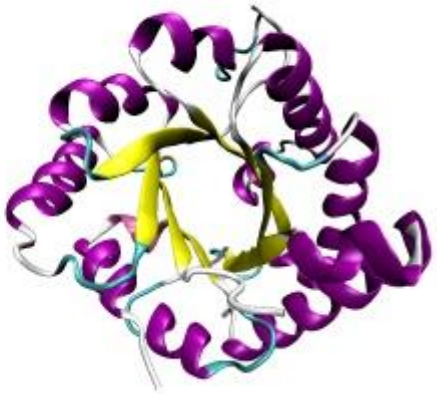
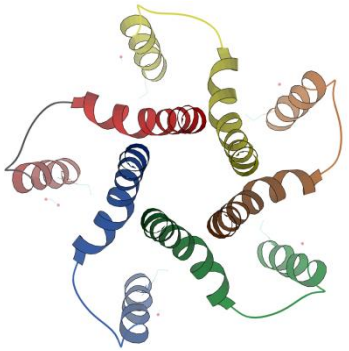
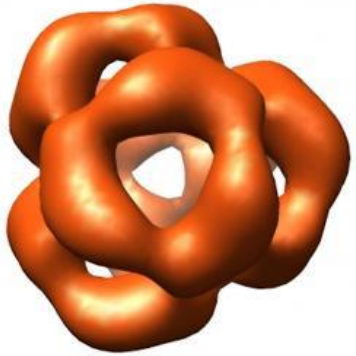
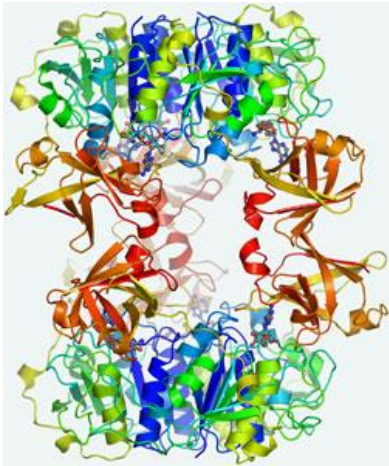






Oqsillarning tuzilishi, xossalari va funksiyalarining xilma-xilligi

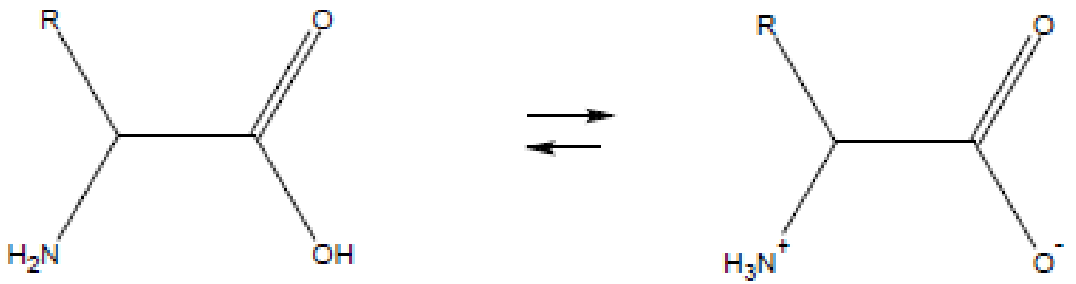




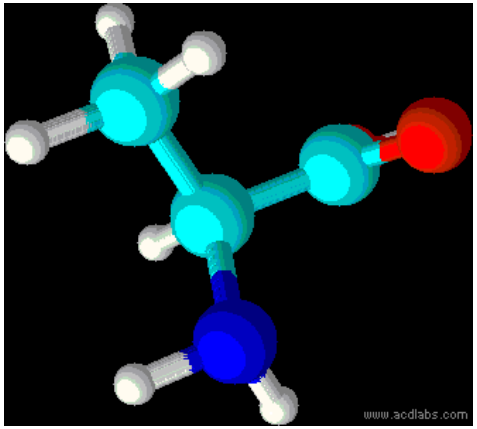
Ma'ruza konspekti

- 1) Aminokislotalar oqsil monomerlaridir
- 2) Aminokislotalarning tasnifi
- 3) Peptid bog'lanish
- 4) Oqsil molekulasining tashkiliy darajalari
- 5) Oqsillarning kimyoviy va fizik xossalari
- 6) Proteinlarni tahlil qilish usullari
- 7) Oqsillarning vazifalari

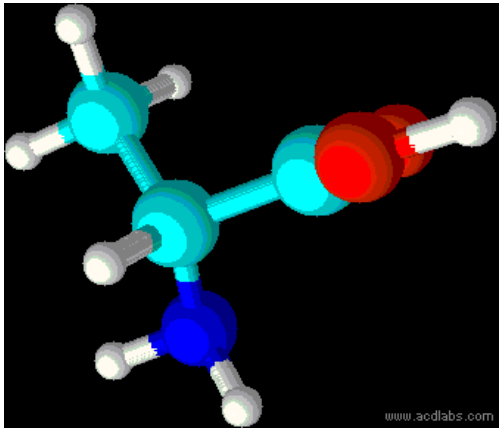
Aminokislotalarning xossalari



zwitterion



L- alanin



D- alanin

Biologik funktsiyalar

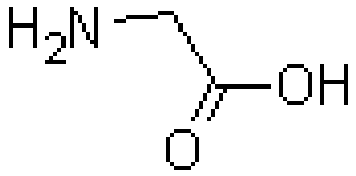
- 1) Ular peptidlar va oqsillarning bir qismidir;
- 2) Metabolitlar va kofermentlar (ornitin);
- 3) Neyrotransmitterlar va gormonlar (GABA);

Proteinlar - tartibsiz biopolimerlar

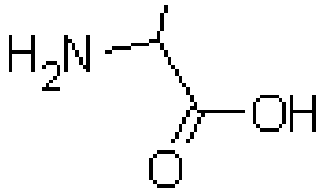
- Polipeptid monomerlari proteinogen 19 a - L-aminokislotalar va imino kislotalar (prolin) dir .

