

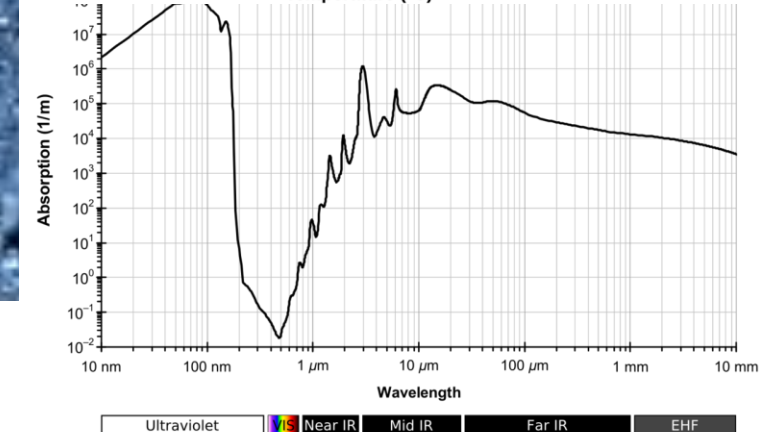
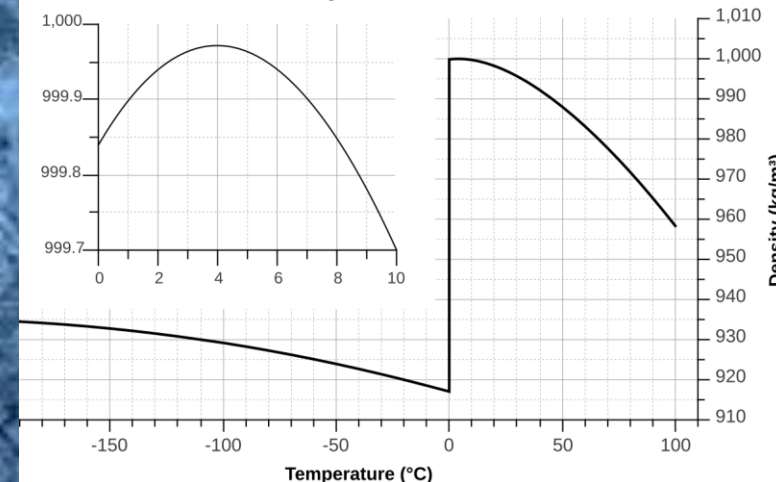
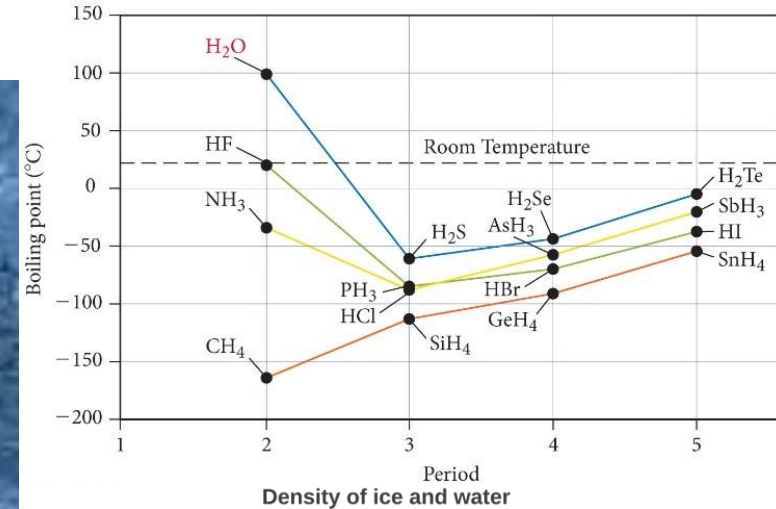
Voda

Voda

Makroskopske fizikalne lastnosti vode so posebne!

