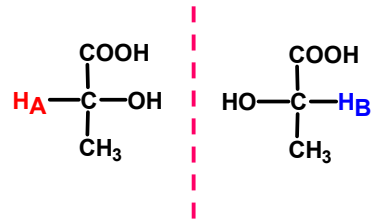
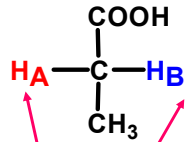
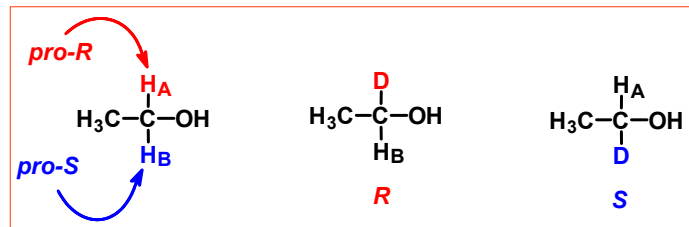


centrum prochiralne



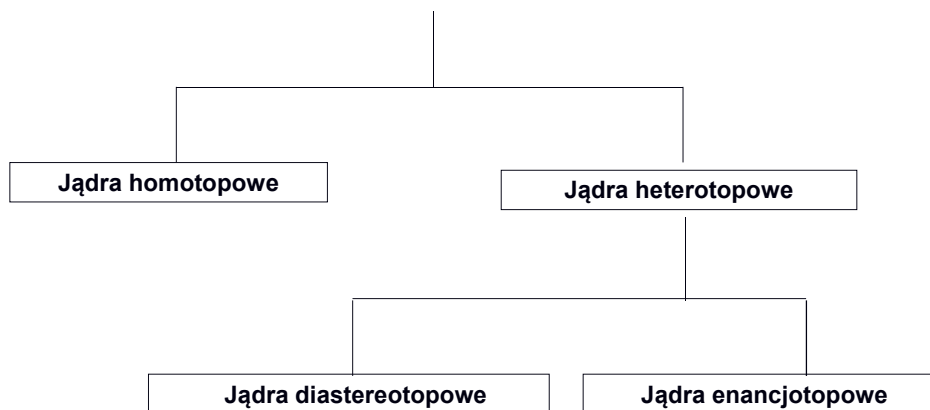
jądra heterotopowe

PROCHIRALNOŚĆ



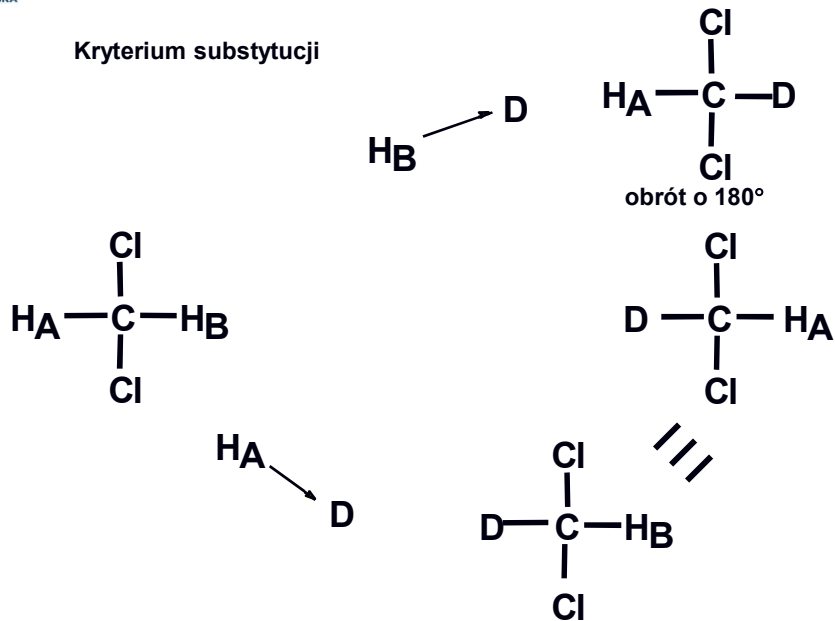
## Jądra homomorficzne

*grec.* – **homos** oznaczający taki sam oraz **morphe** oznaczający formę



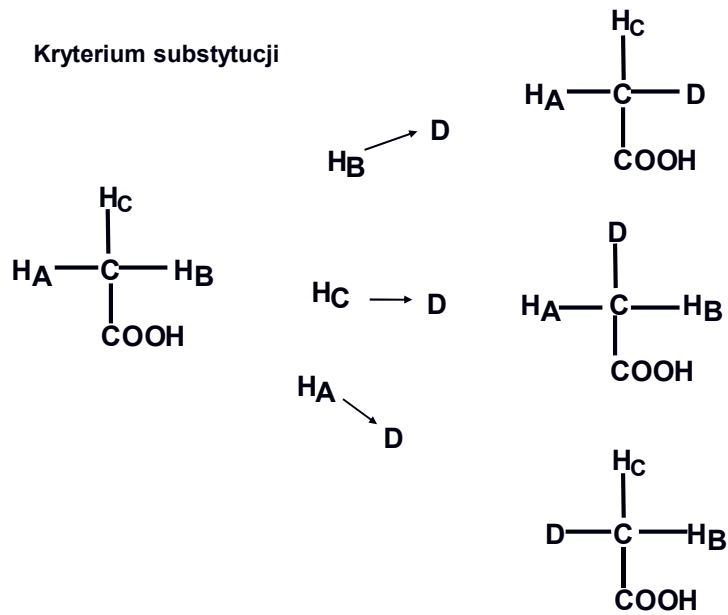
Jądra homotopowe

Kryterium substytucji



