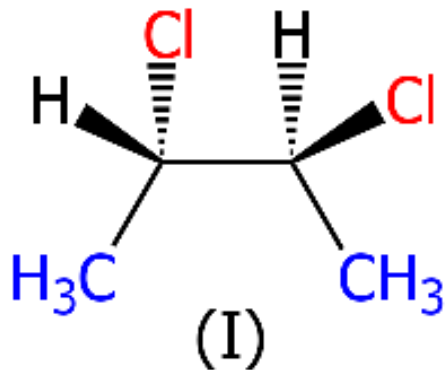
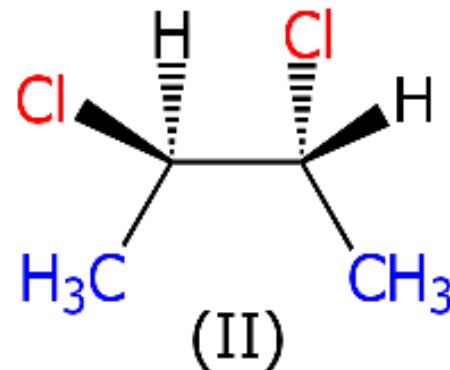
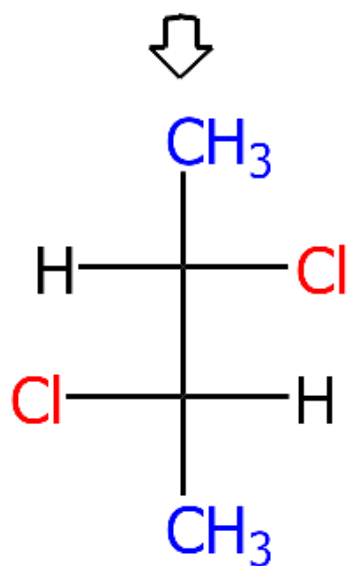




(2*S*, 3*S*)-Dichlorobutane

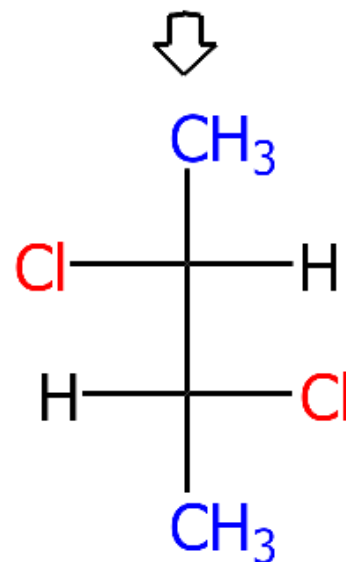


(2*R*, 3*R*)-Dichlorobutane

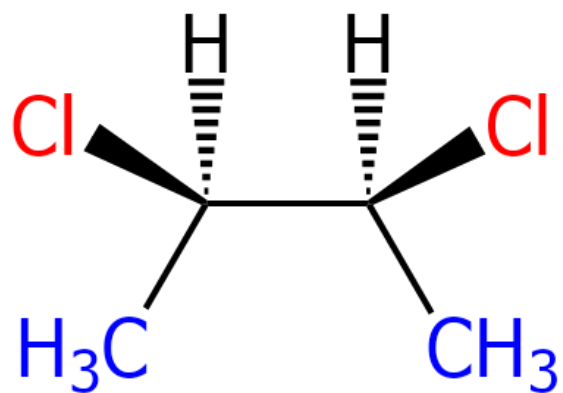


enantiomer

mirror



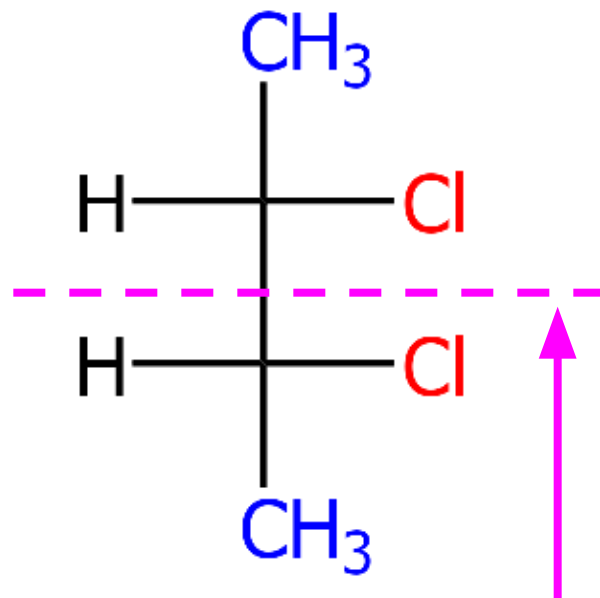
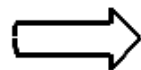
- ❖ (I) and (II) are both chiral and they are enantiomers with each other