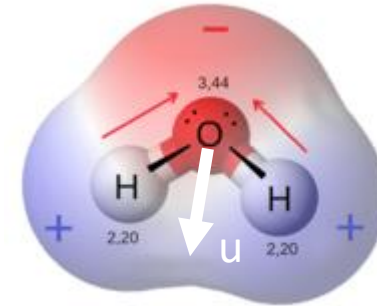
- temperatura vrelišča in tališča (odstopa glede na H_2S ...)
- gostota (nenavadna temperaturna odvisnost)
- specifična toplota (ena najvišjih sploh)
- površinska napetost (velika na večini materialov)
- viskoznost (velika za snov s tako majhno M)
- absorpcija EMV (v zelo različnih delih spektra: IR, MV)
- veliko različnih oblik v trdnem agregatnem stanju

Zakaj ima voda vse te lastnosti?



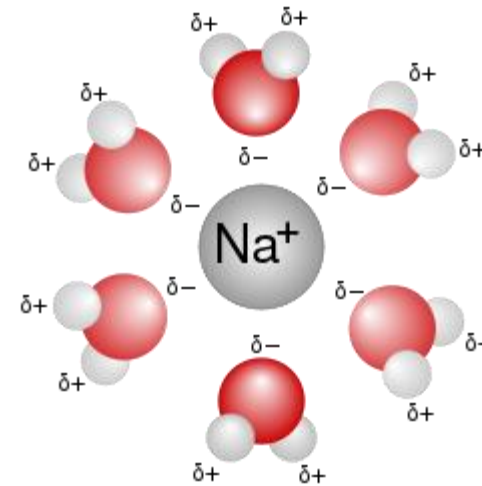
Molekule vode so *polarne*

Naboj elektronov ni enakomerno porazdeljen
→ električni dipolni moment (oznake u, p, d, μ)

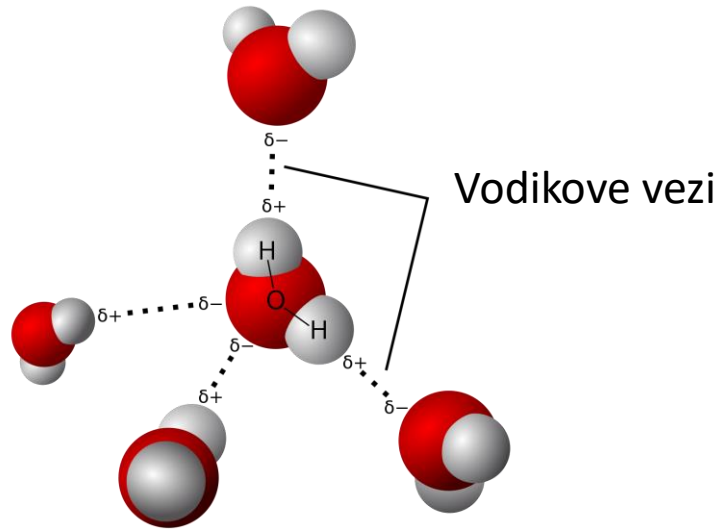


El. dipolni moment povzroča
urejanje molekul v zunanjem el. polju:

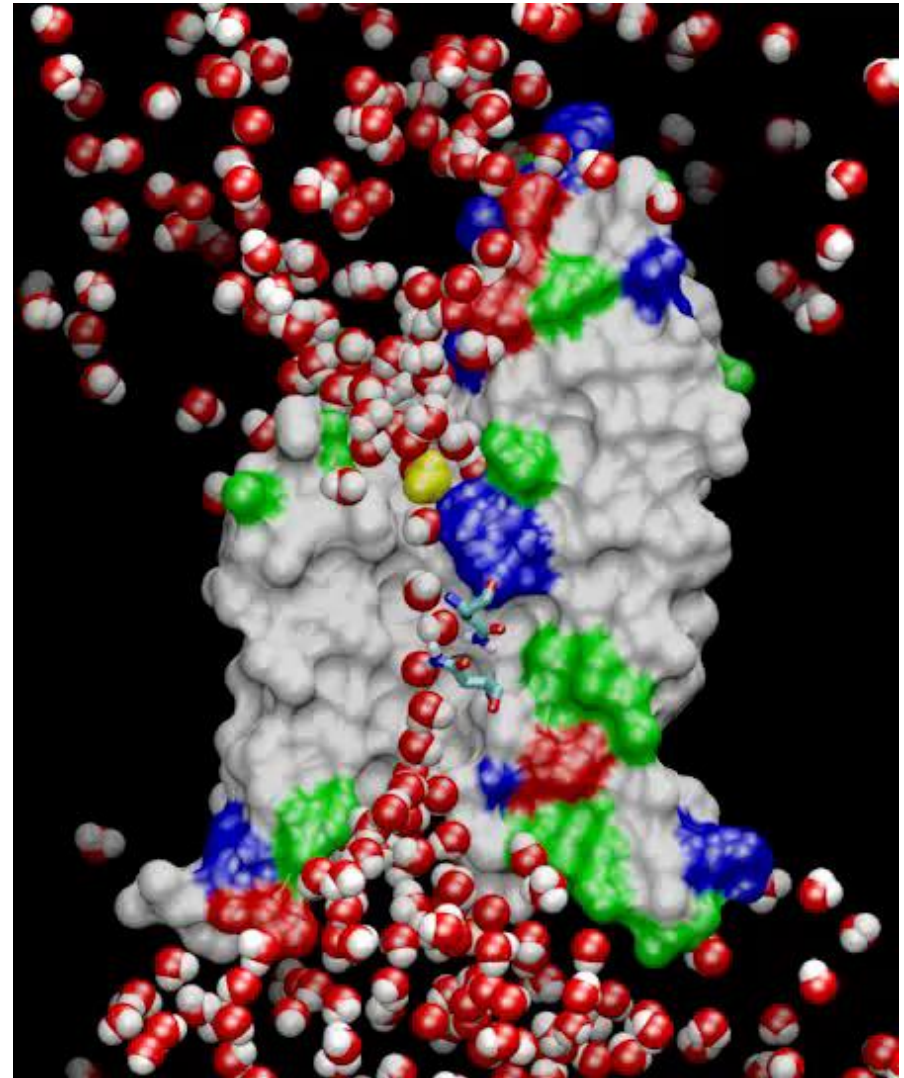
- plašč okoli ionov
- sledenje polju EM valovanja
→ absorpcija