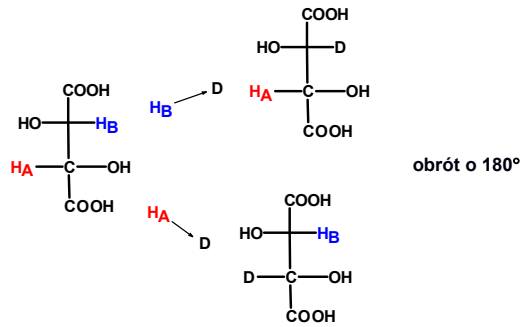
Jądra homotopowe

Kryterium substytucji



Jądra homotopowe

Kryterium substytucji

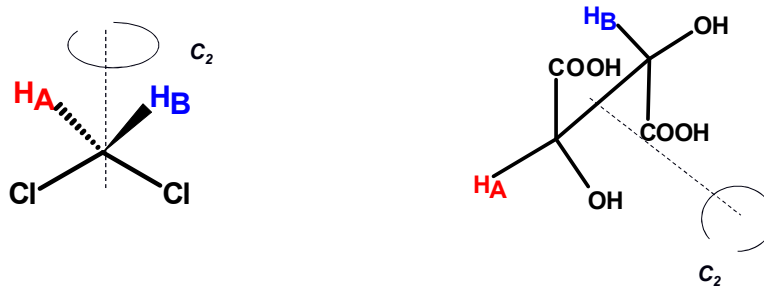


Jądra homotopowe

Kryterium symetrii



oś  $C_n$  gdzie:  $1 < n < \infty$



Jądra homotopowe

Kryterium symetrii

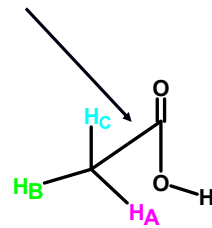


oś  $C_n$  gdzie:  $1 < n < \infty$

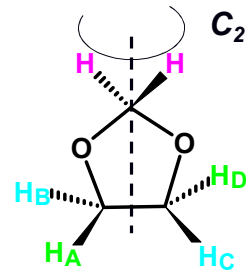
symetria 'uśredniona'



