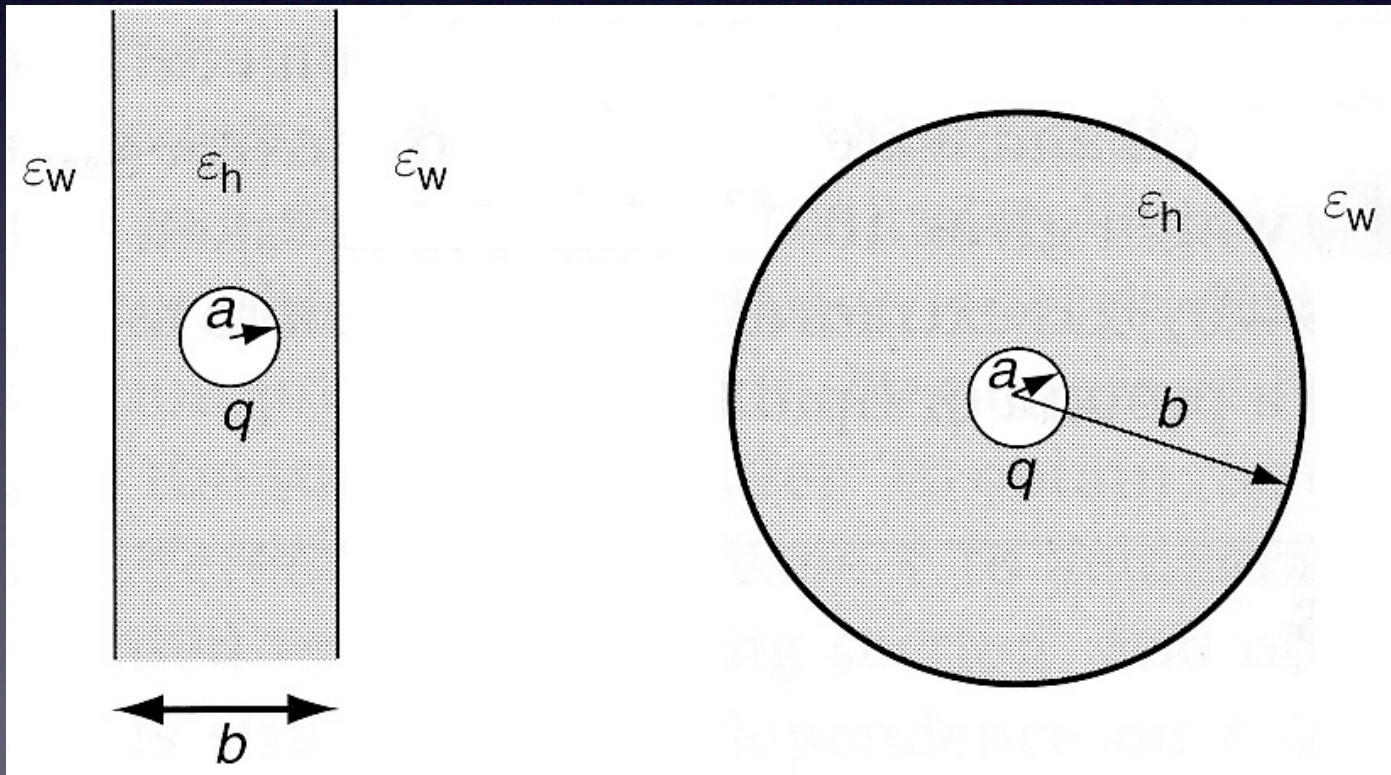
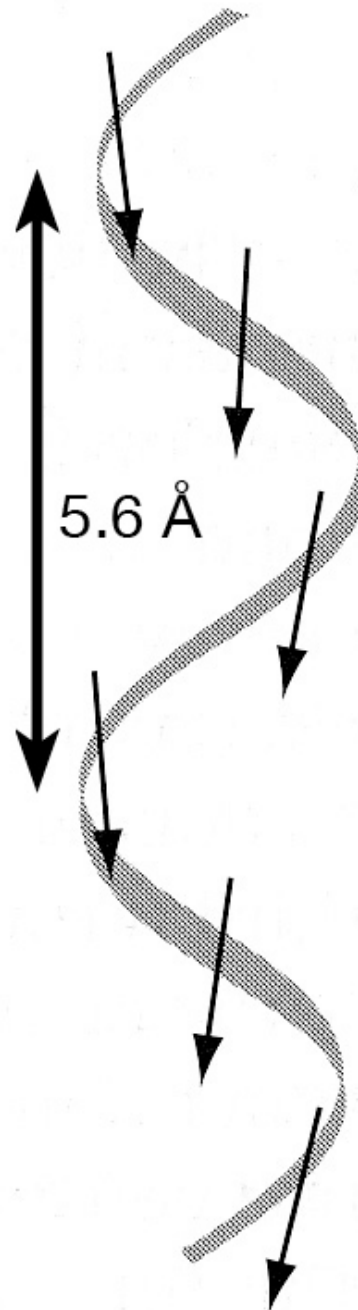
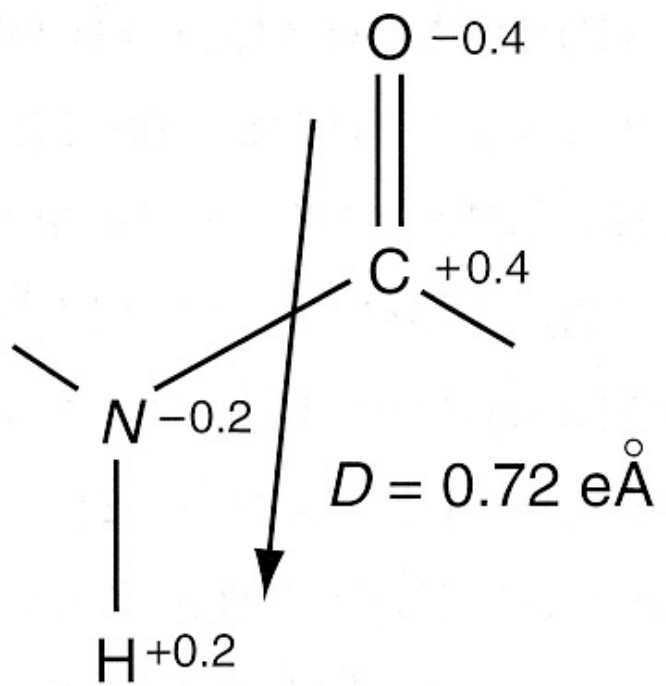


