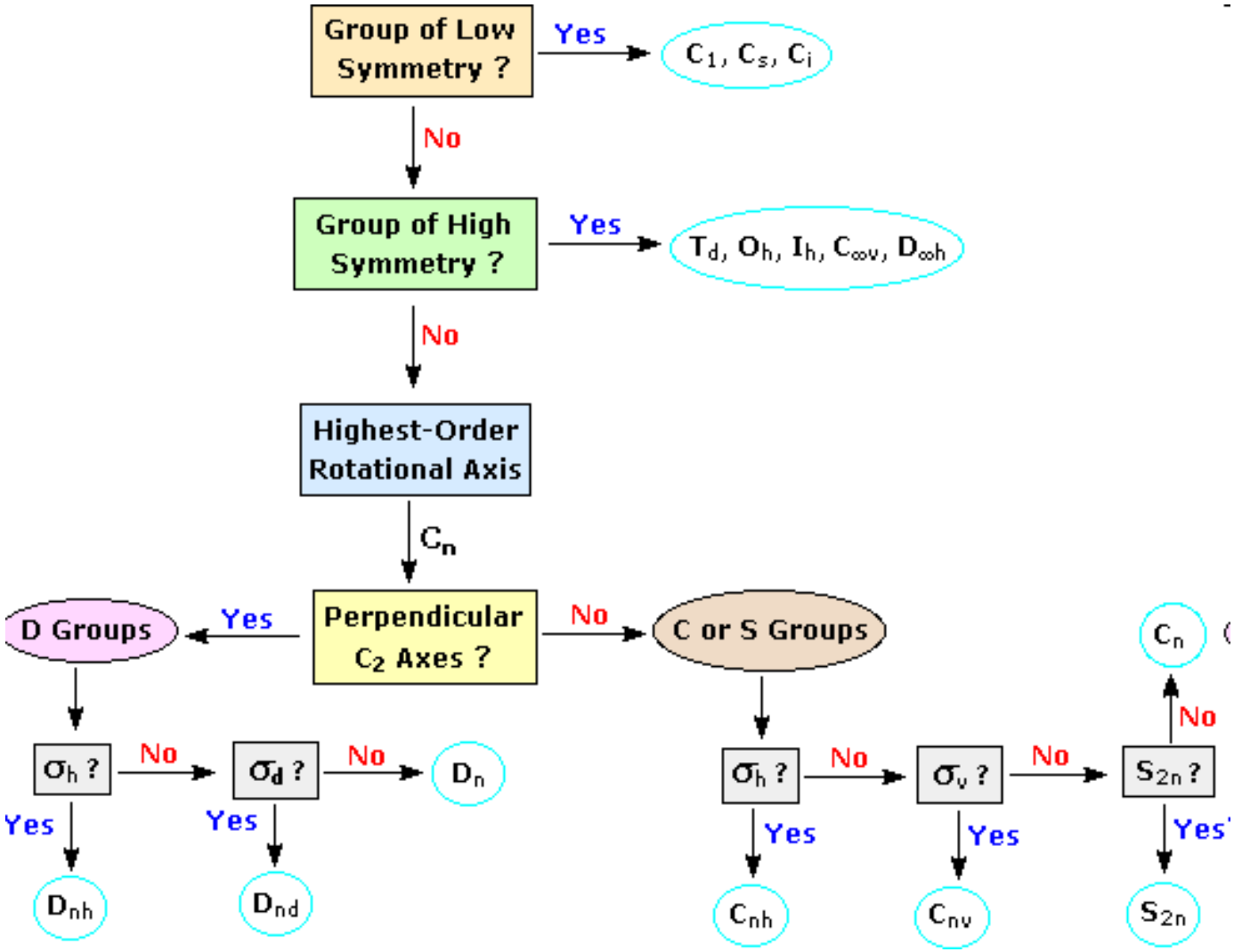
CAPVT VII

SIMETRIJA

Ob simetriji

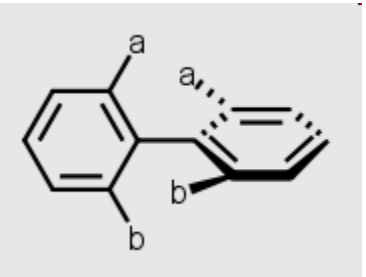
- Elementi simetrije
- Operacije simetrije
- Grupe točke

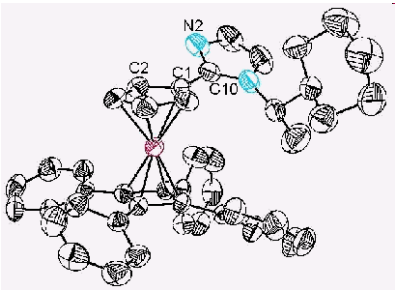

Group of Low Symmetry ?
Yes
C1, Cs, Ci
No
Group of High Symmetry ?
Yes
Td, Oh, Ih, C∞v, D∞h
No
Highest-Order Rotational Axis
Cn
Perpendicular C2 Axes ?
Yes
D Groups
No
C or S Groups
σh ?
No
σd ?
No
Dn
Yes
Dnh
Yes
Dnd
σh ?
No
σv ?
No
S2n ?
No
Cn
Yes
Cnh
Yes
Cnv
Yes
S2n