(III)

(2*S*, 3*R*)-Dichlorobutane

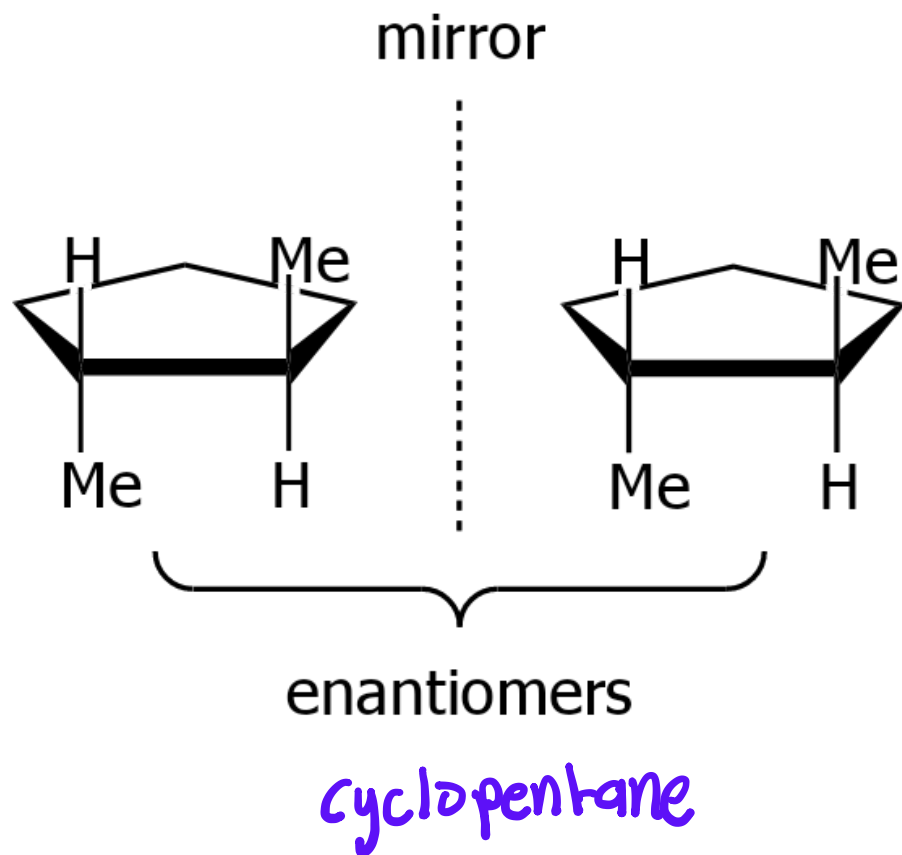
يمكن في الـ دوقان يكون بـ الاسم



*Plane of
symmetry*

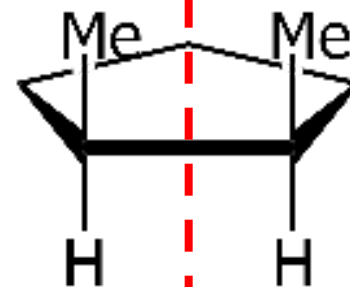
- ❖ (III) is achiral (a **meso** compound)^y
- ❖ (III) and (I) are diastereomers to each other