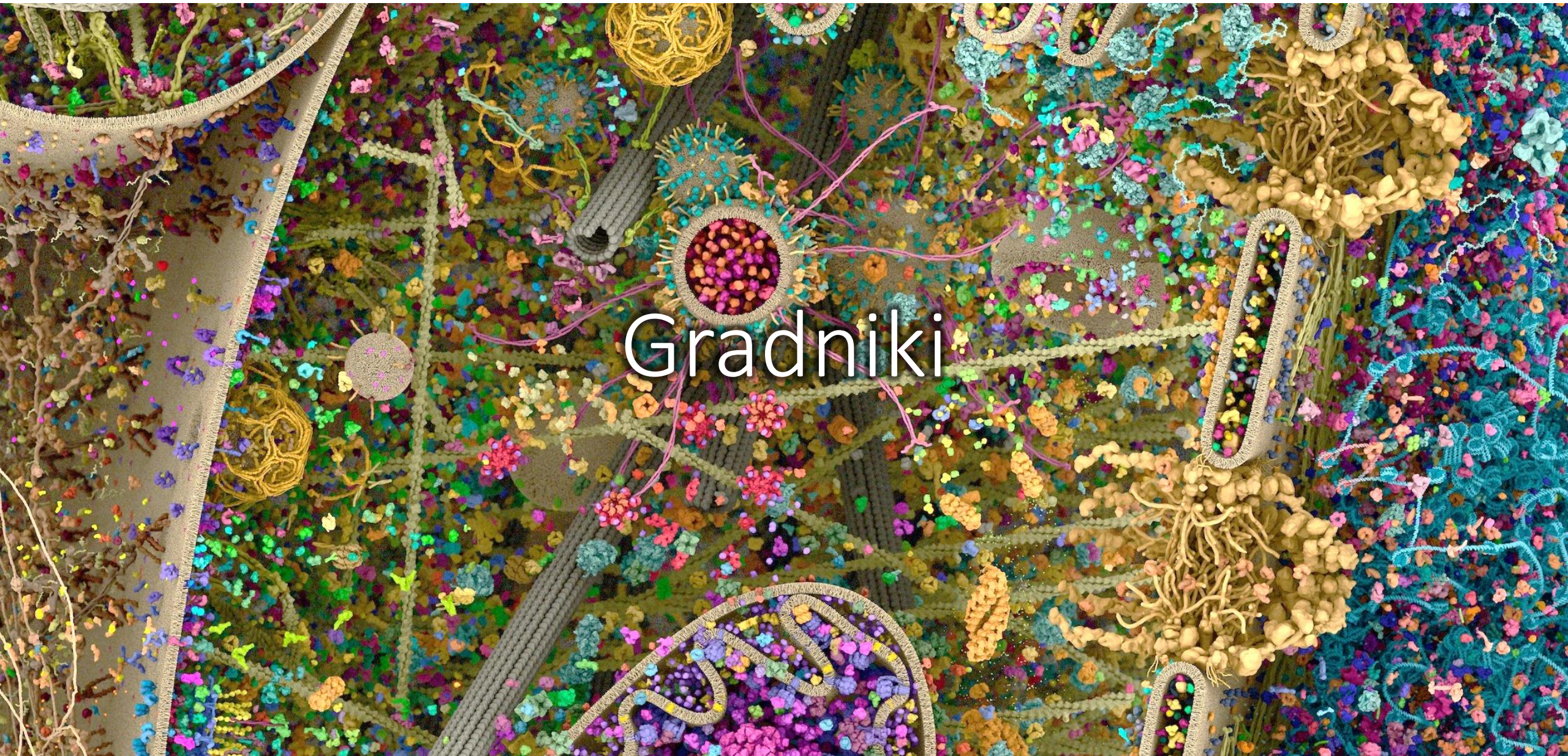


Vodikove vezi



- Strukturiranje vode:
pri 20°C je tvorjenih kar 80% možnih H-vezi
- Ključne za vezavo vode na površine biomolekul, delovanje kanalčkov, ...

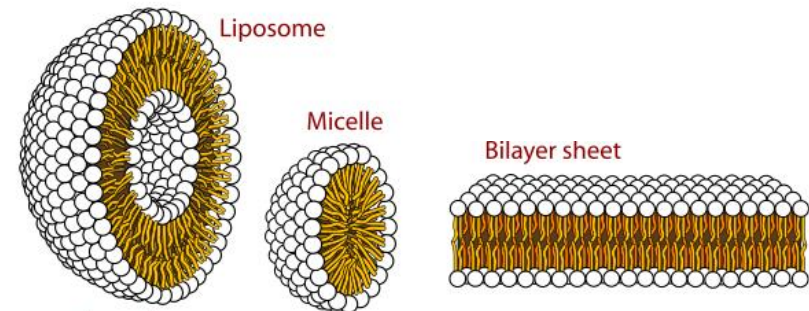
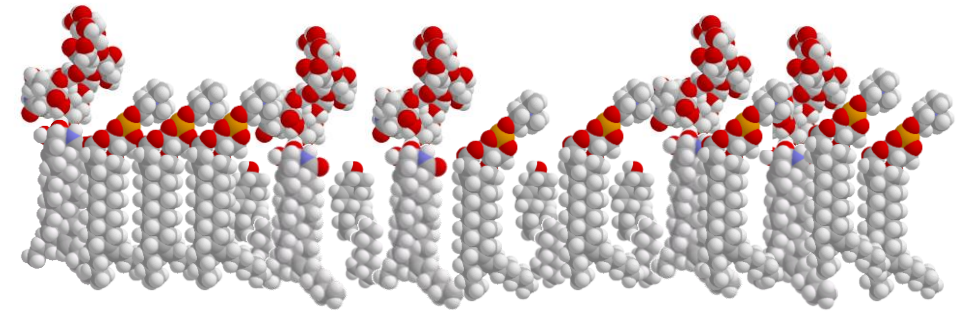