Aminokislotalarning tasnifi

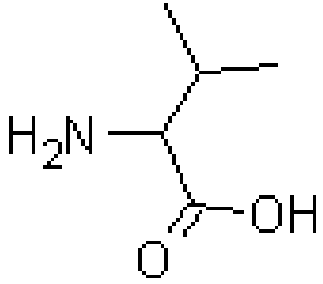
- Qutbsiz yoki alifatik



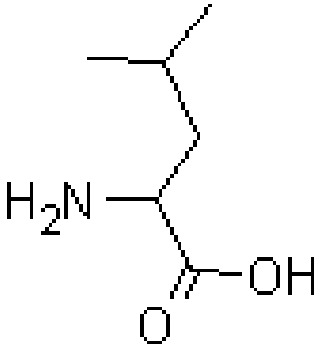
glitsin



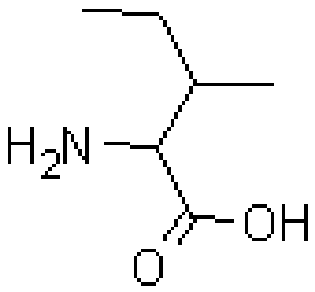
alanin



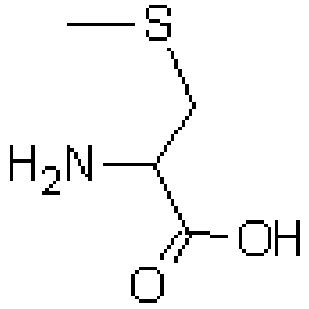
valin



leysin

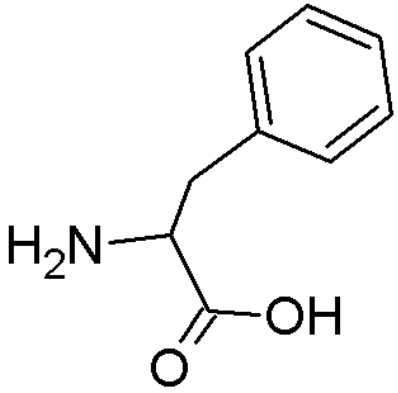


izolösin

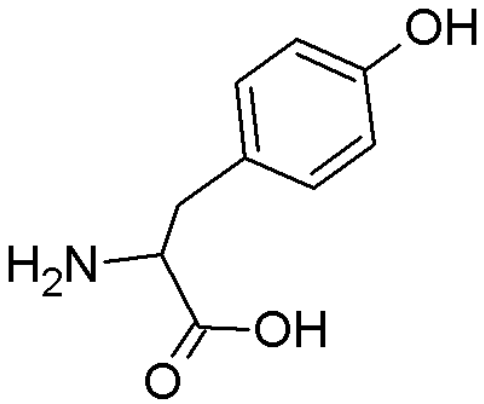


metionin

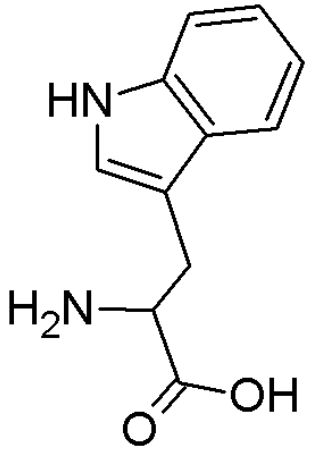
Aromatik



fenialanin

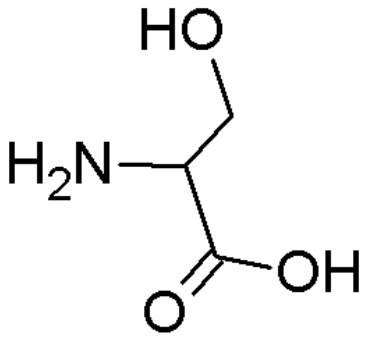


tirozin

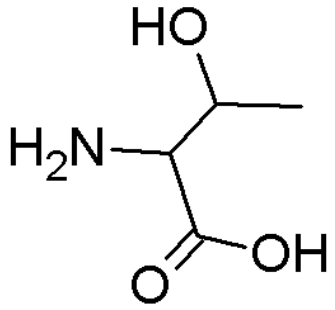


triptofan

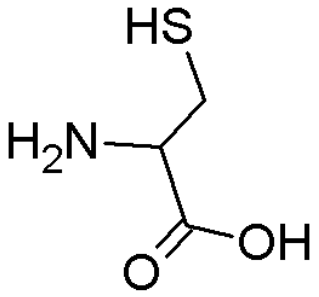
Polar zaryadsiz



serin

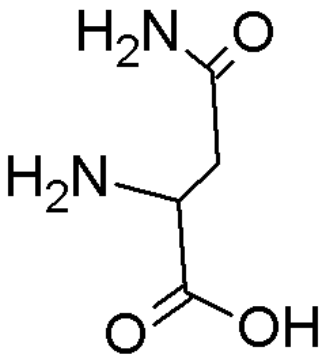


treonin

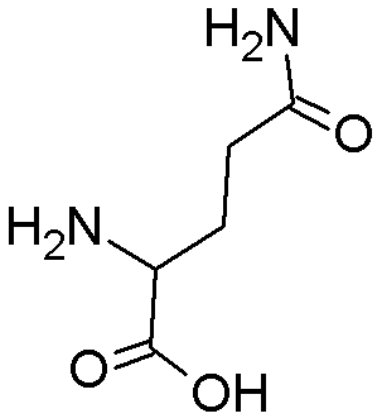


sistein

prolin

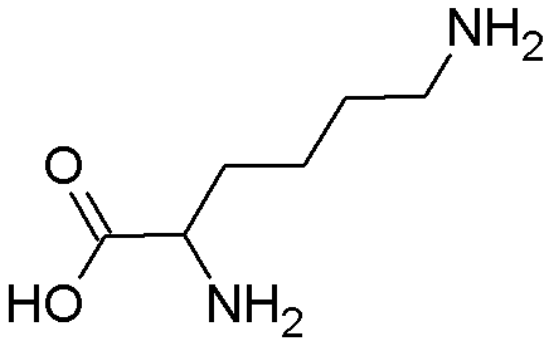


asparagin

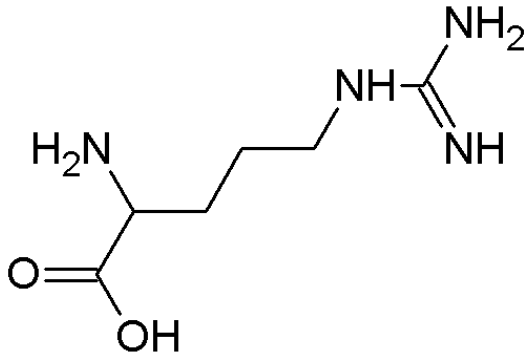


glutamin

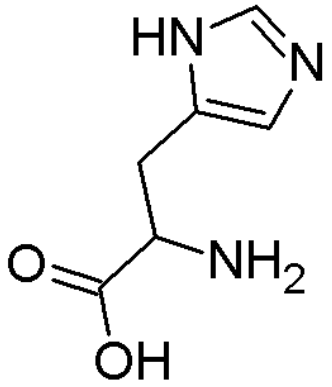
Ijobiy zaryadlangan



lizin

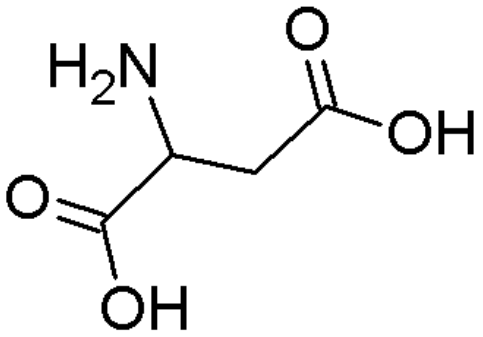


arginin

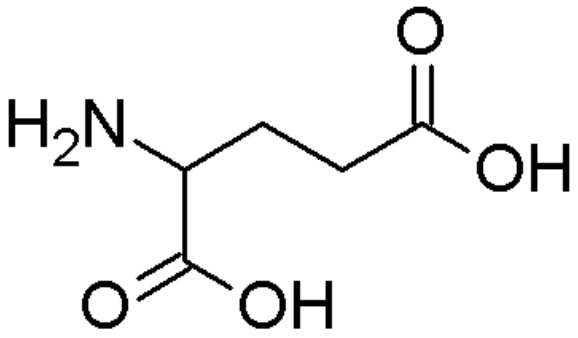


histidin

Salbiy zaryadlangan

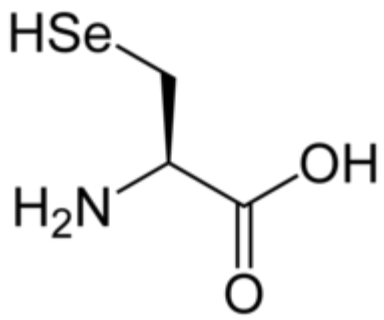


aspartik kislota

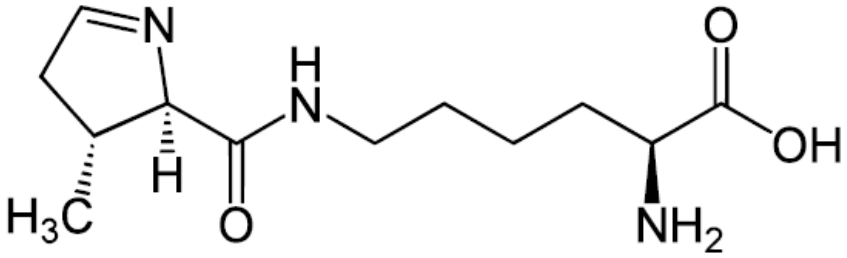


glutamik kislota

Kanonik bo'lmagan aminokislotalar



- Selenosistein (sek) - 21-aminokislota, selenoproteinlarning bir qismi, maxsus kodlangan.



pirolizin (O) 22 - aminokislota , faqat arxebakteriyalarda uchraydi

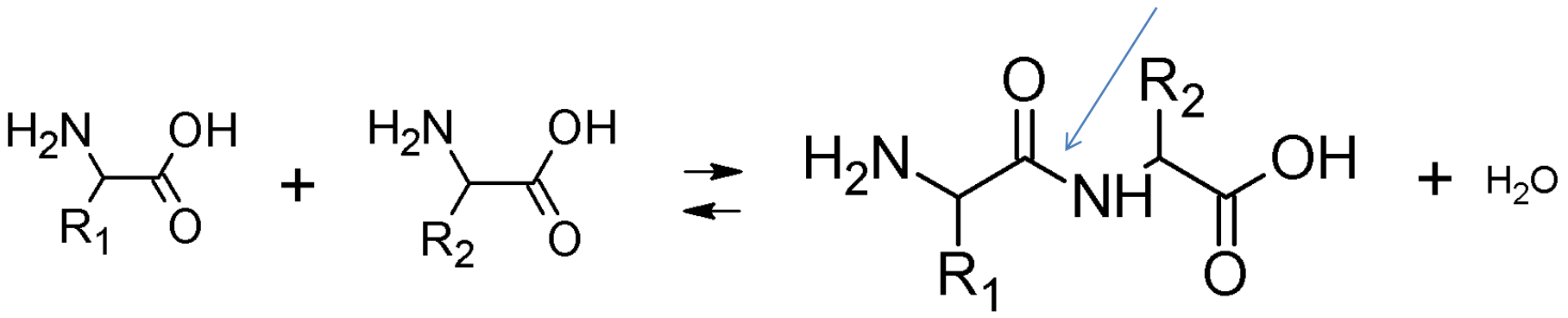
ASOSIY AMİNOKISLATLAR

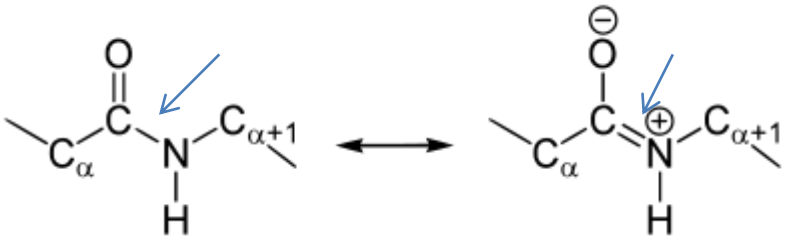
- organizmda sintezlanishi mumkin emas
- ovqat bilan birga tanaga kiritilishi kerak.



