Resolution of Enantiomers

Separation of a racemic mixture into its two respective enantiomers

Diastereomers

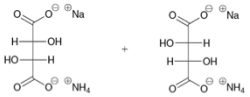
- Diastereomers have different physical properties:
  - ❖BP, MP, density, refractive index, solubility
  - ❖Can be separated through conventional means (*distillation*, *recrystallization*, *chromatography*)

mp = 158°C

mp = 256°C

Resolution of Enantiomers

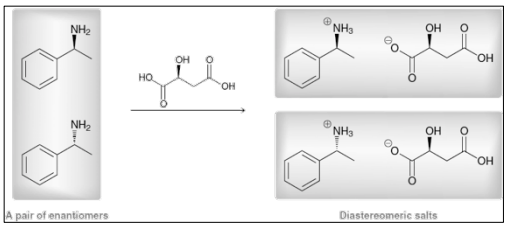
- In 1847, Pasteur performed the first resolution of enantiomers from a racemic mixture of tartaric acid salts.



- The different enantiomers formed different shaped crystals that were separated by hand using tweezers.

Resolution of Enantiomers

- A common method uses a chiral resolving agent.



- An optically pure acid forms diastereomeric salts when reacted with a racemic amine, (+/-) bases.

Resolution of Enantiomers

- *Conversely, an optically pure base reacts with a racemic mixture, (+/-) isomers of acids, to produce diastereomeric salts.*
- *S-(-)-α-phenethylamine* can resolve a racemic mixture of ibuprofen, [Ibu(-)] [Ibu(+)] (*R,S)-2-(4-(2-methylpropyl)phenyl)propanoic acid*
- *S-(-)-α-phenethylamine* [Phe(-)] reacts with a racemic mixture of ibuprofen, [Ibu(-)] [Ibu(+)] (*R/S)* to produce [Phe(-)] [Ibu(-)] (*S,S)* and [Phe(-)] [Ibu(+)] (*S,R),* which can be separated.