image forces

dielectric self energy





dipolar moment
of an α -helix

| | polarizability $\alpha/4\pi\epsilon_0$ (10^{-30} m^3) | perm. dipole moment μ (D) | Keesom $U_{\text{Keesom}} \times r^6$ (10^{-79} Jm^6) | Debye $U_{\text{Debye}} \times r^6$ (10^{-79} Jm^6) | London $U_{\text{London}} \times r^6$ (10^{-79} Jm^6) | Tot. vdW theoretical (10^{-79} Jm^6) | energy as obtained from fit to gas eqn. of state (10^{-79} Jm^6) |
|--------------------|---|-------------------------------------|---|---|---|---|---|
| Ne | 0.39 | 0 | 0 | 0 | 4 | 4 | 4 |
| CH ₄ | 2.60 | 0 | 0 | 0 | 102 | 102 | 101 |
| HCl | 2.63 | 1.08 | 11 | 6 | 106 | 123 | 157 |
| HBr | 3.61 | 0.78 | 3 | 4 | 182 | 189 | 207 |
| HI | 5.44 | 0.38 | 0.2 | 2 | 370 | 372 | 350 |
| CH ₃ Cl | 4.56 | 1.87 | 101 | 32 | 282 | 415 | 509 |
| NH ₃ | 2.26 | 1.47 | 38 | 10 | 63 | 111 | 162 |
| H ₂ O | 1.48 | 1.85 | 96 | 10 | 33 | 139 | 174 |

from:

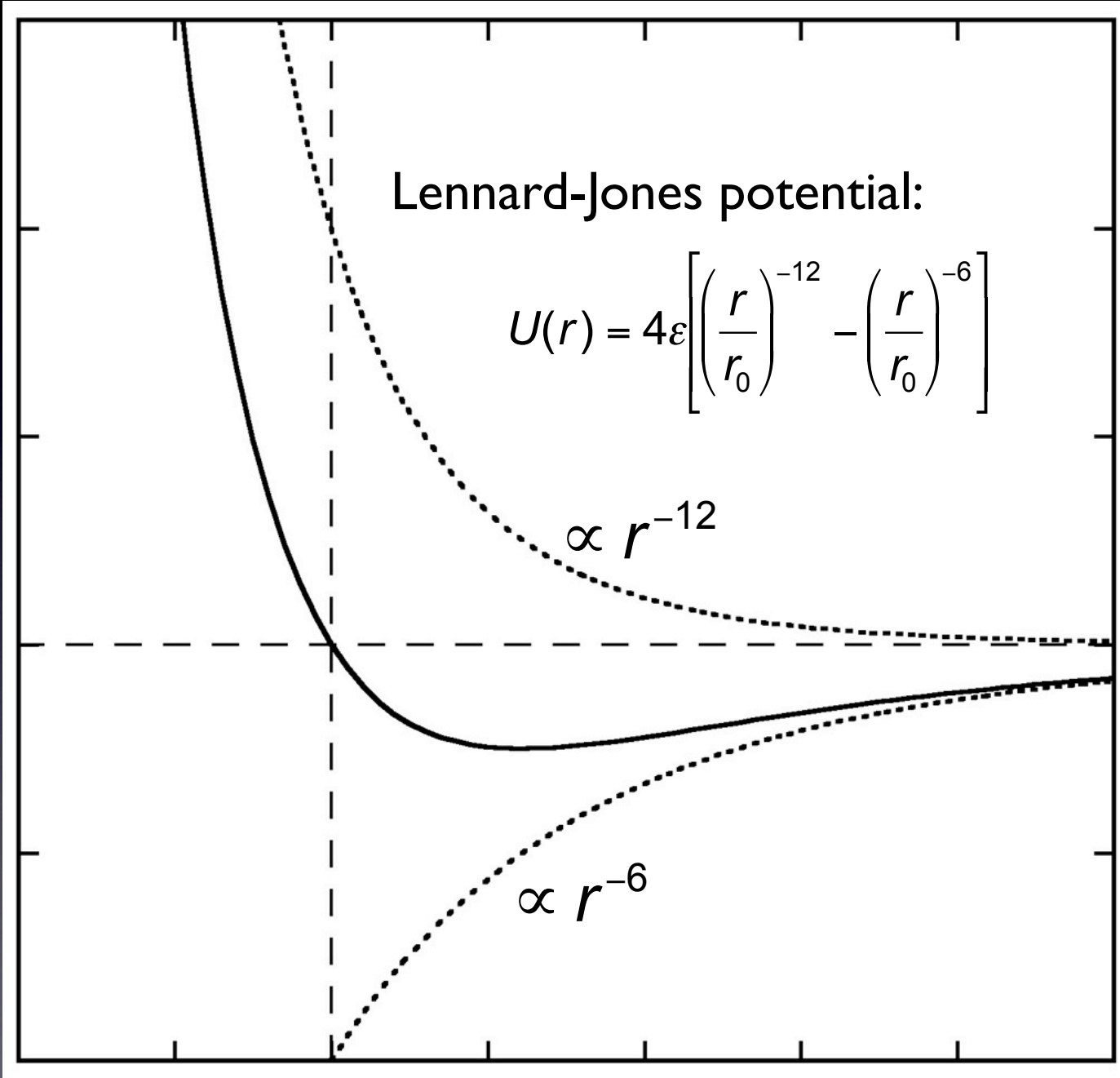
Israelachvili, Intermolecular & Surface Forces