swobodny obrót



konformacja ekliptyczna

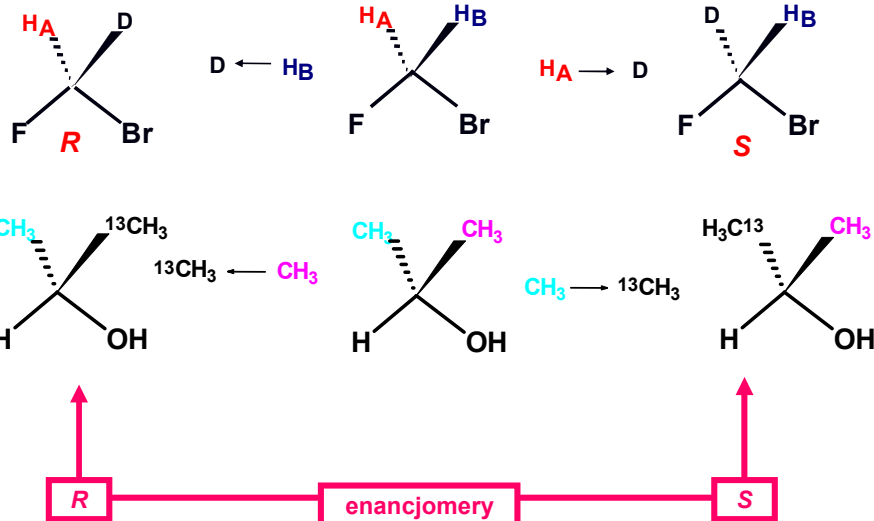


protony heterotopowe:  $H_A$  i  $H_B$  oraz  $H_D$  i  $H_C$

protony homotopowe:  $H_A$  i  $H_D$ ,  $H_B$  i  $H_C$ ,  $H$

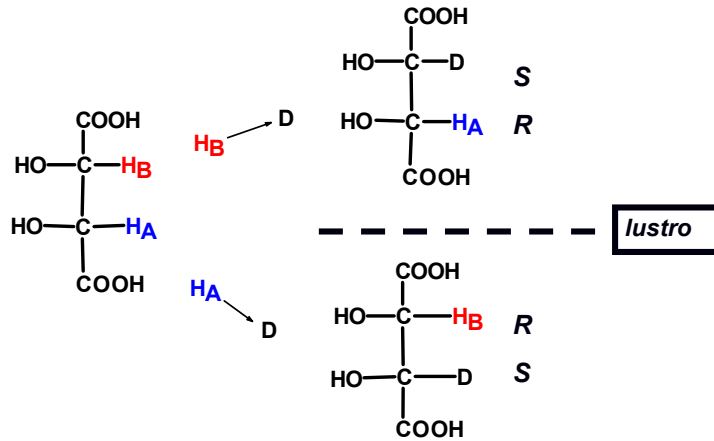
Jądra heterotopowe – enancjotopowe

Kryterium substytucji



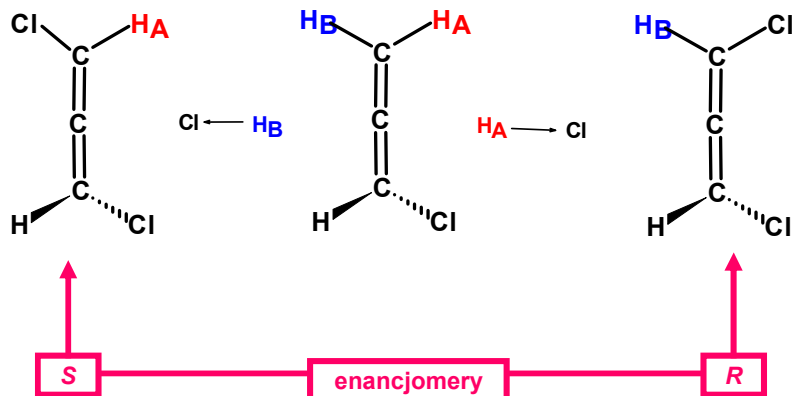
Jądra heterotopowe – enancjotopowe

Kryterium substytucji



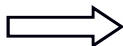
Jądra heterotopowe – enancjotopowe

Kryterium substytucji

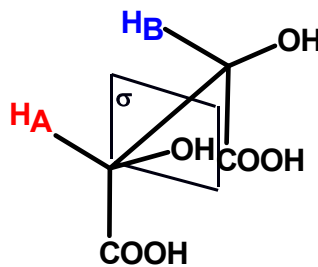
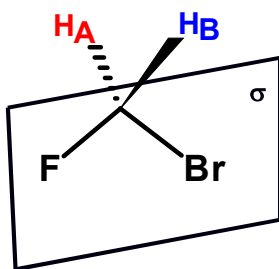