Odamlar uchun: arginin, valin, histidin, izolösin, leysin, lizin, metionin, treonin, triptofan va fenilalanin.

Peptid aloqasi





Aylanish qiyin!

POLİPEPTIDLAR

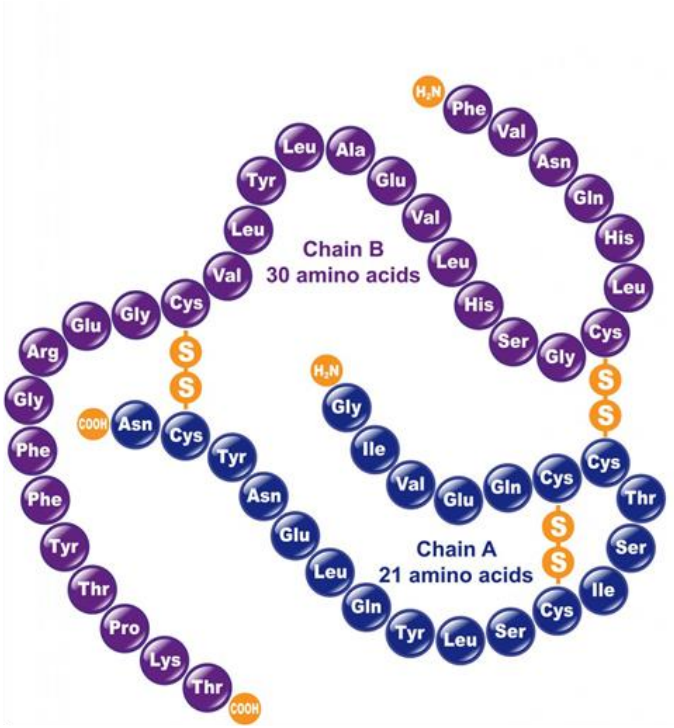
- Proteinlar - 100 dan 2000 gacha aminokislota qoldiqlari
- Xilma-xillik - aminokislotalarning soni va tartibi
- Strukturaning tartibliligi

Protein va virusli kristallar,
kosmosda o'sgan kemalar
(NASA Marshall kosmik parvozlar ma

Oqsil molekulasining tashkiliy darajalari

- Birlamchi tuzilma

aminokislotalar qoldiqlarining ketma-ketligi



Birlamchi tuzilma
inson insulini
(http://www.interactive-biology.com)

Birlamchi strukturani yo'q qilish - gidroliz!

Proteinning ikkilamchi tuzilishi

- vodorod aloqalari tufayli buyurtma berish

Alfa spiral

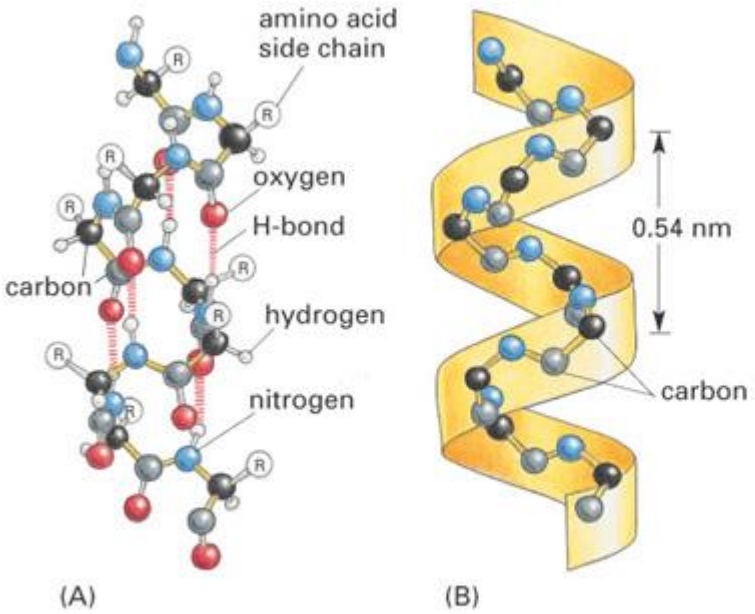
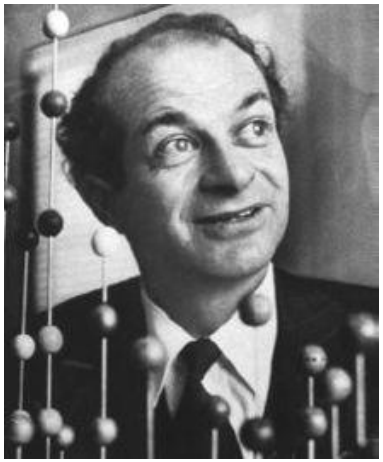


Figure 4-10 part 1 of 2 Essential Cell Biology, 2/e. (© 2004 Garland Science)



Linus Karl Pauling
(1901-1994)

1954 yil kimyo bo'yicha Nobel mukofoti

Proteinning ikkilamchi tuzilishi

- b - burmalar

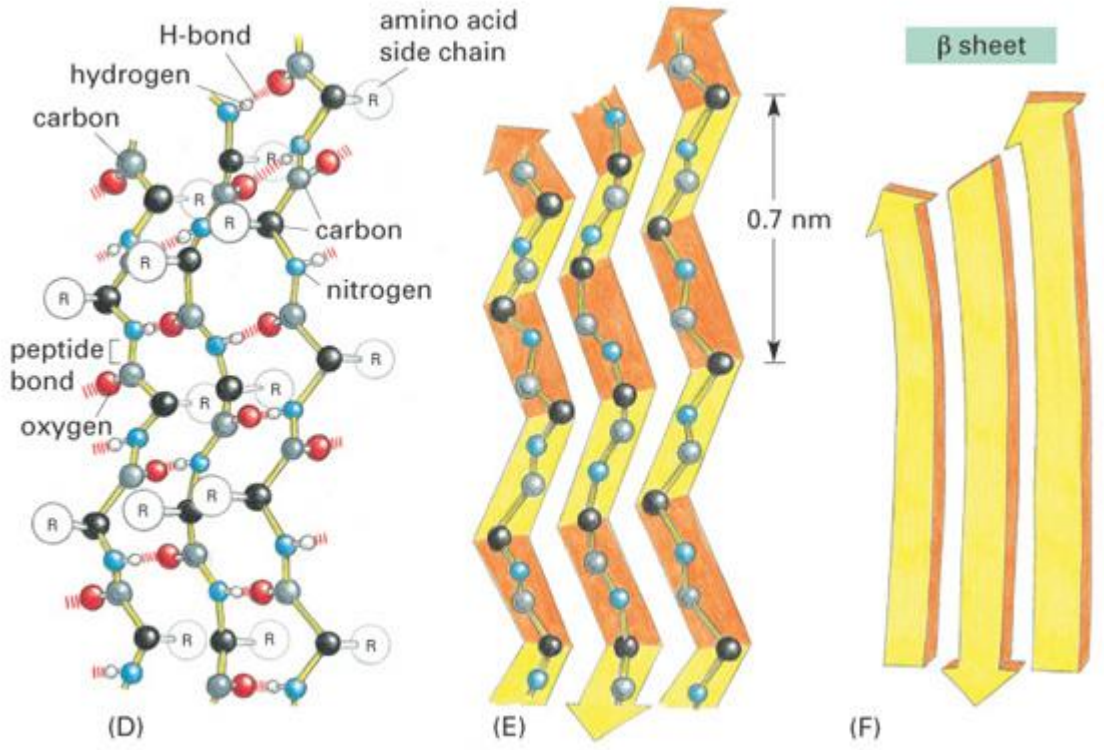
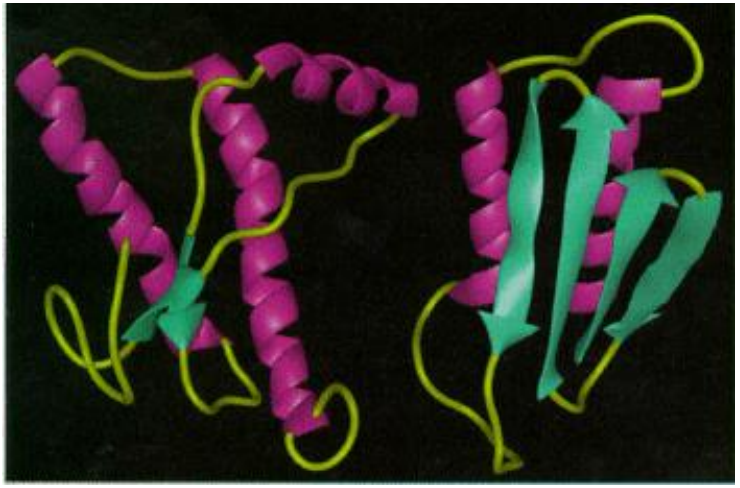