12. Stereoisomerism of Cyclic Compounds



a meso
compound

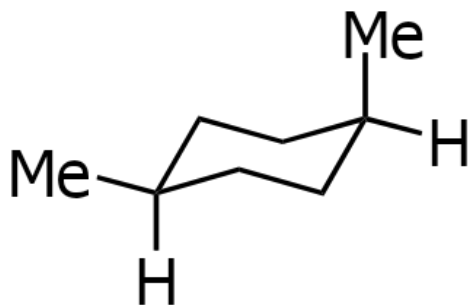
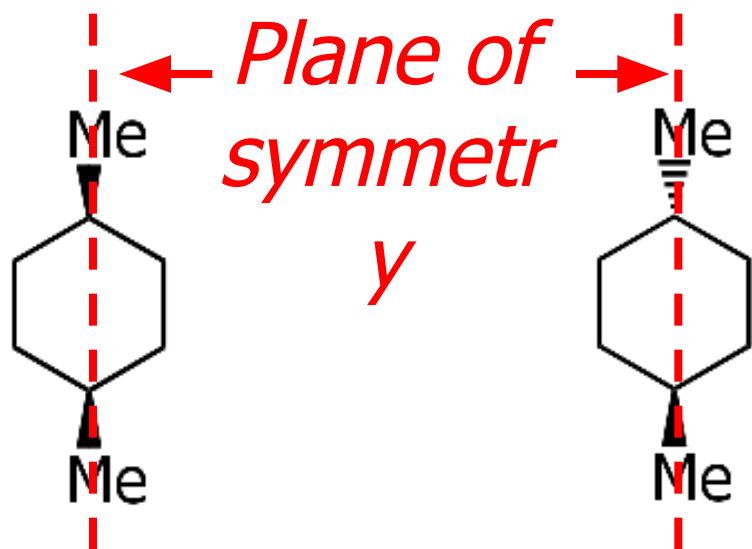
achiral



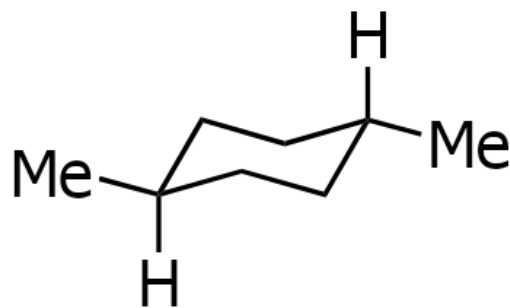
*Plane of
symmetry*

12A. Cyclohexane Derivatives

❖ 1,4-Dimethylcyclohexane



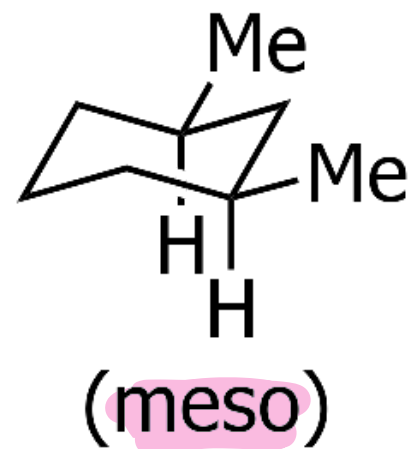
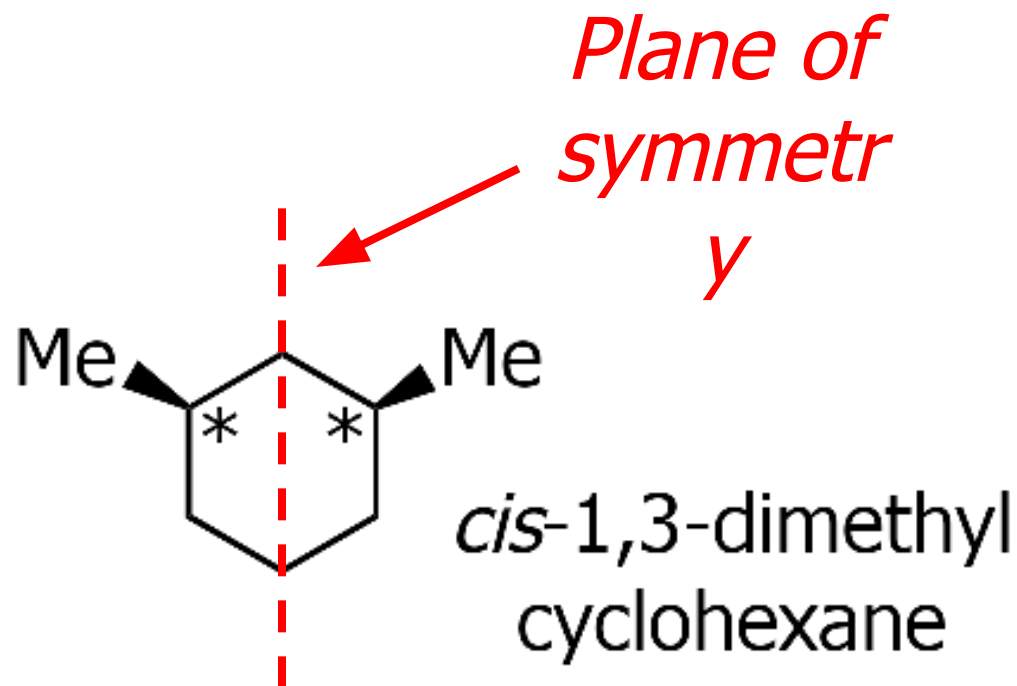
cis-1,4-dimethyl
cyclohexane



trans-1,4-dimethyl
cyclohexane

- Both *cis*- & *trans*-1,4-dimethylcyclohexanes are **achiral** and optically inactive