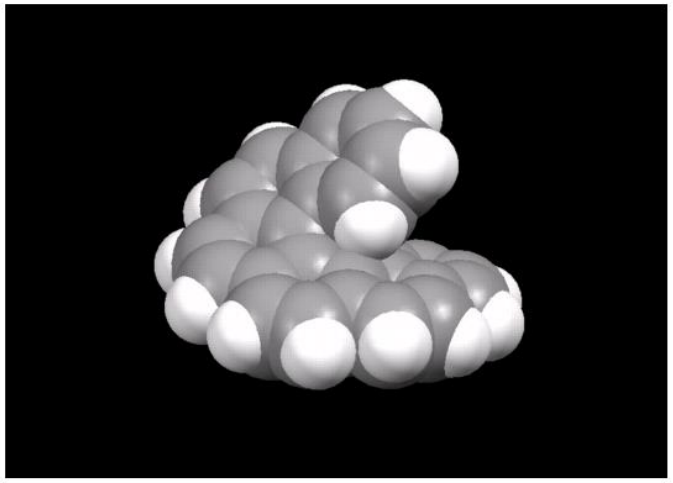
- Kiralnost
  - Izostanak elemenata simetrije 2. vrste
- Polarnost
  - Barem jedna polarna os

Vrste kiralnosti

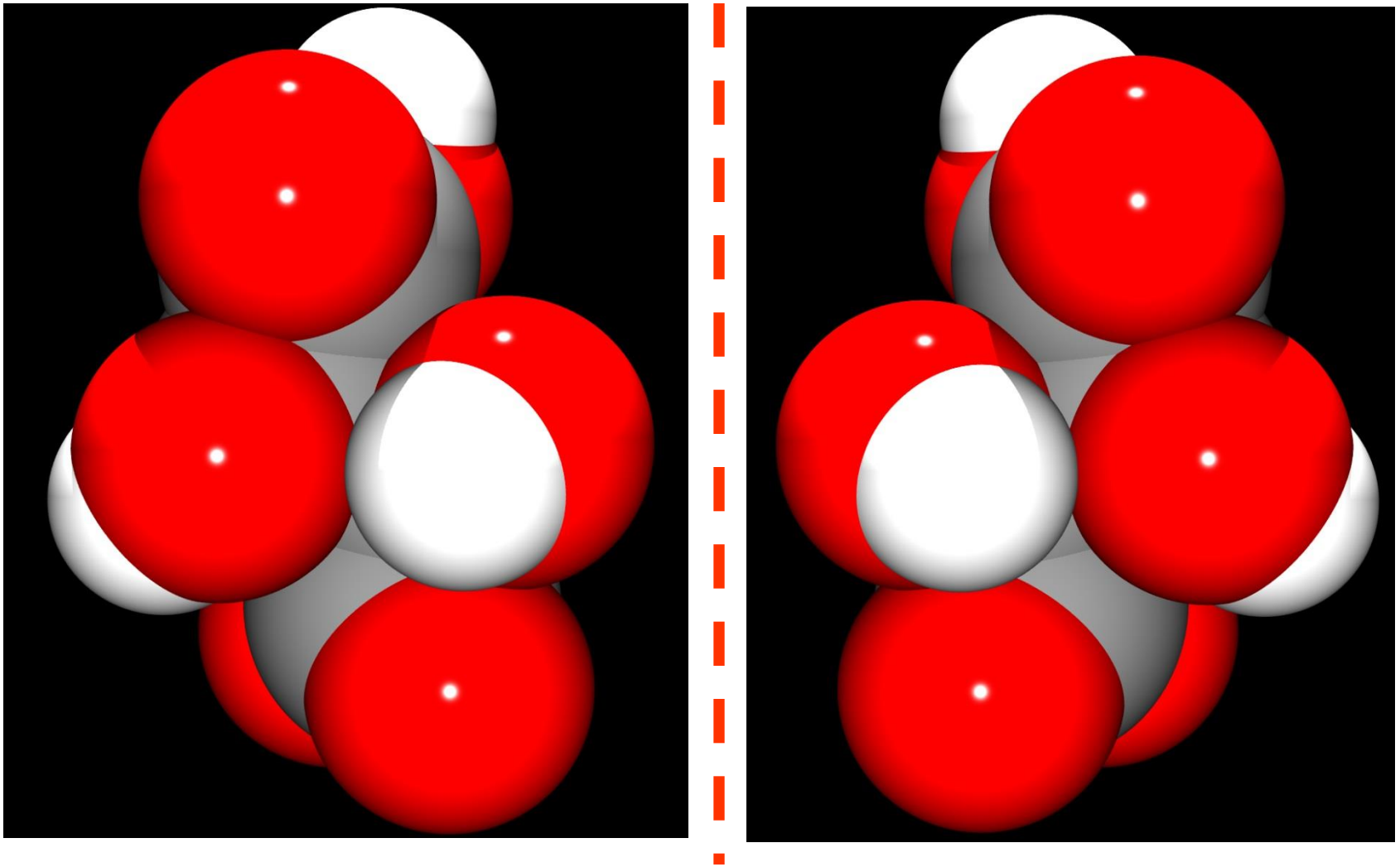
- Centralna
- Osna
- Ravninska
- Helikalna