Jądra heterotopowe – enancjotopowe

Kryterium symetrii

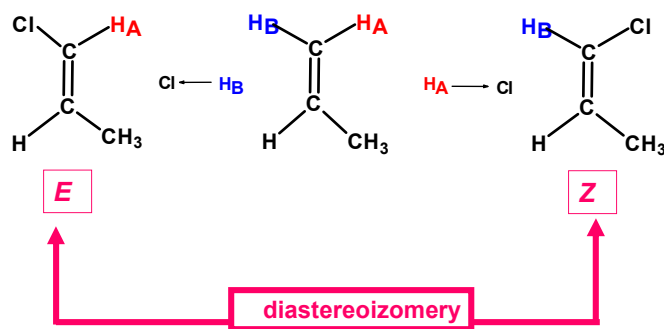


płaszczyzna  $\sigma$



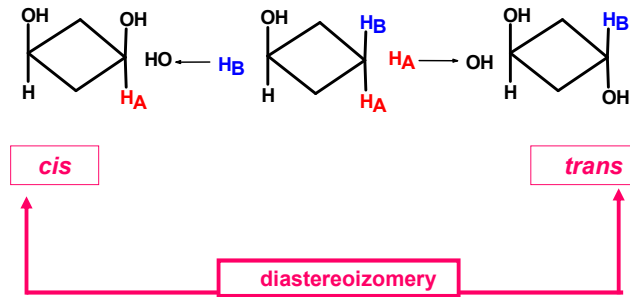
Jądra heterotopowe – diastereotopowe

Kryterium substytucji



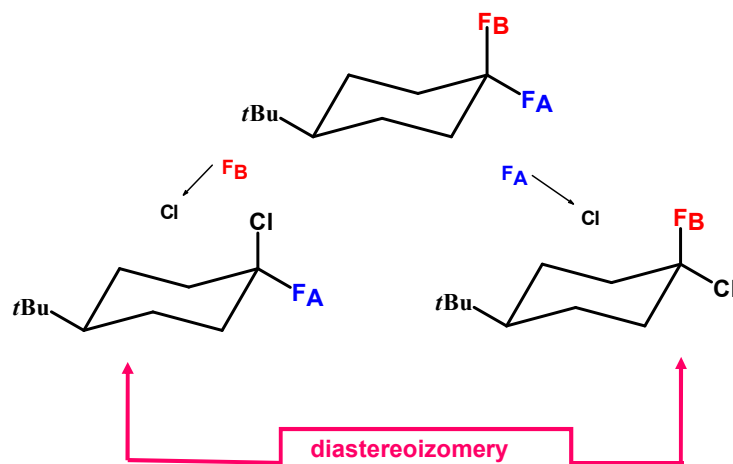
### Jądra heterotopowe – diastereoizomery

Kryterium substytucji



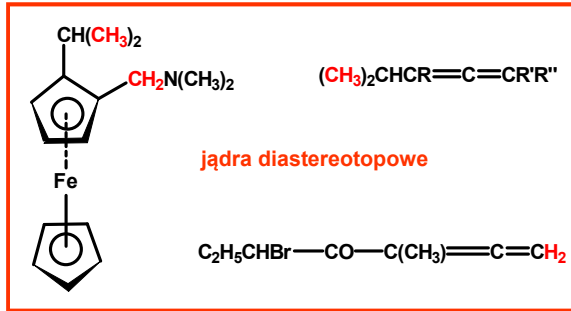
### Jądra heterotopowe – diastereoizomery