Figure 4-10 part 2 of 2 Essential Cell Biology, 2/e. (© 2004 Garland Science)

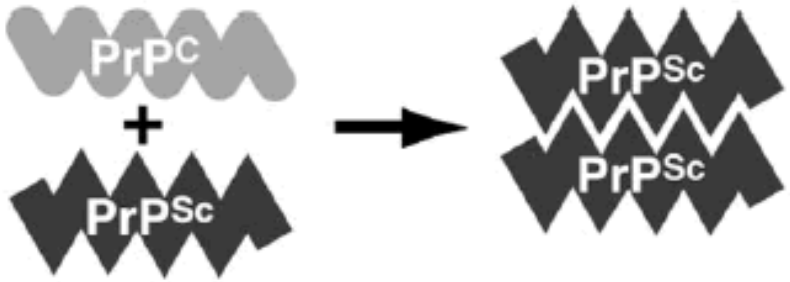
Prionlar

- Yuqumli oqsillar .
- PrPC asab hujayralarining oddiy membrana oqsilidir.
- PrPSc "patologik" konformatsiyasi.



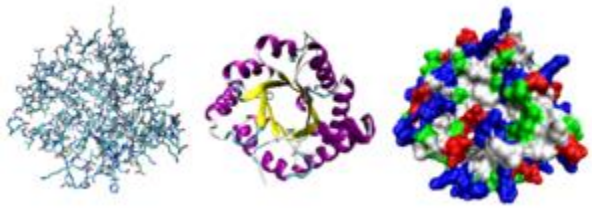
PrPC PrPSc

a - spirallarga aylanadi b - burmalar

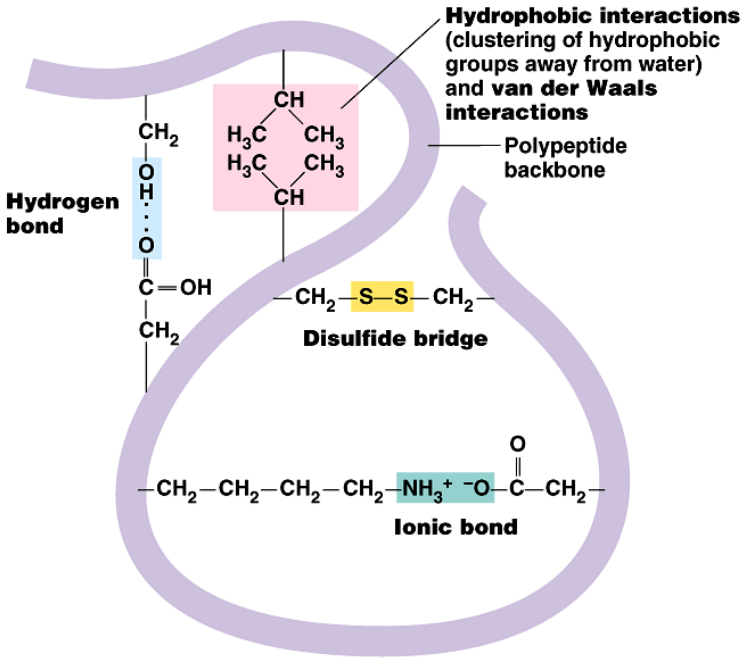


OQSILNING UCHCHIMCHI TUZILISHI

- Aminokislotalar qoldiqlarining yon guruhlari o'rtasidagi o'zaro ta'sir tufayli polipeptid zanjirining fazoviy joylashishi



vodorod



hidrofobik

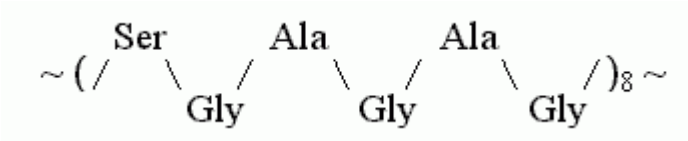
kovalent

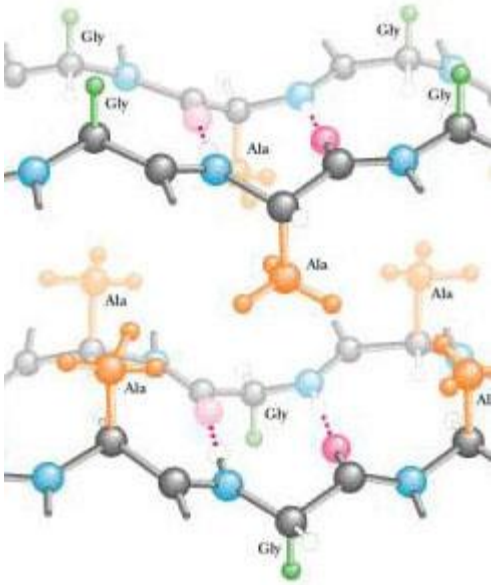
ionli

Fibrillar va globulyar oqsillar

- Fibrilyar oqsillar - bu bir o'q bo'ylab bir-biriga parallel joylashgan va uzun tolalar (fibrillalar) yoki qatlamlarni hosil qiluvchi polipeptid zanjirlari tomonidan hosil bo'lgan oqsillar.

Fibroin - ipak oqsili





Kollagen

Keratinlar

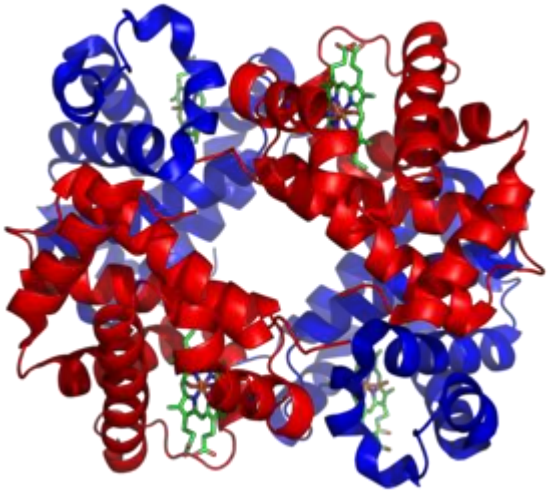
Globulyar oqsillar - globula hosil qiladi, eriydi

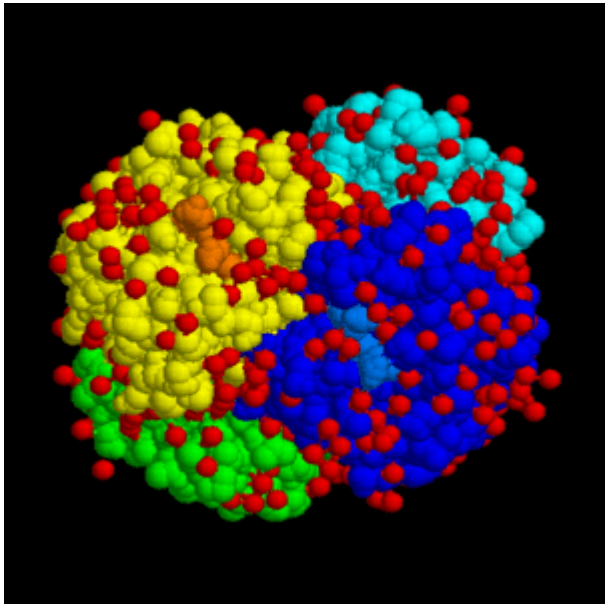
Fermentlar, antikorlar

OQSILNING TO'RTNARCHALIK TUZILISHI

- Bitta protein kompleksining bir qismi sifatida bir nechta polipeptid

  zanjirlarining o'zaro joylashishi





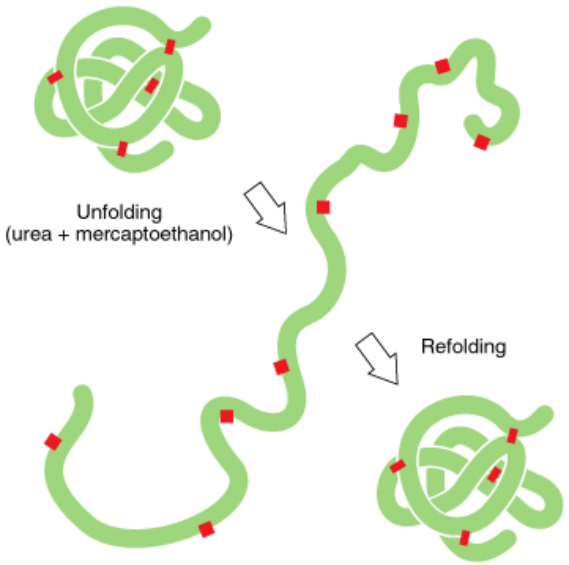
Gemoglobin tetramerni o'z ichiga oladi
4 ta polipeptid zanjiri