Lijeva i desna vinska kiselina



(+), L, *R*,*R*

(-), D, *S*,*S*

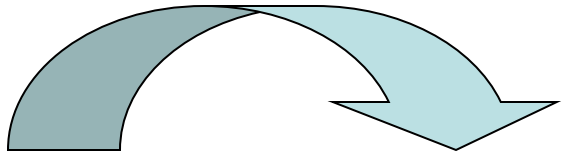
Pasteur, 1847.

- (+), (–) – smjer optičkog zakretanja
- D, L – za ugljikohidrate i aminokiseline... i spojeve koje se može izvesti iz gliceraldehida
- *R*, *S* – za četverovalentne (tetraedarske) atome
- Λ, Δ i λ, δ – za šesterovalentne (oktaedarske) atome
- *M*, *P* – za zavojnice
- Nema univerzalnog sustava!!

Kako definirati kiralnost?

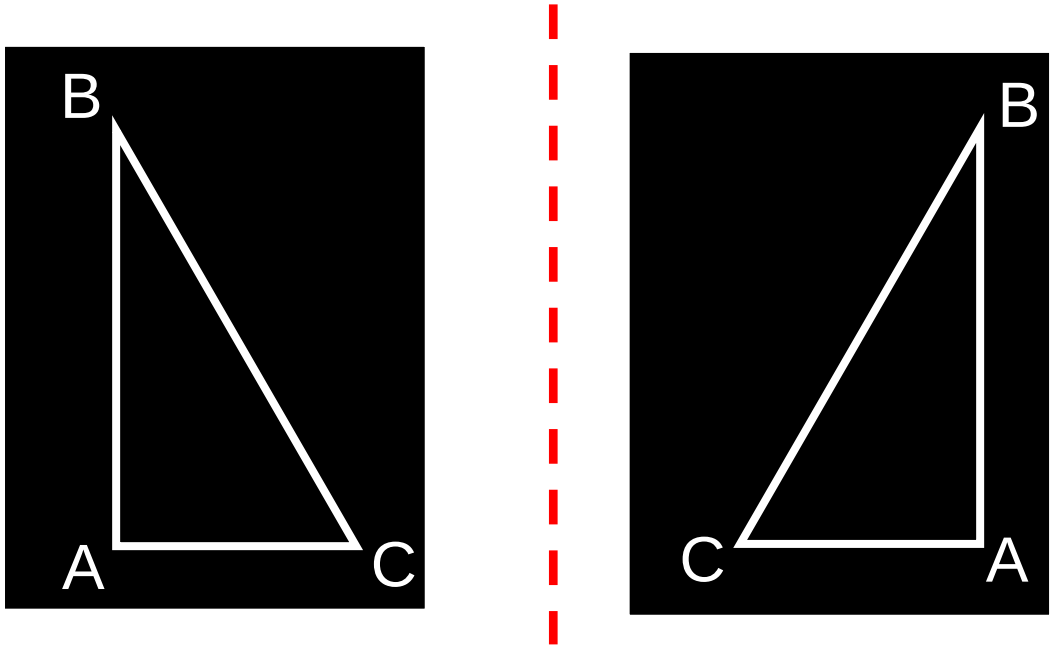
(Koliko točaka nam za to treba?)

Pravac (1D):