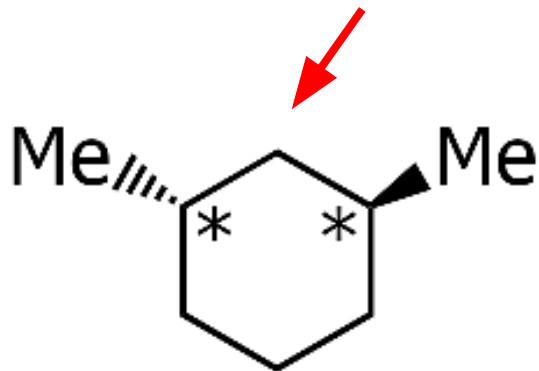
❖ 1,3-Dimethylcyclohexane



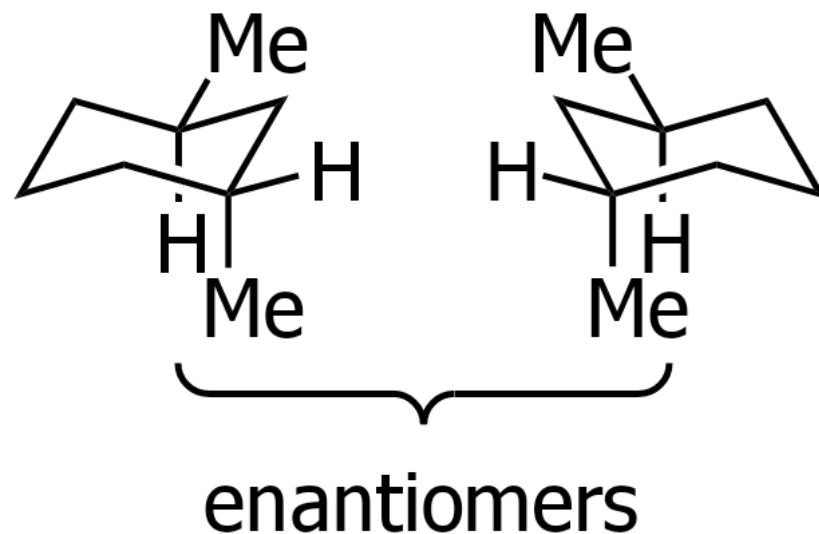
- *cis*-1,3-Dimethylcyclohexane has a plane of symmetry and is a meso compound

❖ 1,3-Dimethylcyclohexane

NO plane of symmetry



trans-1,3-dimethyl
cyclohexane

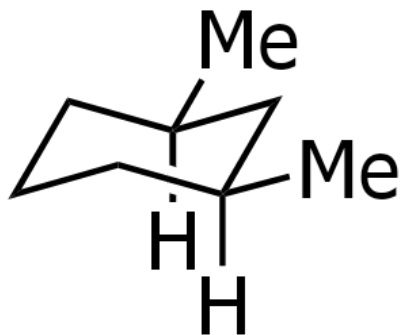


- *trans*-1,3-Dimethylcyclohexane exists as a pair of enantiomers

❖ 1,3-Dimethylcyclohexane

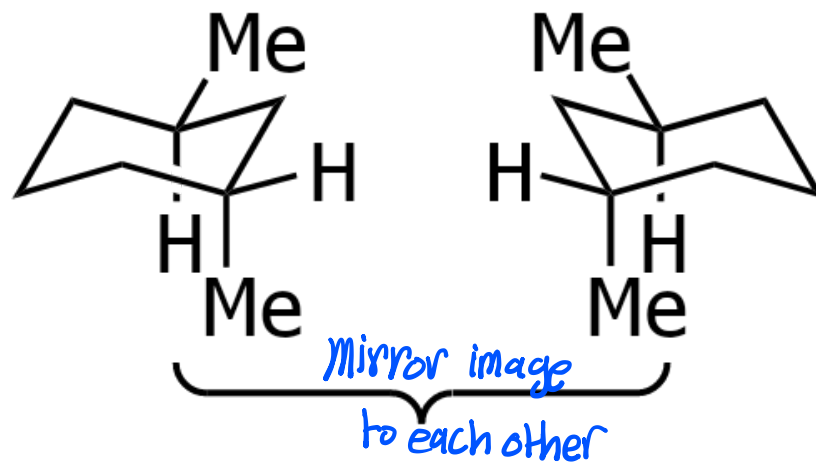
- Has two chirality centers but only **three** stereoisomers

cis-1,3-dimethyl
cyclohexane



(meso)