Protein denaturatsiyasi

- To'rtlamchi, uchinchi va ikkilamchi oqsil tuzilmalarini yo'q qilish

Jismoniy ta'sir : harorat, zarba, radiatsiya

Kimyoviy ta'sirlar : pH o'zgarishi , kamaytirish va xaotrop moddalar

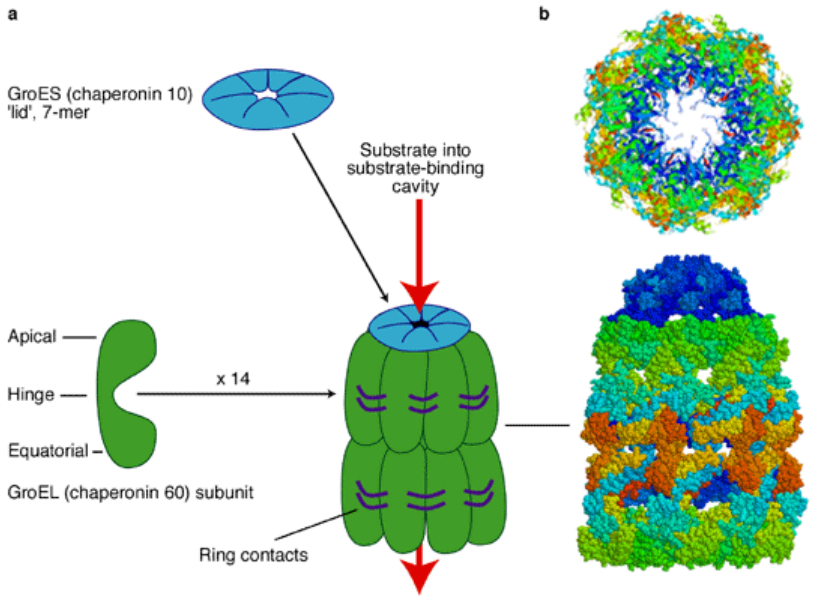


From C. J. Epstein, R. F. Goldberger, and C. B. Anfinsen, *Cold Spring Harbor Symp. Quant. Biol.* 28:439, 1963.

Qaytariladigan va qaytmas denaturatsiya

Chaperonlar

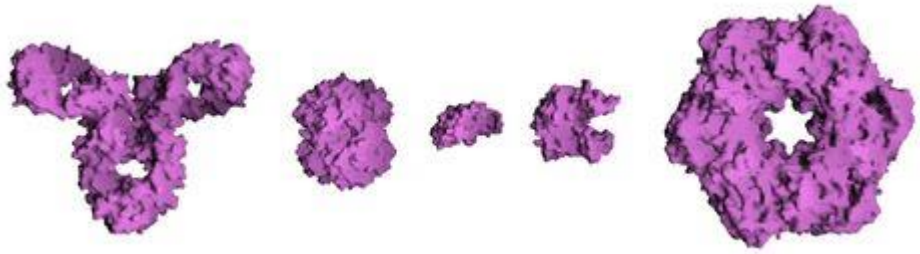
- Zararlangan oqsillarning to'g'ri uchinchi darajali tuzilishini tiklaydigan oqsillar (issiqlik zarbasiga javoban sintez kuchayadi)



Barcha pro- va eukariotlarda topilgan!

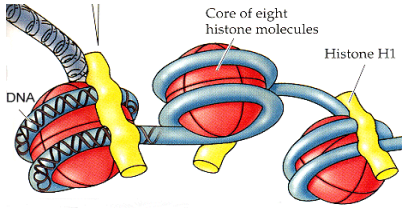
Oqsillarning fizik xossalari

- Hajmi - o'rtacha 300-500 a/k, eng kattasi 38138 a/k konnektordir.



- Zaryad (izoelektrik nuqta)

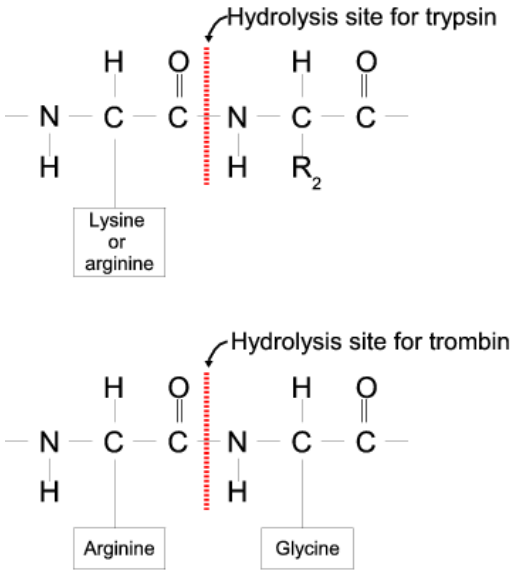
Asosiy oqsillar (gistonlar, protaminlar , pI=11)
Kislotali oqsillar (pepsin, pI = 1)