Gradniki

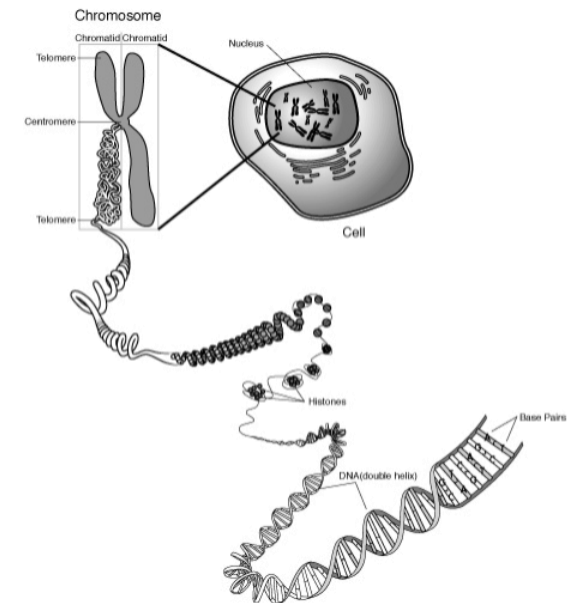
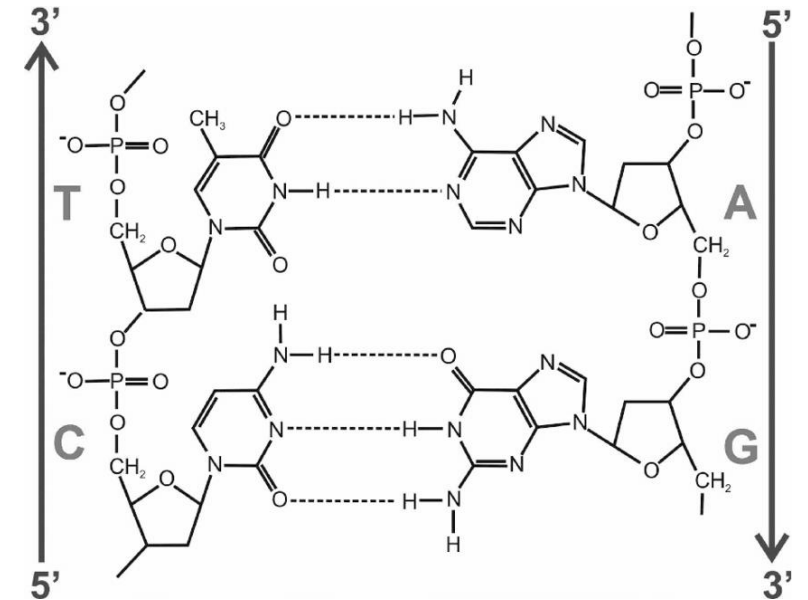
Lipidi