Kryterium substytucji

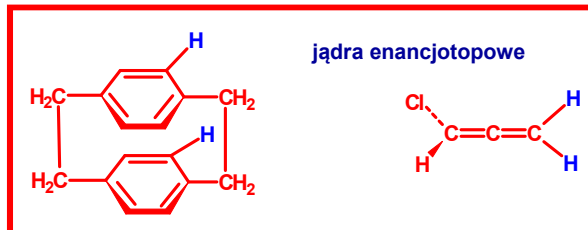


**Jądra heterotopowe – diastereotopowe**

Kryterium symetrii  $\Rightarrow$  BRAK ELEMENTÓW SYMETRII



PORÓWNANIE



**jądra (grupy) homotopowe**  $\Leftrightarrow$  **jądra równocenne chemicznie i magnetycznie**  
nierozróżnialne w spektroskopii NMR

**jądra (grupy) heterotopowe**

**jądra (grupy) enancjotopowe**

**jądra (grupy) diastereotopowe**

nierozróżnialne w spektroskopii NMR  
w środowisku achiralnym

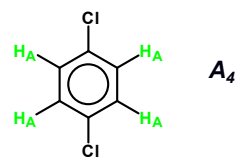
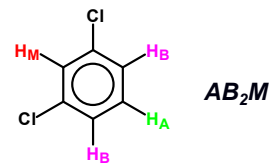
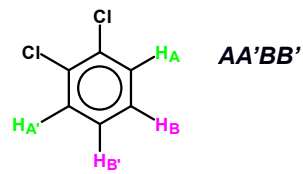
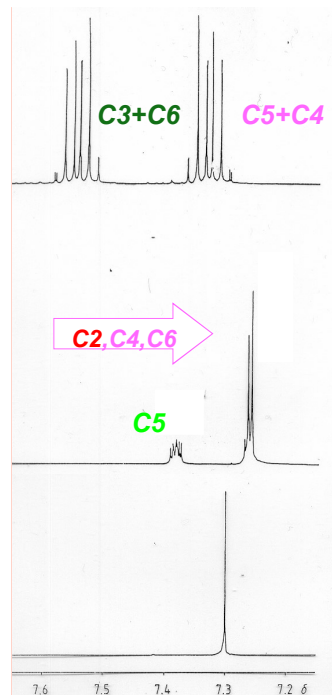
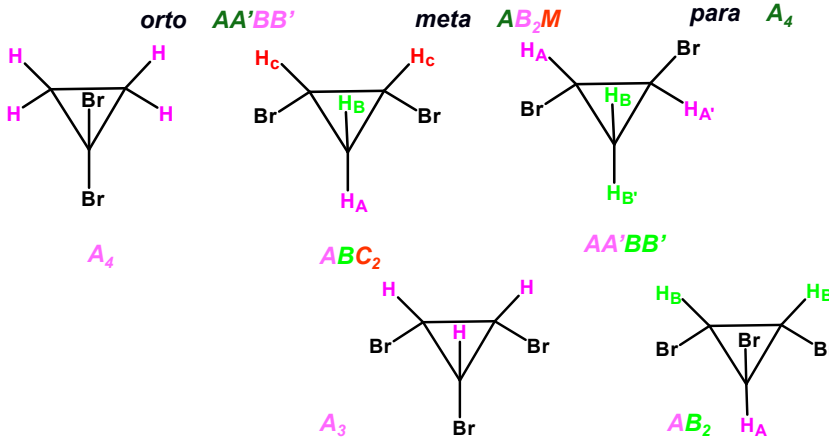
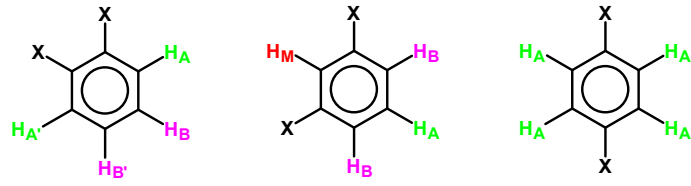
**ALE**