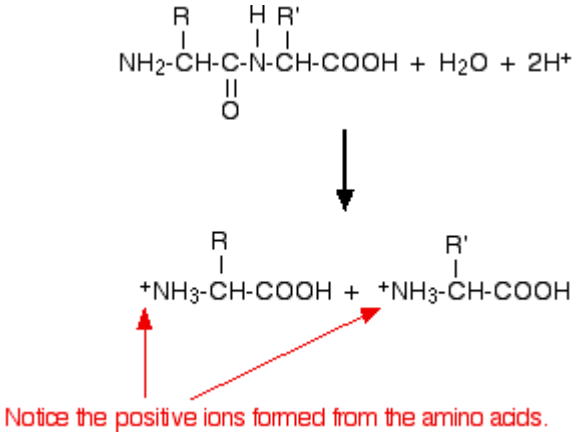
Protein gidrolizi

- Birlamchi tuzilmani yo'q qilish

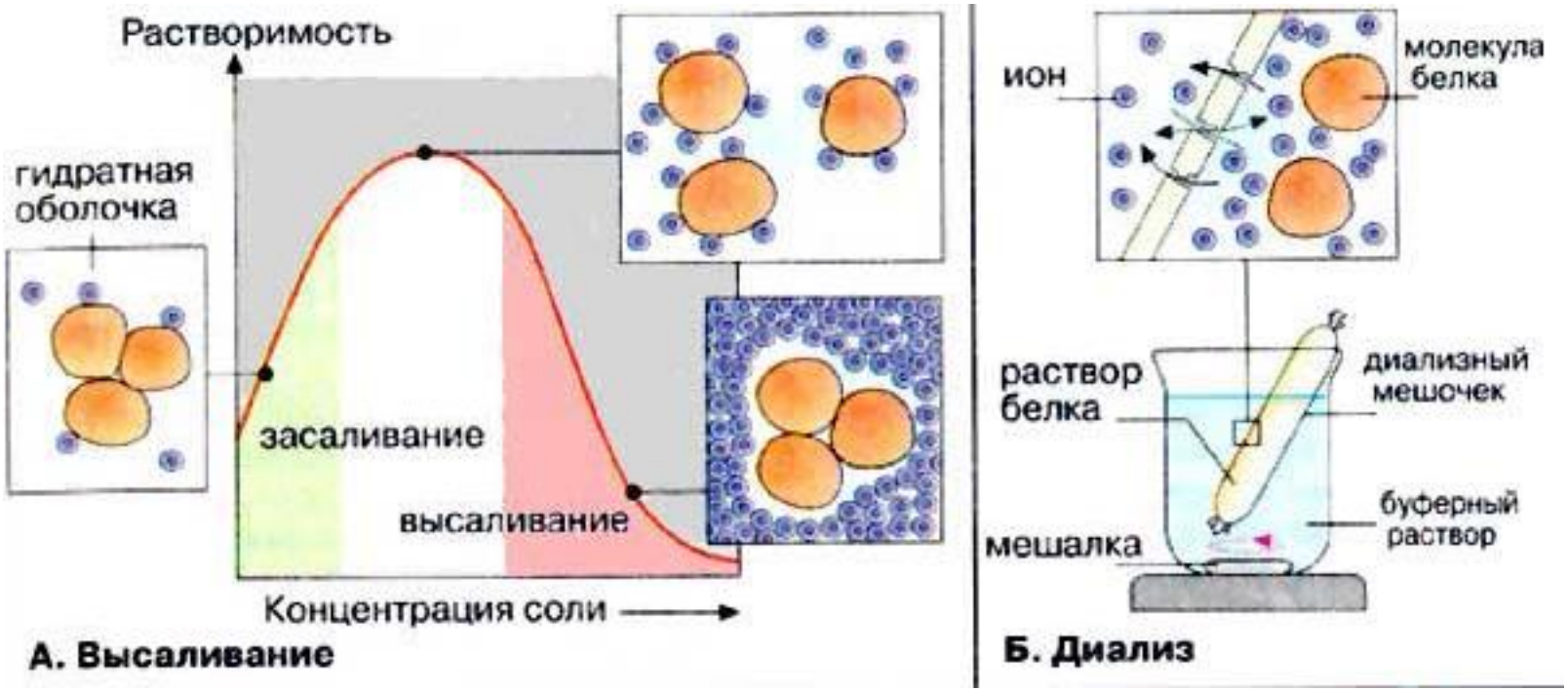
fermentativ



kimyoviy

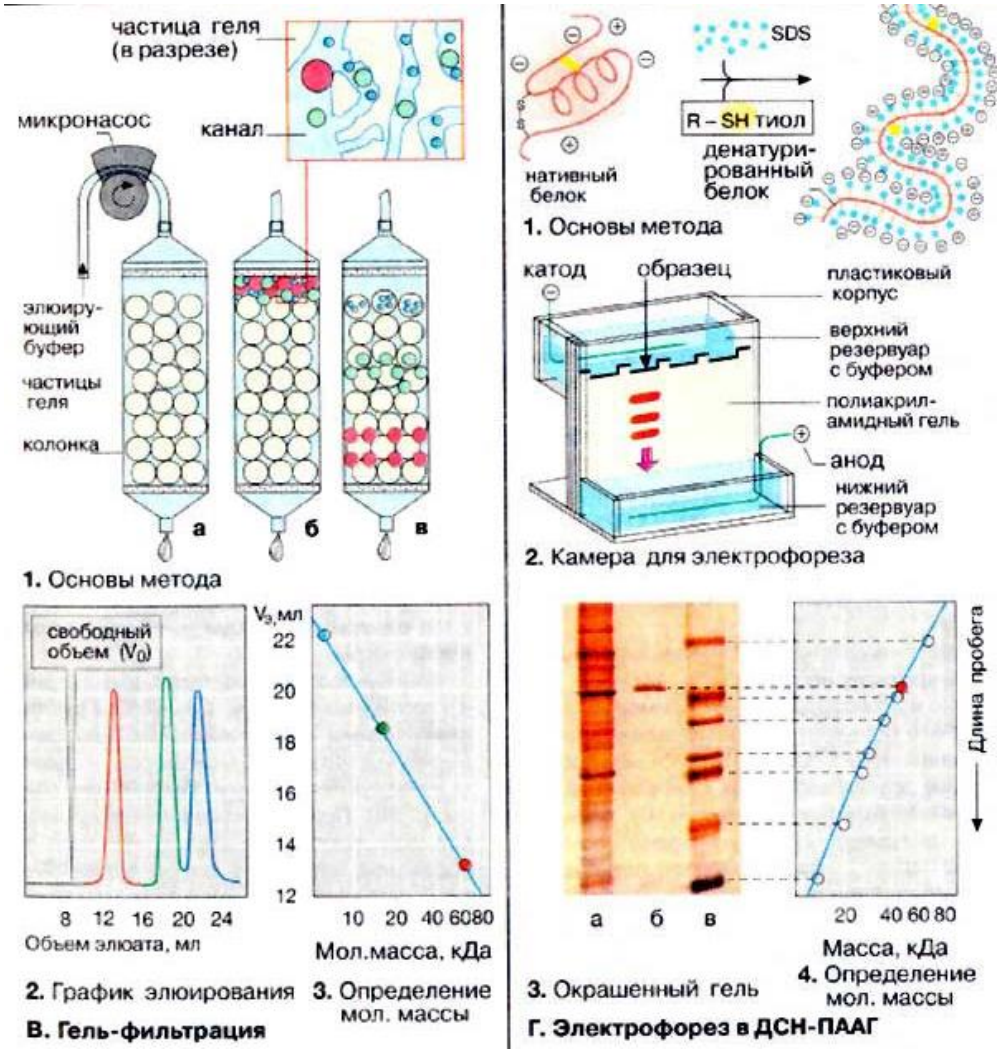


Tahlil usullari



Kolmandan, Rem
"Vizual biokimyo"

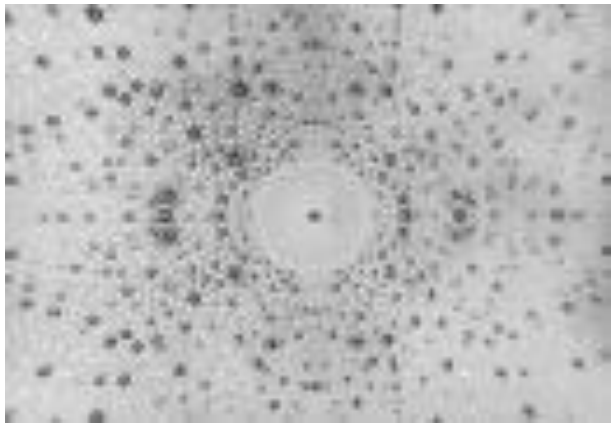
Proteinlarni tahlil qilish usullari



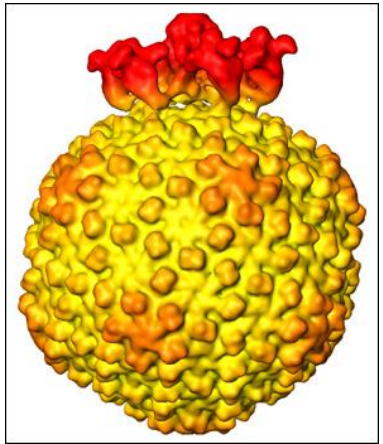
Kolmandan, Rem
"Vizual biokimyo"

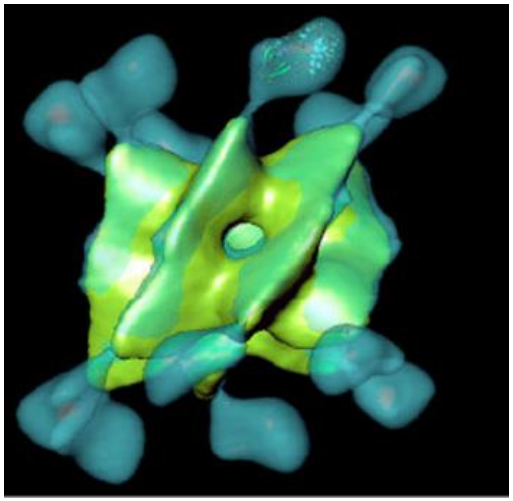
Proteinlarni tahlil qilish usullari

- X-nurlarining diffraksion tahlili



Elektron mikroskopiya



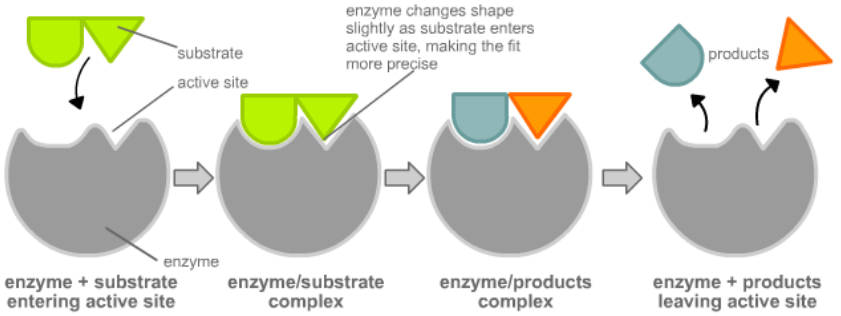


Proteinlarning funktsiyalari

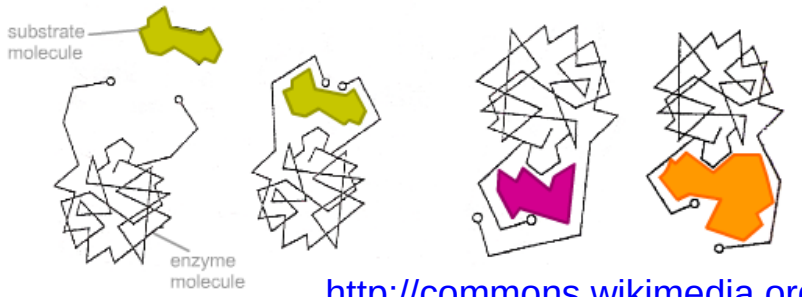
- Katalitik funktsiya

Fermentlar - biokimyoviy reaksiyalarning katalizi

5000 dan ortiq turli xil reaktsiyalar
Juda yuqori o'ziga xoslik!