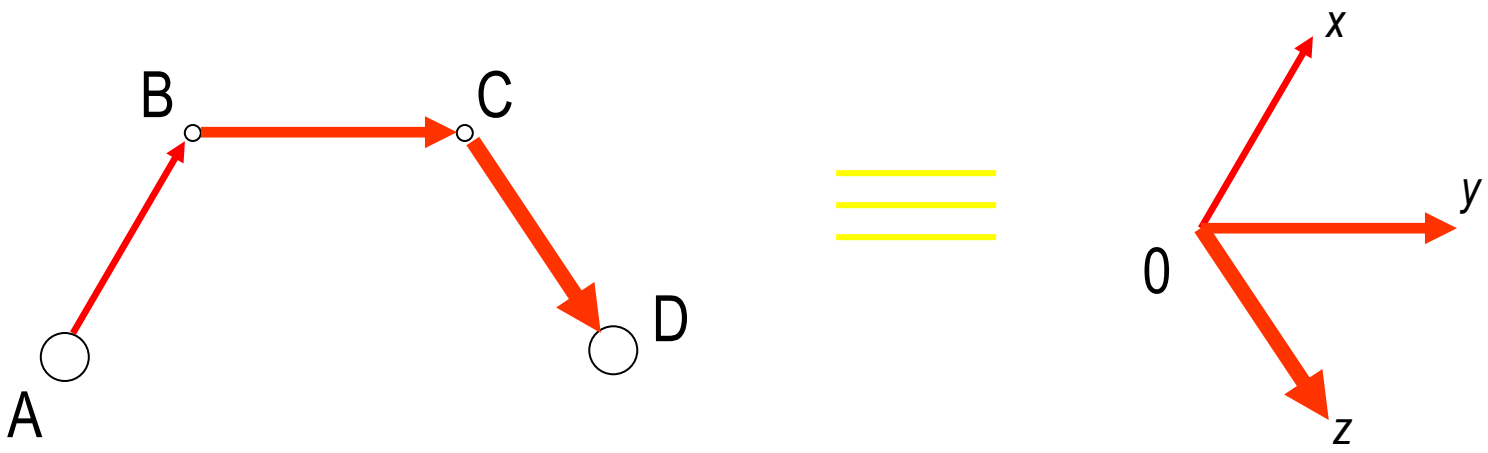


A B B A

Ravnina:



3D prostor



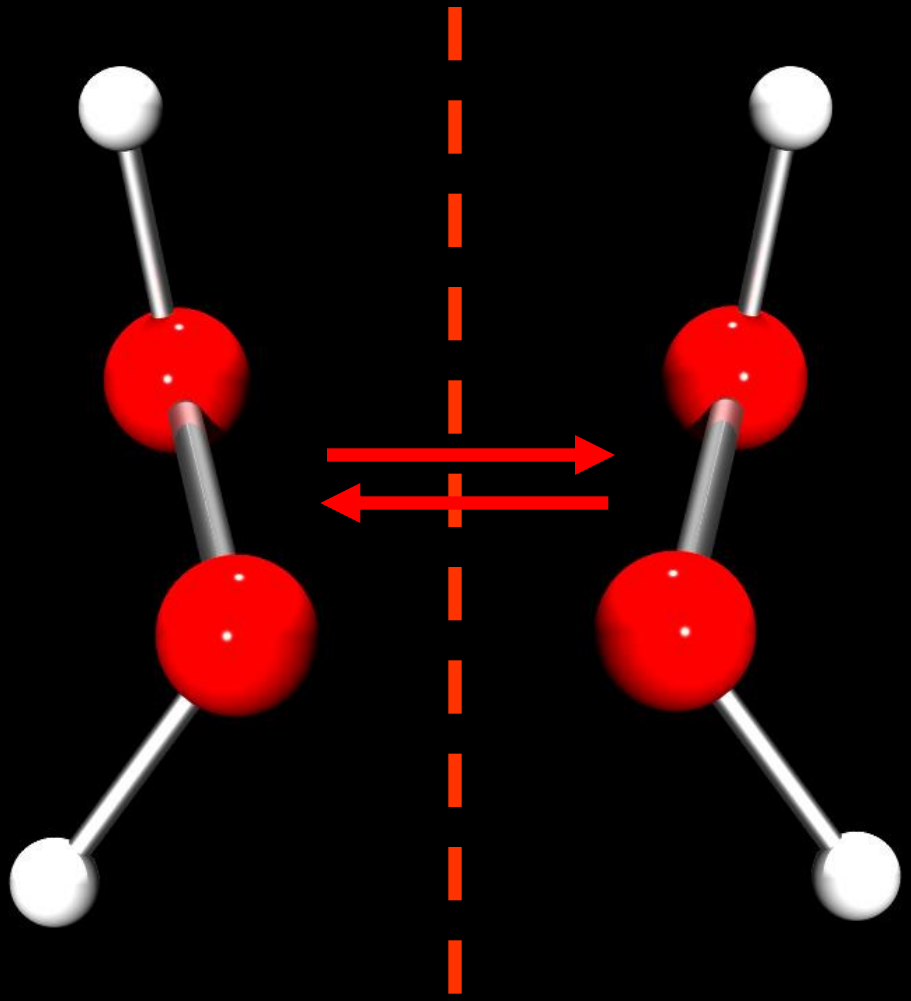
S četiri točke definiramo koordinatni sustav