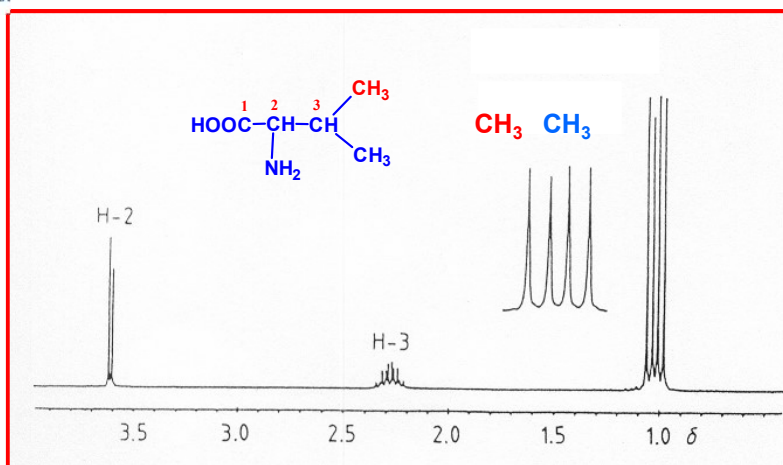
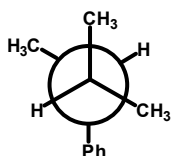
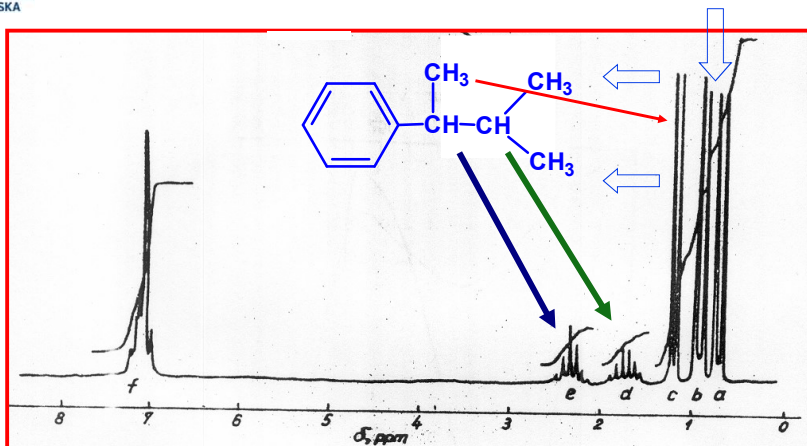
**rozróżnialne w spektroskopii NMR**