Tugmachani qulflash modeli



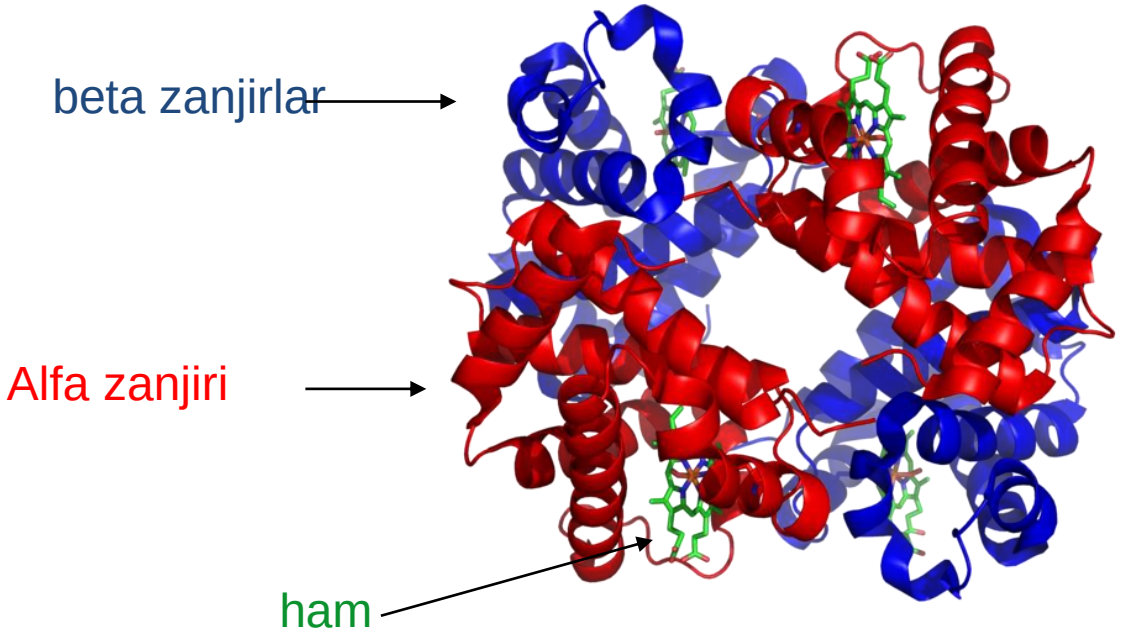
Induktsiyalangan yozishmalar modeli

http://commons.wikimedia.org

Oqsillarning katalitik funktsiyasi

- Ba'zi fermentlar kofaktorlarni talab qiladi. Kofaktorlar ferment bilan erkin bog'langan qattiq bog'langan kofermentlar - protez guruhlari deyiladi

Bu noorganik molekulalar (metall ionlari) va organik birikmalar (flavin, gem, vitaminlar) bo'lishi mumkin.



gemoglobin

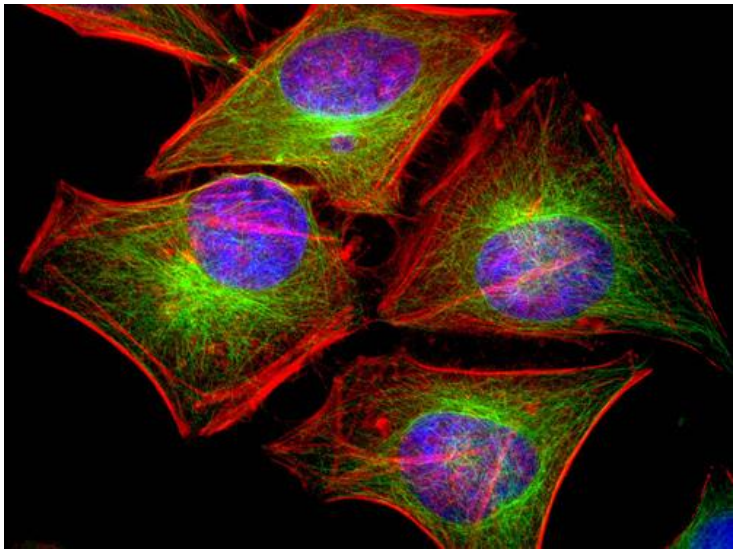
http://en.wikipedia.org

Oqsillarning strukturaviy funktsiyasi

- Ular hujayraning barcha membrana va membrana bo'lmagan organellalarining bir qismidir

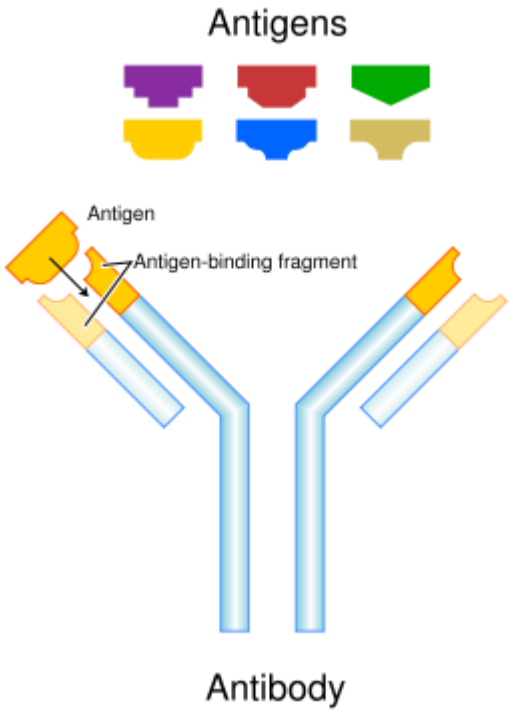
- Kollagen - biriktiruvchi to'qima
- Keratin - sochlar va tirnoqlar

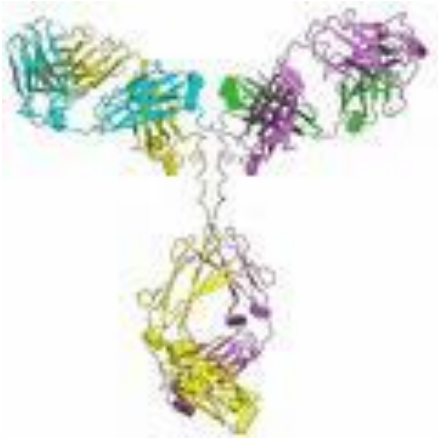
- Aktin va tubulin - sitoskelet



Himoya funktsiyasi

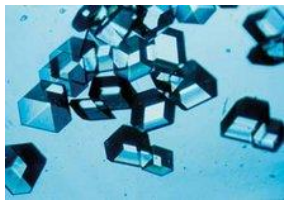
- Antikorlar (immunoglobulinlar)
- B limfotsitlari tomonidan sintez qilingan, organizmga begona moddalarga yuqori yaqinlikka ega (antigenlar)





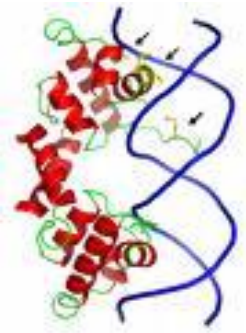
Tartibga solish funktsiyasi

- Proteinlar - gormonlar (insulin)