Koordinatni sustav može biti lijevi i desni

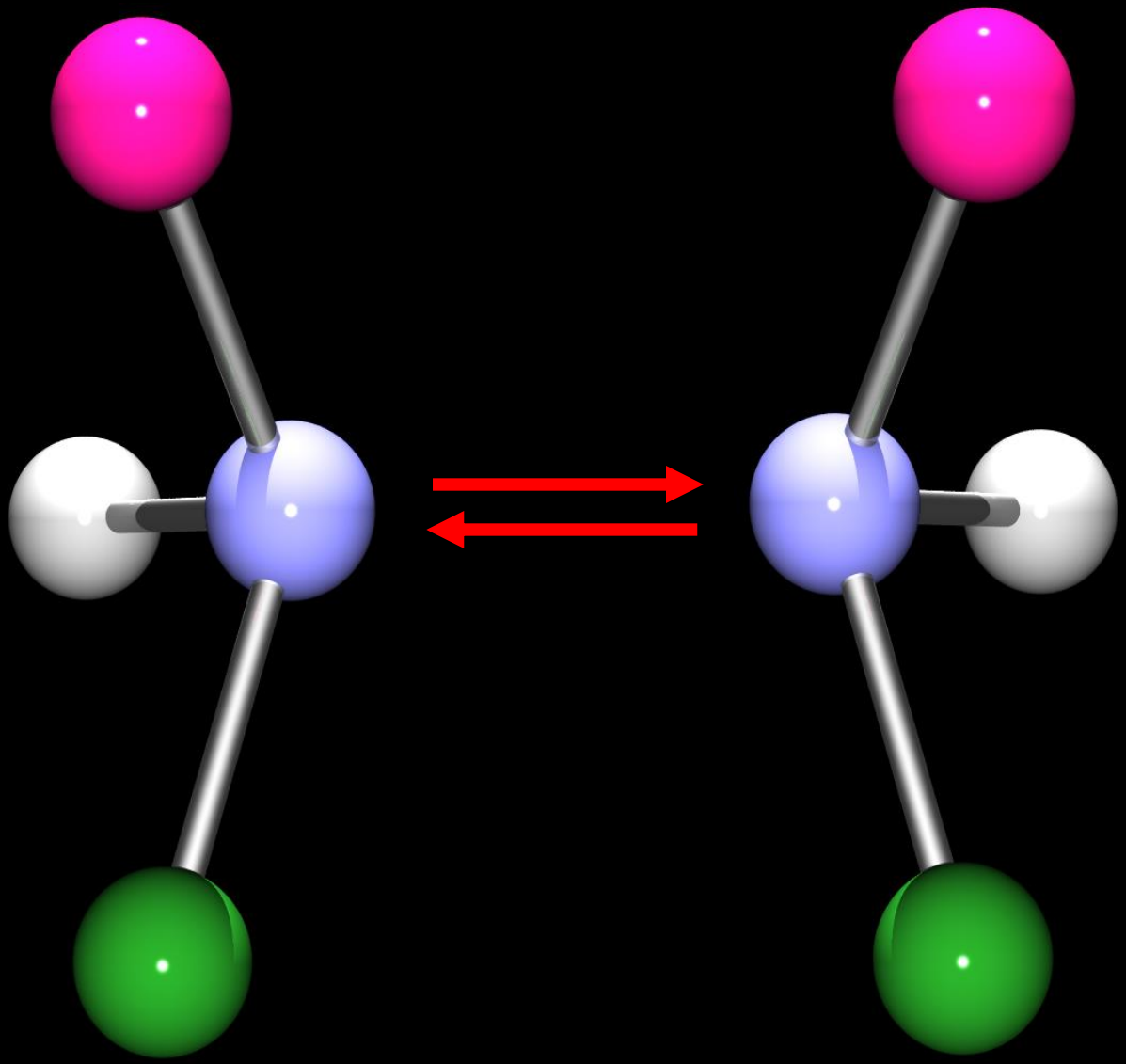
Kiralna molekula mora imati najmanje 4 atoma

Najmanja kiralna molekula?

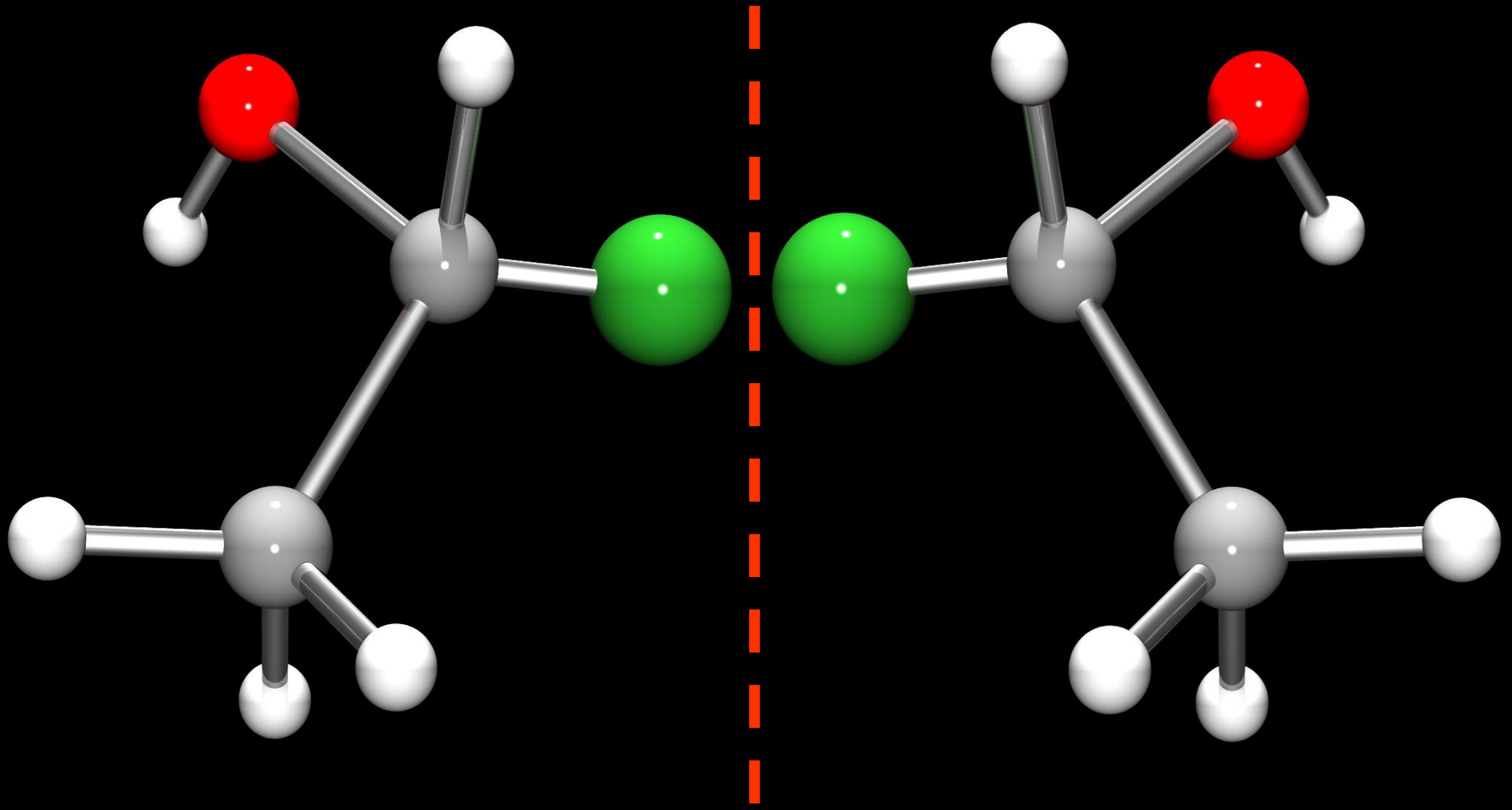
Ima samo 4 atoma:



Tercijarni amin



Četverovalentni ugljik:
2 različita spoja!



Sterički onemogućena pretvorba lijevog u desno

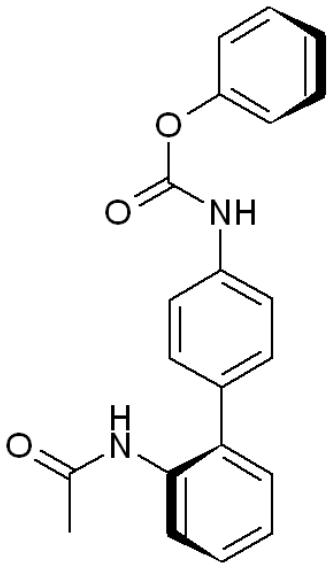
- Kiralan spoj **ne mora** imati stereogeni centar

  - spojevi sa stereogenim centrom su specijalni slučaj kiralnih spojeva

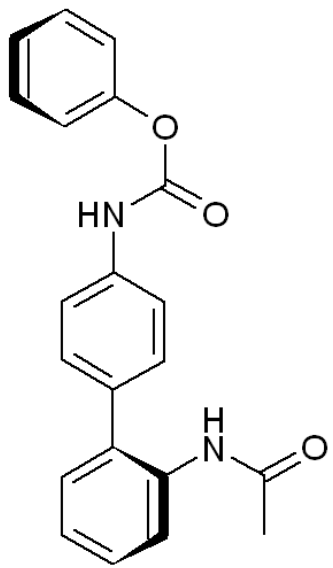
  - tetraedarski stereogeni centri su specijalni slučaj kiralnih spojeva sa stereogenim centrima

- Molekula je akiralna samo ako ima **centar inverzije** ili **zrcalnu ravninu**
- Ako nema ni centar inverzije ni zrcalnu ravninu, kiralna je!