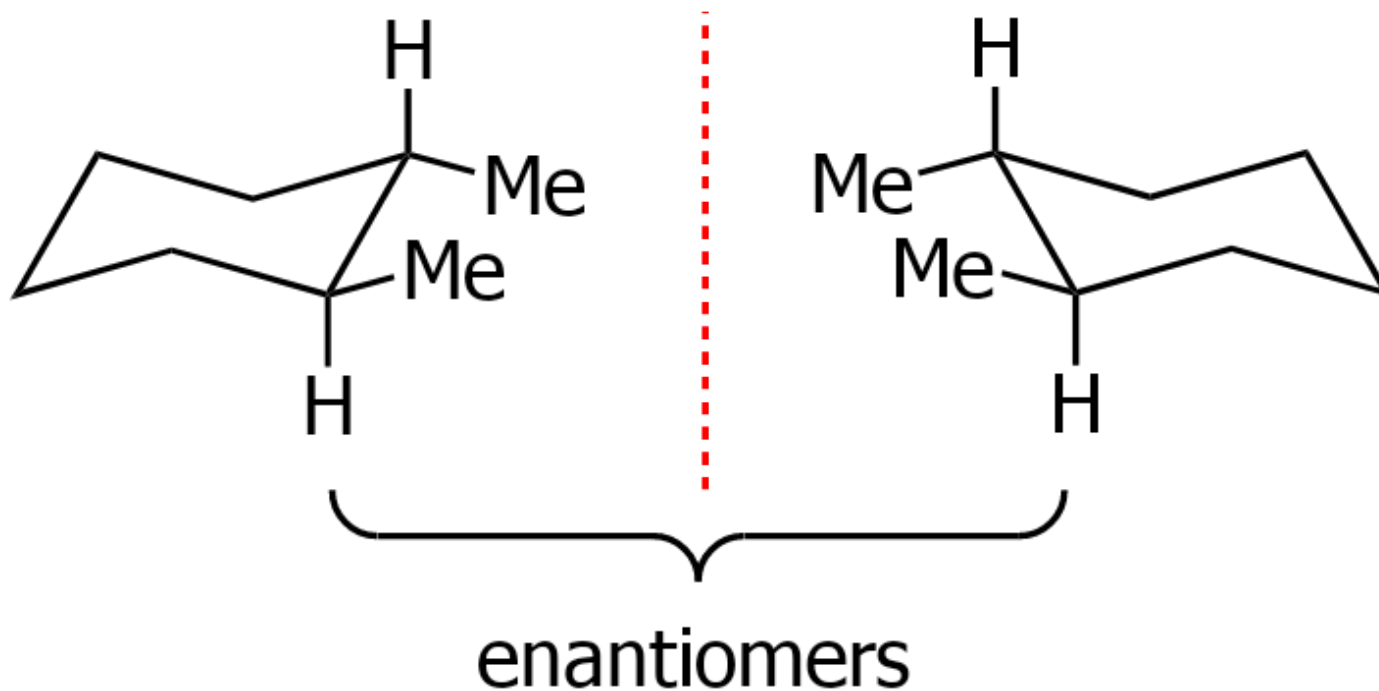
trans-1,3-dimethyl
cyclohexane



enantiomers

❖ 1,2-Dimethylcyclohexane

mirror



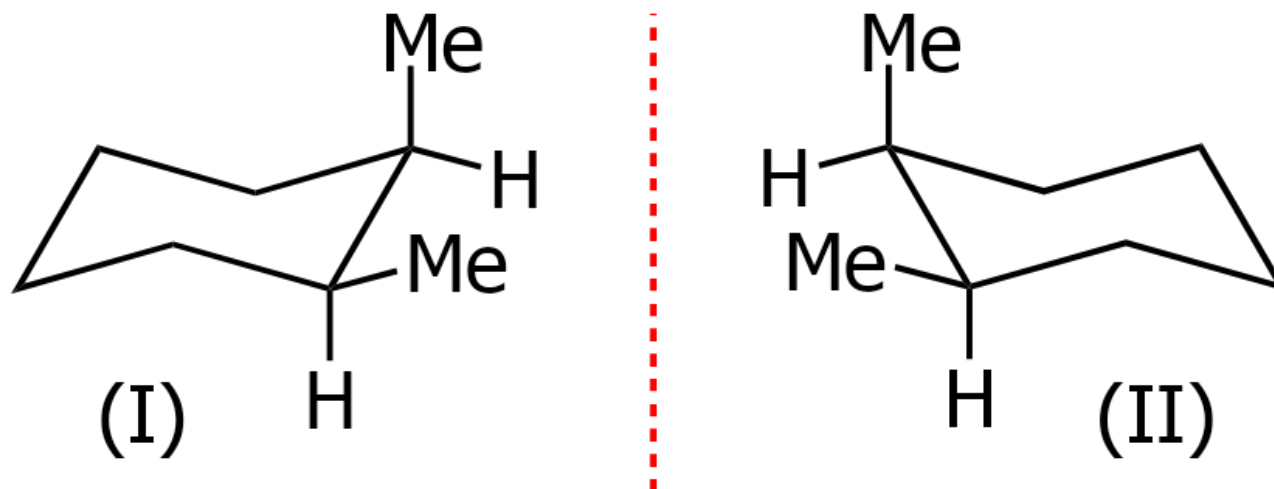
- *trans*-1,2-Dimethylcyclohexane exists as a pair of enantiomers
(optically active)

❖ 1,2-Dimethylcyclohexane