- Več kot 1000 različnih vrst
 - Fosfolipidi, steroli, sfingolipidi, glikolipidi, ...
- Lastnosti
 - Amfifilne molekule (polaren in nepolaren del)
 - Pogosto zwitter-ionska oblika, el. naboj in dipol
- V vodi agregirajo v dvosloje (membrane) in micide
 - repi zavzemajo velik konformacijski prostor
 - membrane so tekoče (hitra difuzija znotraj sloja)
 - nizka propustnost za ione
- Vloge
 - kompartmentalizacija prostora
 - vir energije



Nukleinske kisline

- Polimer iz nukleotidov, ki jih sestavljajo
 - baze (A,G,T,C)
 - sladkorji
 - fosfat
- Ključne močne interakcije
 - zelo velik el. naboj
 - vodikove vezi osnova za enolično podvojevanje
- Vloge
 - DNA = shramba genetske informacije
 - RNA = prenosnik genetske informacije
 - + ...



Proteini

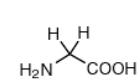
- Polimeri iz aminokislin

- 20 vrst AK z različnimi lastnostmi (polarnost, naboj, velikost, rigidnost ...)
- zaporedje AK (1D/I. struktura) določa jakosti interakcij znotraj proteina in z okolico ter s tem 3D strukturo proteina (II.-III.)

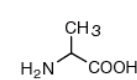
- Izjemno raznolike vloge v celici

- zgradba (citoskelet, kontakti)
- transport snovi (motorji, črpalke, kanalčki)
- katalizatorji reakcij (encimi)
- prenašanje signalov (citokini, receptorji, ligandi, kanalčki)
- kontrola aktivnosti (transkripcijski faktorji)