**rozróżnialne w spektroskopii NMR  
w środowisku chiralnym**

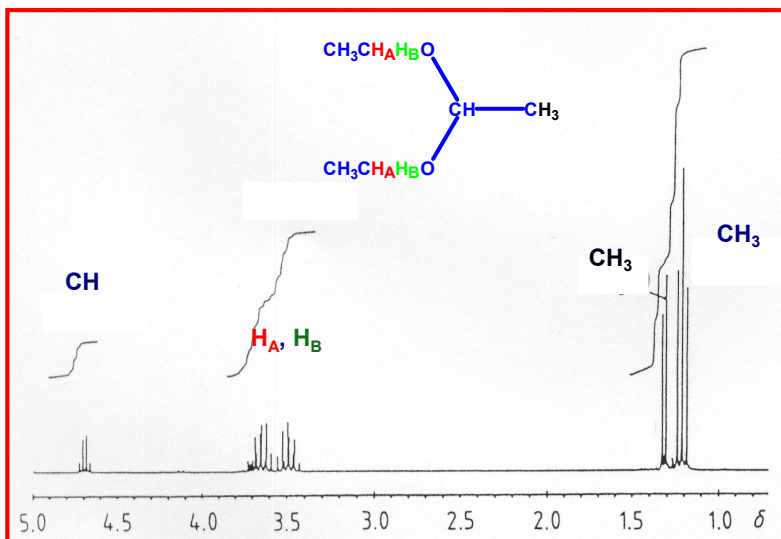


### Wpływ symetrii cząsteczki i jej chiralności na widma NMR

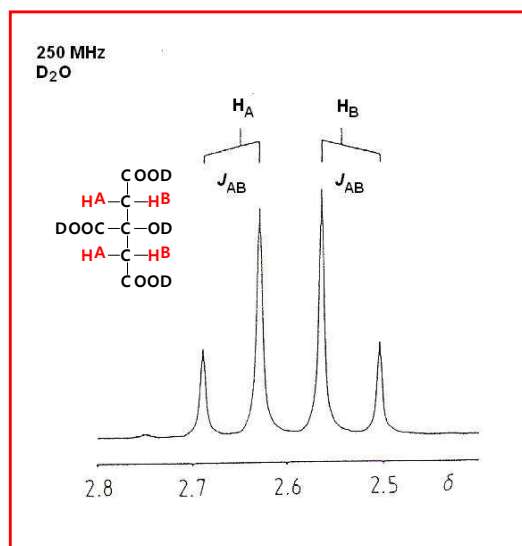


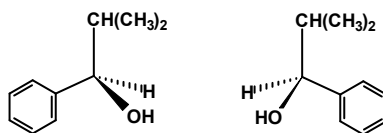


Widmo <sup>1</sup>H NMR [250 MHz] waliny; rozpuszczalnik D<sub>2</sub>O



Widmo <sup>1</sup>H NMR [250 MHz] acetalu dietylowego etanal; rozpuszczalnik CDCl<sub>3</sub>



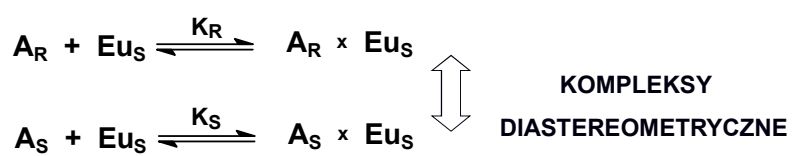


rozpuszczalnik: *D*- $\alpha$ -naftyloetyloamina

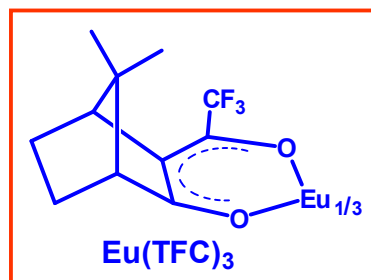
60 MHz

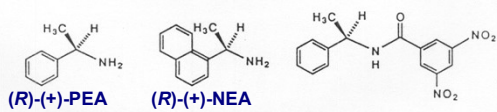
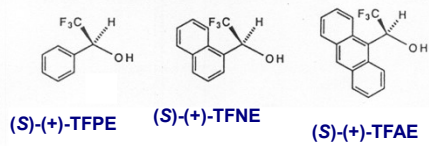
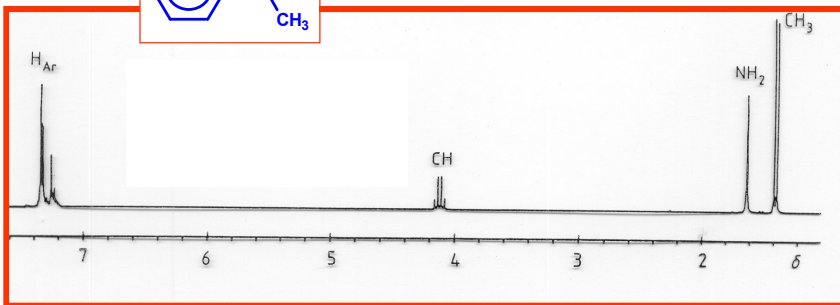
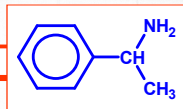
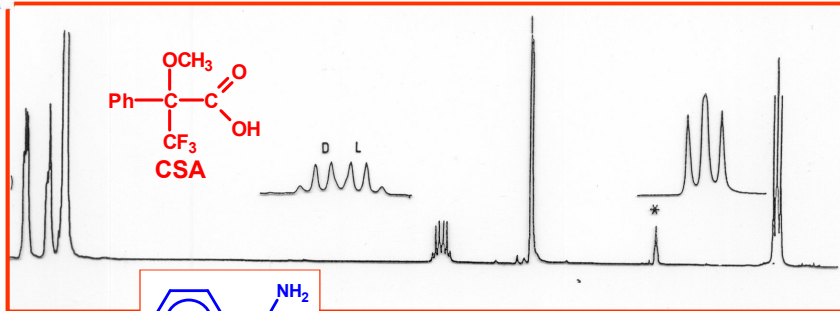


100 MHz



$$K_R \neq K_S$$





**CSA**  
**ang. Chiral Solvating Agents**