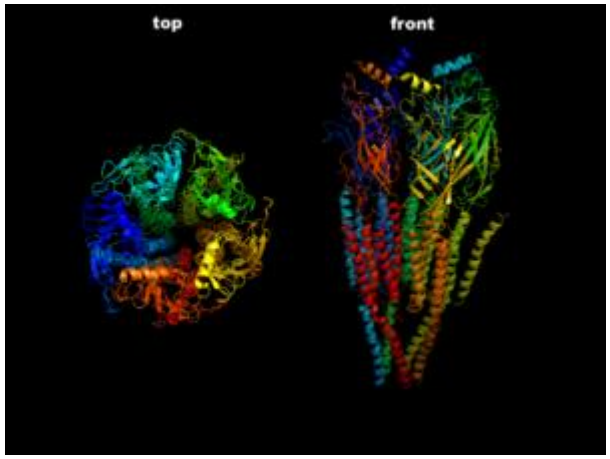
- O'sish omillari

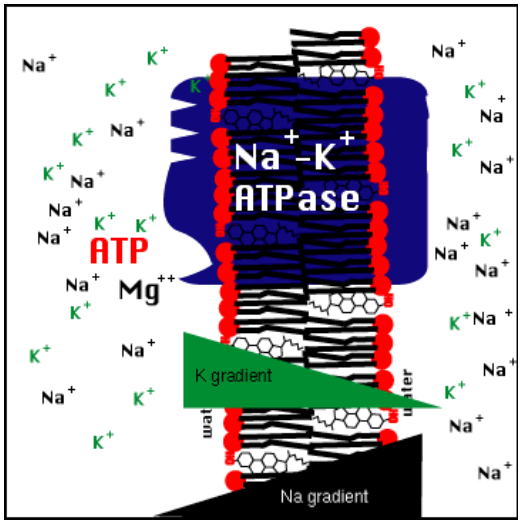
- Proteinlar - gen faolligini regulyatorlari (aktivatorlar va repressorlar)



Transport funktsiyasi

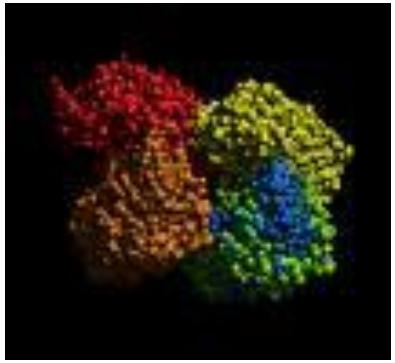
- Gemoglobin, apolipoproteinlar
- Membran ion kanallari



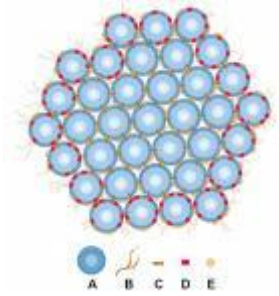


Zaxira va ozuqaviy funktsiyalar

- Ovalbuminli tuxum

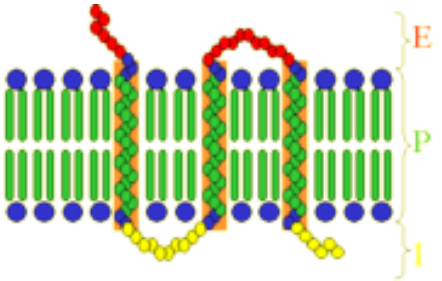


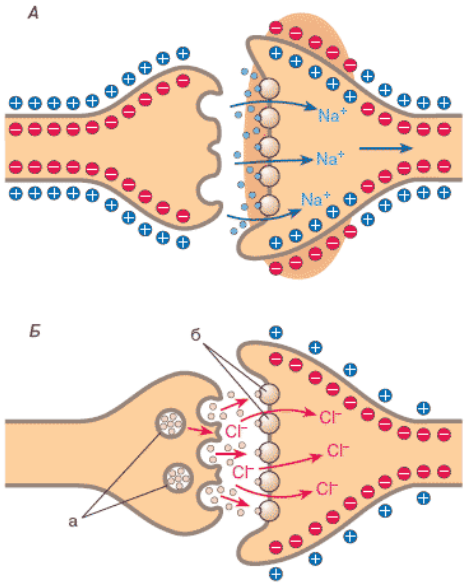
Sut kazein



Oqsillarning retseptorlari funktsiyasi

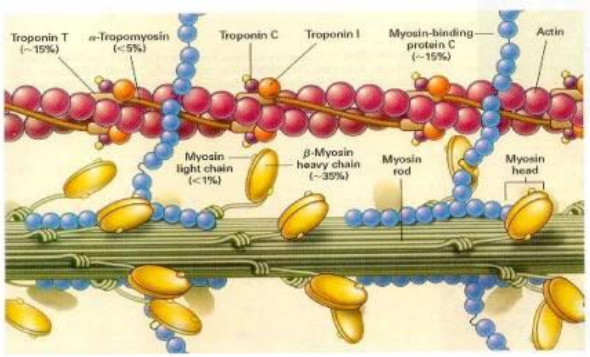
- Transmembran retseptorlari



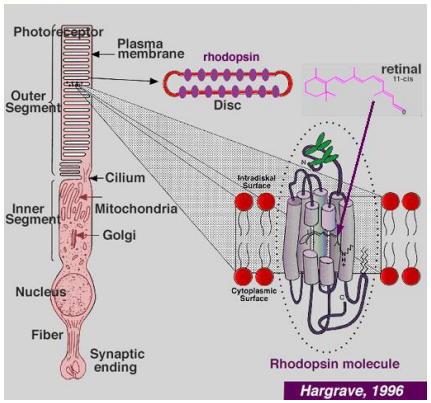


Energiya transformatsiyasi

- Kimyoviy → mexanik

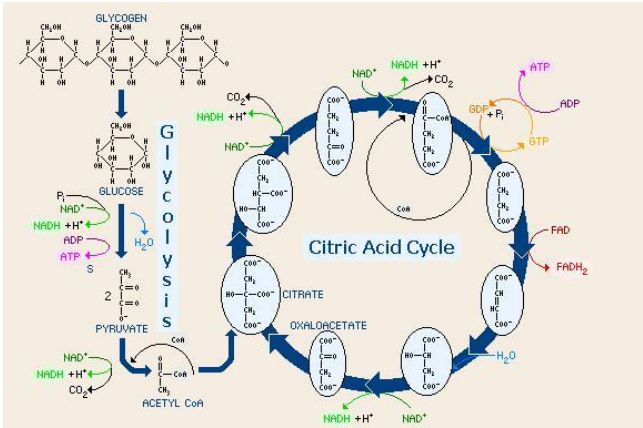


- Nur → kimyoviy



- Kimyoviy → termal

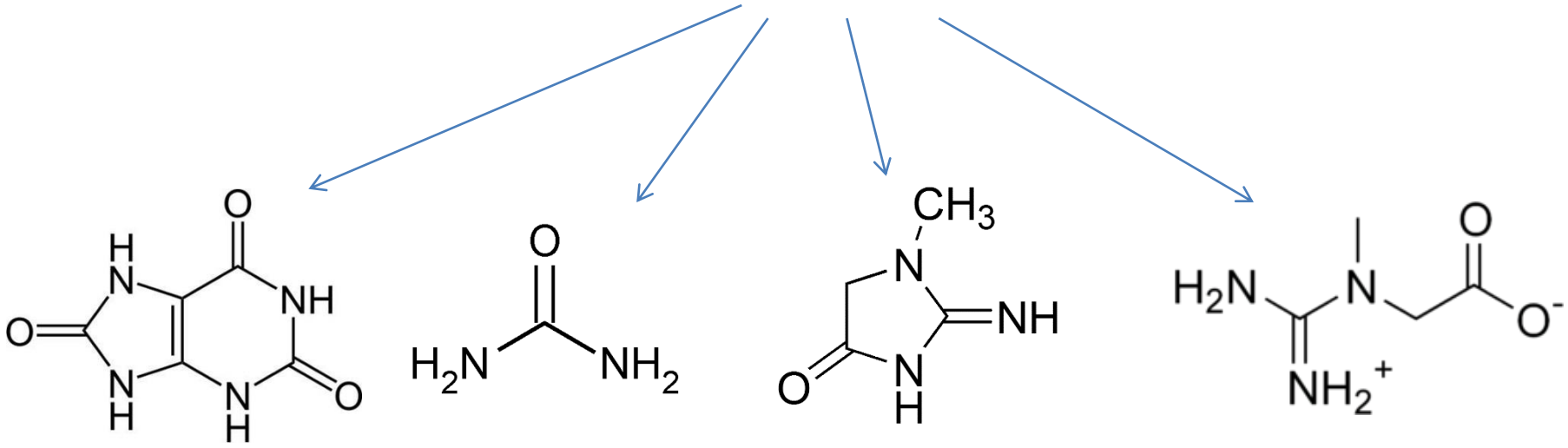
(ko'p ekzotermik reaktsiyalar)



Energiya

oqsillar energiya manbai bo'lib xizmat qilishi mumkin. Aminokislotalarning dezaminlanishi.

Protein almashinuvining yakuniy mahsulotlari



siydik kislotasi karbamid kreatinin kreatin