Small

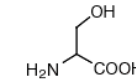


Glycine (Gly, G)
MW: 57.05

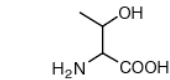


Alanine (Ala, A)
MW: 71.09

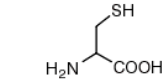
Nucleophilic



Serine (Ser, S)
MW: 87.08, pK_a ~ 16

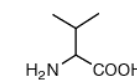


Threonine (Thr, T)
MW: 101.11, pK_a ~ 16

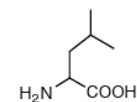


Cysteine (Cys, C)
MW: 103.15, pK_a = 8.35

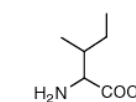
Hydrophobic



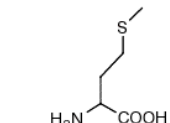
Valine (Val, V)
MW: 99.14



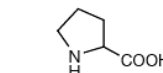
Leucine (Leu, L)
MW: 113.16



Isoleucine (Ile, I)
MW: 113.16

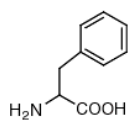


Methionine (Met, M)
MW: 131.19

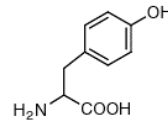


Proline (Pro, P)
MW: 97.12

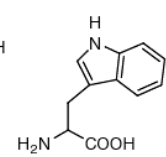
Aromatic



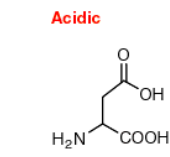
Phenylalanine (Phe, F)
MW: 147.18



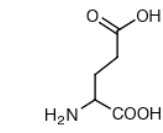
Tyrosine (Tyr, Y)
MW: 163.18



Tryptophan (Trp, W)
MW: 186.21

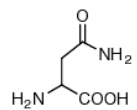


Aspartic Acid (Asp, D)
MW: 115.09, pK_a = 3.9

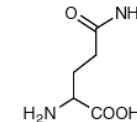


Glutamic Acid (Glu, E)
MW: 129.12, pK_a = 4.07

Amide

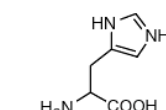


Asparagine (Asn, N)
MW: 114.11

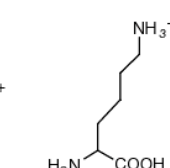


Glutamine (Gln, Q)
MW: 128.14

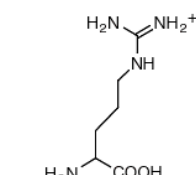
Basic



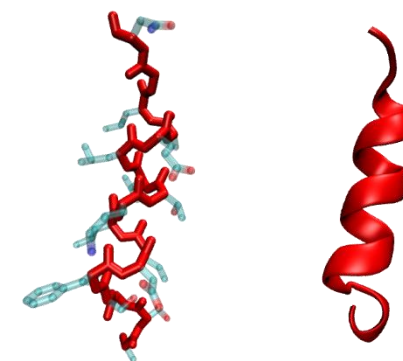
Histidine (His, H)
MW: 137.14, pK_a = 6.04



