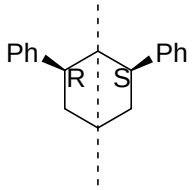
TUTORIAL- MESO COMPOUNDS **CHE318** **05.03.2014**

A meso compound is a molecule with multiple stereocenters that is superposable (not superimposable: (two objects can be superimposed over one another regardless of whether they are the same. If two objects can be superposed, all aspects of the objects coincide) on its mirror image. All meso compounds have an internal plane of symmetry that bisects (cuts in half) the molecule. Each half is a mirror image of the other half. Here is an example of a meso compound and its internal mirror plane:



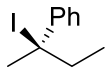
Any molecule can have an internal mirror plane, but meso compounds must also be stereoisomers, thus meso compounds must have a minimum of two stereocenters, with at least one on each side of the internal mirror plane. These stereocenters must also have different absolute configurations. If both of the stereocenters have the same absolute configurations, then each half would no longer be a mirror image of the other half and the compound would no longer be a meso compound, but instead another stereoisomer.

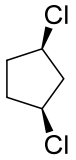
Meso compounds are achiral (chiral molecules, are not superposable on their mirror Images) and thus optically inactive. Thus, meso compounds cannot be assigned with either dextrorotatory (+) or levorotatory (-) designations.
A meso compound is achiral so cannot have an enantiomer. When a molecule is superposable on its mirror image, then that molecule and the mirror image are merely the same molecule.

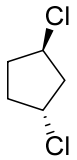
HOW TO IDENTIFY MESO COMPOUNDS

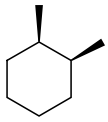
1. Identify how many stereocenters the molecule contains.
A meso compound requires at least two stereocenters. A compound with only one stereocenter cannot be considered a meso compound as it would not have another stereocenter to oppose its optical behavior.
2. See if the molecule has an internal mirror plane.
Any molecule can have stereoisomers, but not all have internal mirror planes.
The mirror plane should bisect the molecule.
3. Ensure that both halves are in fact mirror images of each other.
The meso compound must be symmetric about the internal mirror plane. Each opposing stereocenter must have differing absolute configurations and the attachments on each stereocenter must be the same.

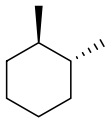
LET´s PRACTICE NOW: Identify in the following series, which molecules are meso compounds

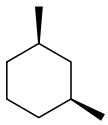

I
Ph

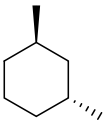

Cl
Cl

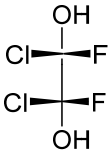

Cl
Cl

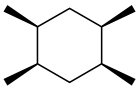


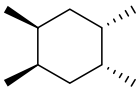


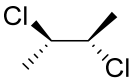


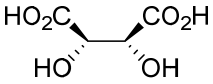


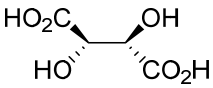

OH
Cl
F
Cl
F
OH






Cl
Cl


HO2C
CO2H
HO
OH


HO2C
OH
HO
CO2H