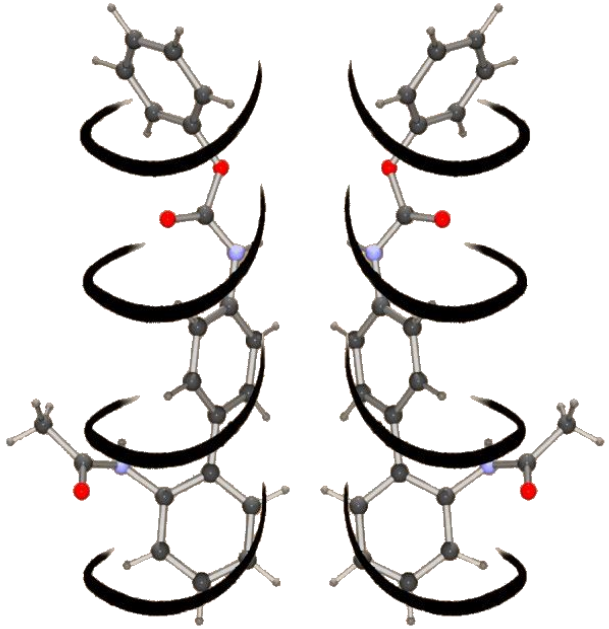
Heličnost

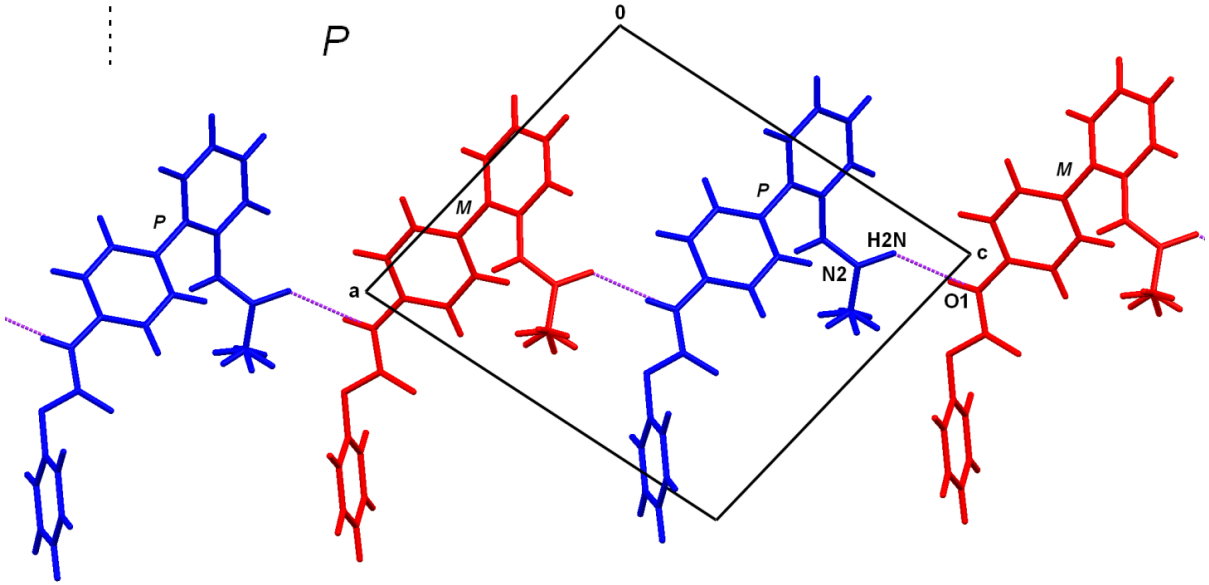


M

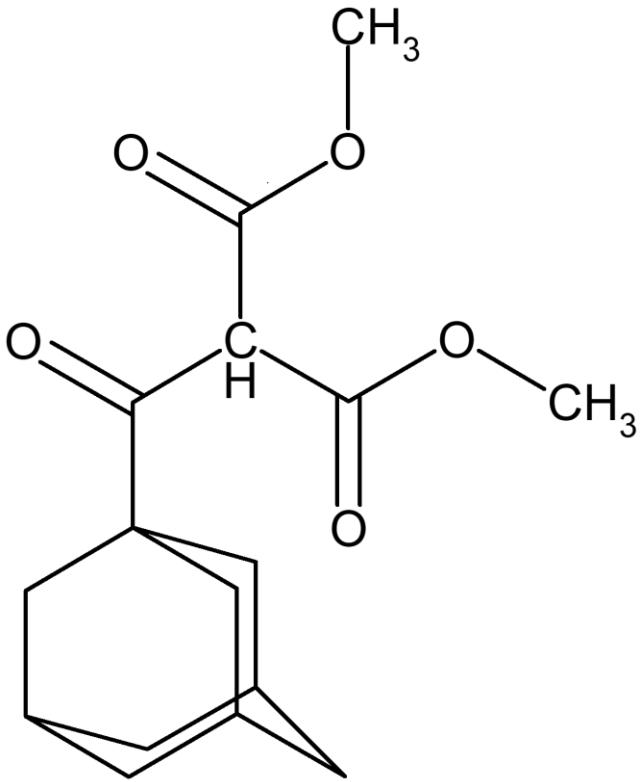


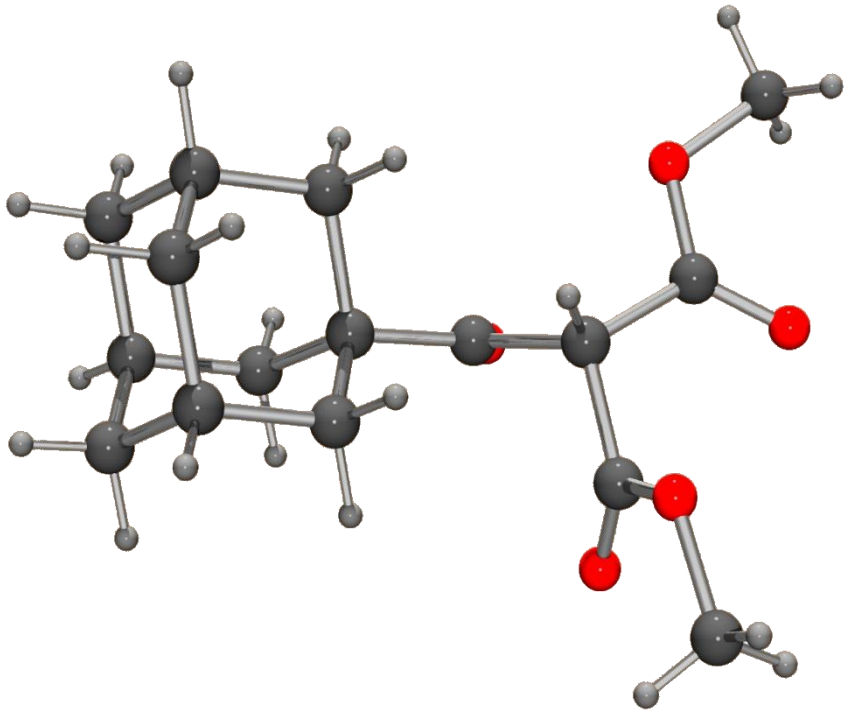
P