Lysine (Lys, K)
MW: 128.17, pK_a = 10.79



Arginine (Arg, R)
MW: 156.19, pK_a = 12.48

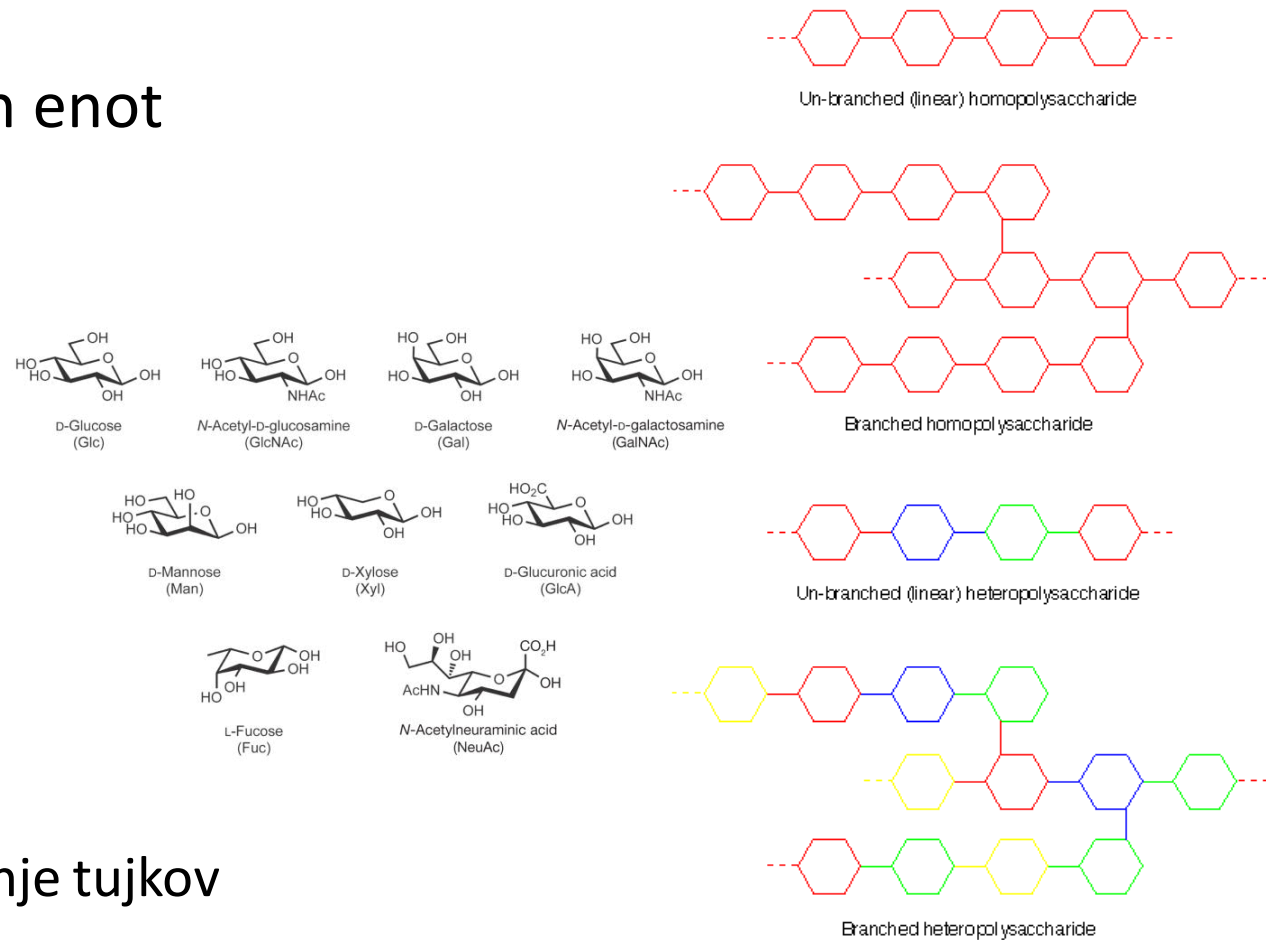


Polisaharidi

- Biopolimeri iz sladkornih enot

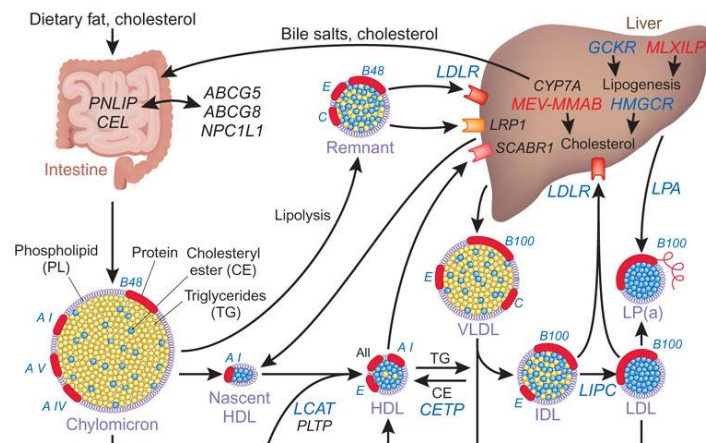
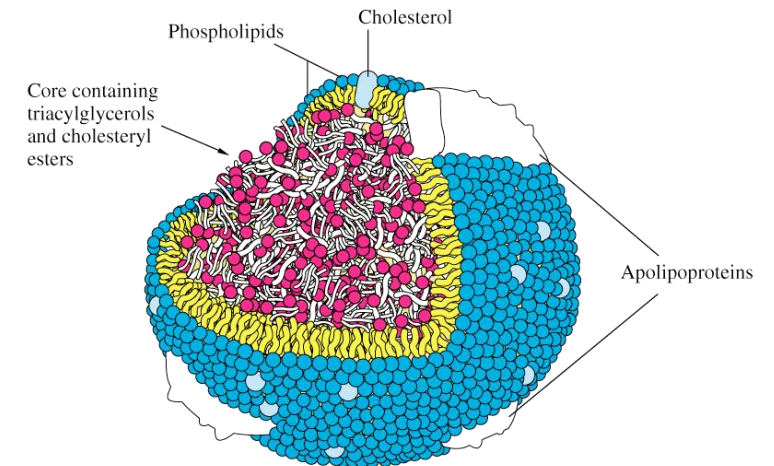
- ekstremno polarni
- z veliko gostoto naboja
- vežejo veliko vode

- glavni vir energije
- ogrodje struktur
- komunikacija
- pritrditev celic
- obramba in odstranjevanje tujkov



Lipoproteini

- Nanometrskе supramolekularne strukture z lipofilno notranjostjo
 - lipidni monosloj z apolipoproteini
 - znotraj trigliceredi in esterificiran holesterol
- prenos lipofilnih snovi po telesu: HDL, LDL, VLDL, hilomikroni



V: Kako velike (majhne) so molekule?

B. Franklin (1773): olje ene jedilne žlice se razleze preko polovice ribnika ...

Velikost povprečnega proteina?