- With *cis*-1,2-dimethylcyclohexane the situation is quite complicated

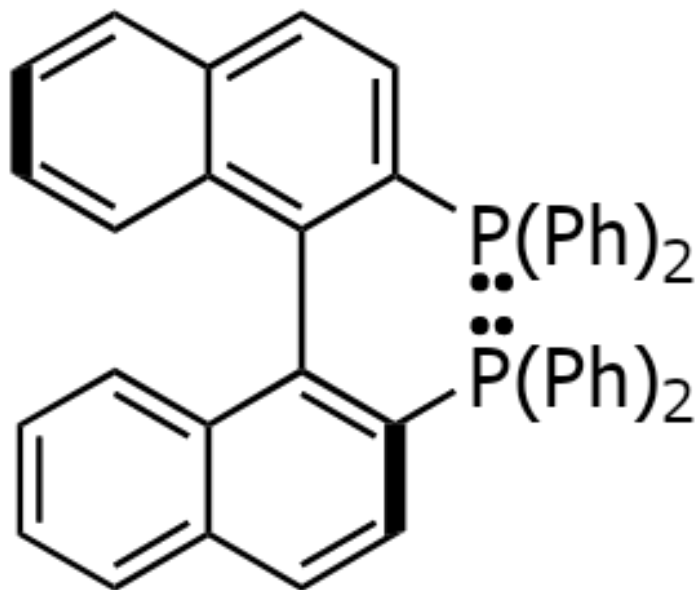
(optically active)

mirror

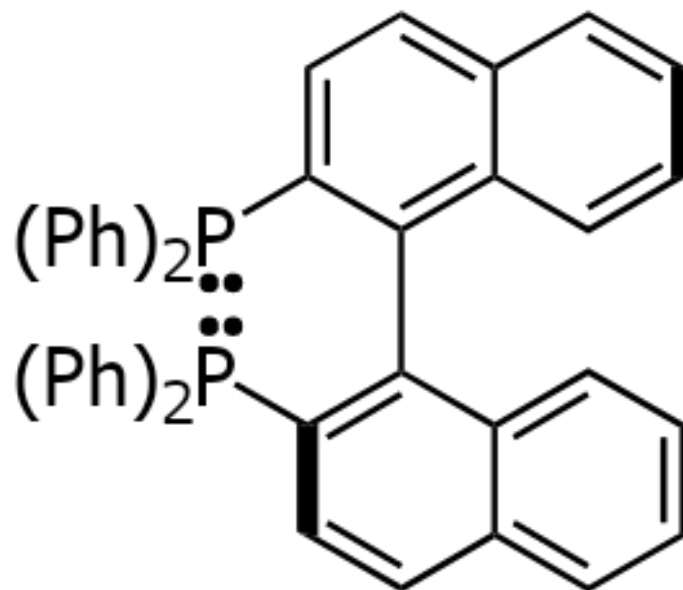


- (I) and (II) are enantiomers to each other

13. Chiral Molecules That Do Not Possess a Chirality Center



(*S*)-BINAP



(*R*)-BINAP

enantiomers

