

- 7.1 Chemische Bindung
- 7.2 Wasserstoffmoleküllen
- 7.3 Mehratomige Moleküle
- 7.4 Molekülanregungen



Early chemists describe the first dirt molecule.

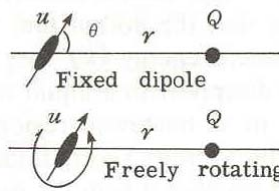
Bindungstypen:

- Kovalente Bindung:
Elektronen besetzen gemeinsame Zustände der Atome („Molekülorbitale“)
- Ionische Bindung:
Transfer von Elektronen + Coulombwechselwirkung
- Van-der-Waals Wechselwirkung
- Wasserstoffbrückenbindung

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Van-der-Waals Wechselwirkung

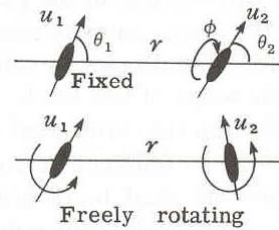
Ladung - Dipol



$$-Qu \cos \theta / 4\pi\epsilon_0 r^2$$

$$-Q^2 u^2 / 6(4\pi\epsilon_0)^2 kTr^4$$

Dipol - Dipol



$$-u_1 u_2 [2 \cos \theta_1 \cos \theta_2 - \sin \theta_1 \sin \theta_2 \cos \phi] / 4\pi\epsilon_0 r^3$$

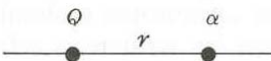
$$-u_1^2 u_2^2 / 3(4\pi\epsilon_0)^2 kTr^6$$

(Keesom energy)

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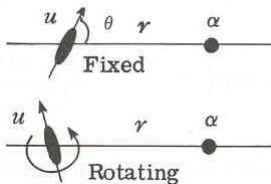
Van-der-Waals Wechselwirkung

Ladung - unpolar



$$-Q^2 \alpha / 2(4\pi\epsilon_0)^2 r^4$$

Dipol - unpolar

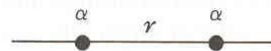


$$-u^2 \alpha (1 + 3 \cos^2 \theta) / 2(4\pi\epsilon_0)^2 r^6$$

$$-u^2 \alpha / (4\pi\epsilon_0)^2 r^6$$

(Debye energy)

unpolar - unpolar



$$\frac{3}{4} \frac{h\nu \alpha^2}{(4\pi\epsilon_0)^2 r^6}$$

(London dispersion energy)