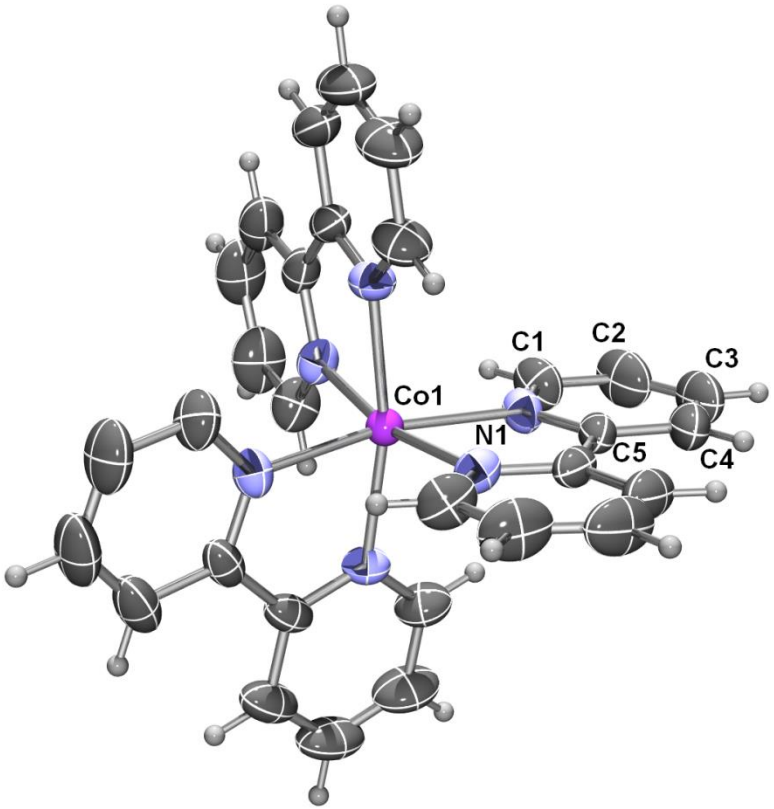


Konformacijska kiralnost

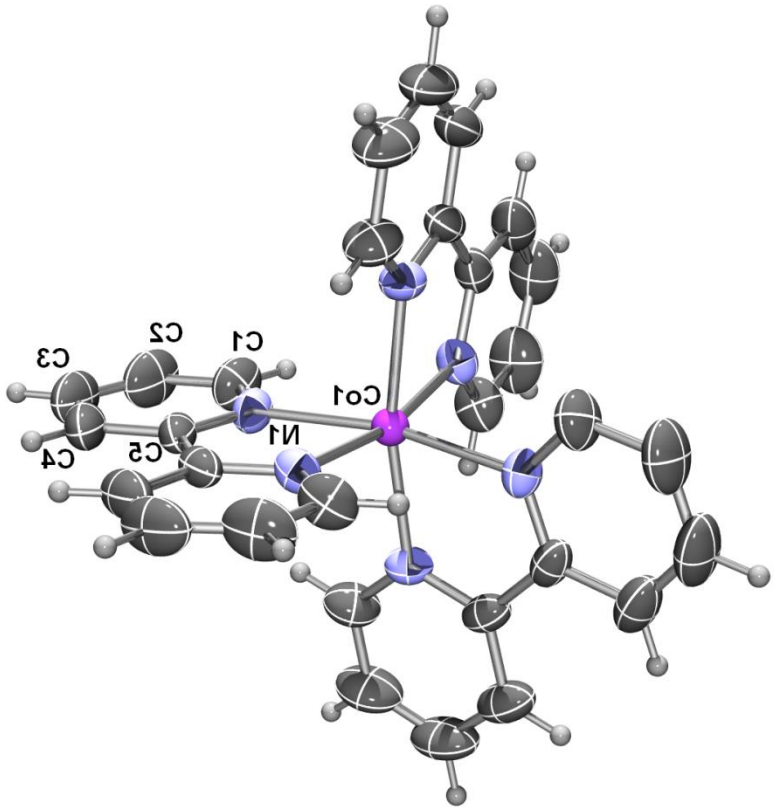




Kiralnost na oktaedarski koordiniranom atomu



Λ



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