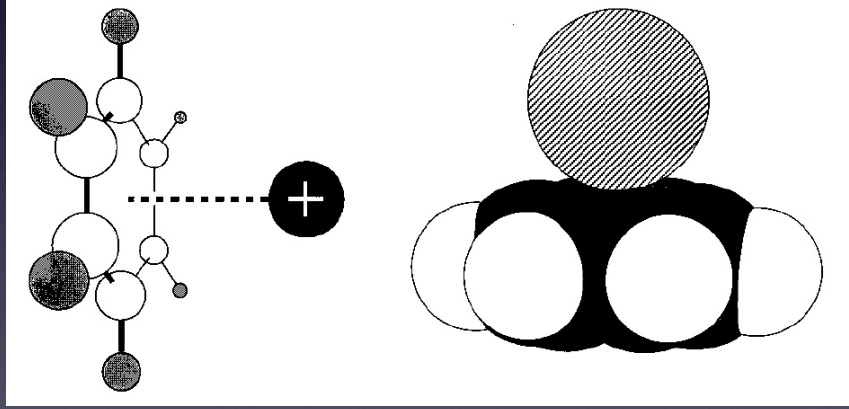
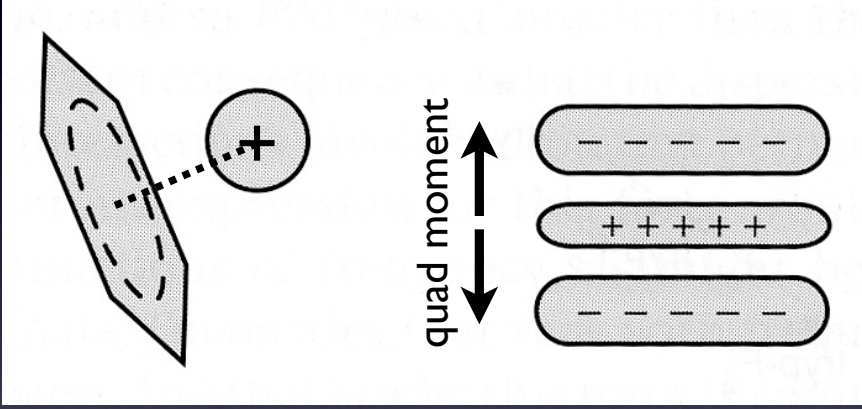
Lennard-Jones potential:

$$U(r) = 4\epsilon \left[\left(\frac{r}{r_0} \right)^{-12} - \left(\frac{r}{r_0} \right)^{-6} \right]$$

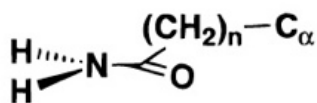
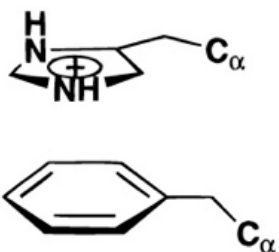
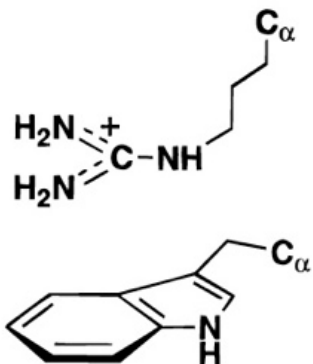
$\propto r^{-12}$

$\propto r^{-6}$

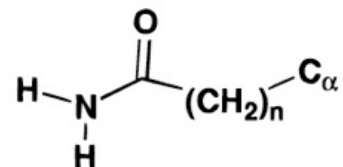
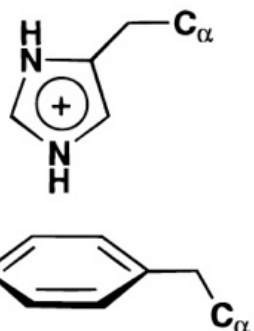
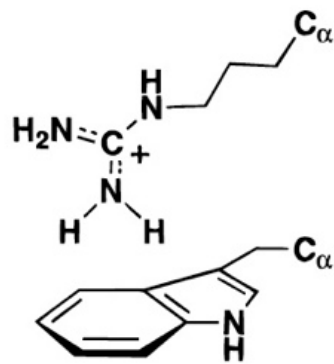




**Parallel
(stacking)**



**Perpendicular
(Hydrogen bonding)**



Arginine (Arg)

Tryptophan (Trp)

Histidine (His)

Phenylalanine (Phe)

n = 1: Asparagine (Asn)

n = 2: Glutamine (Gln)

Tyrosine (Tyr)

from Ma & Dougherty, *Chem. Rev.* 97 (1997)