(22) **Today**

Sections 4.3 – 4.8 Stability of Cycloalkanes and Conformations of Cyclohexanes

Sections 5.1 – 5.5
Chirality and Determining the Configuration of Chiral Centers

Next Class (23)

Canceled

(24) **Second Class from Today**

Canceled

Third Class from Today (25)

Review for Monday 11/4 Test on Chap 3, Chap 4, and Sections 5.1 and 5.2

Office hours on Thursday, October 24 Rescheduled.

Office hours on Friday, October 25 extended to 12:25.

Test on Monday, November 4, on Section 2.12, Chap 3, 4, and

Sections 5.1 and 5.2

4 carbon atoms

2-chlorobutane is chiral

chlorine on C-2

a 3-D representation of 2-chlorobutane

same

not identical molecules

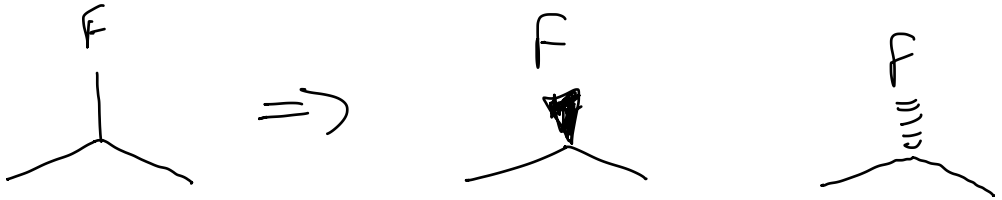
tetrahedral C can have at most 2 in-plane bonds

2-fluoropropane is achiral (not chiral)

3 carbon atoms

fluorine on C-2

3-D



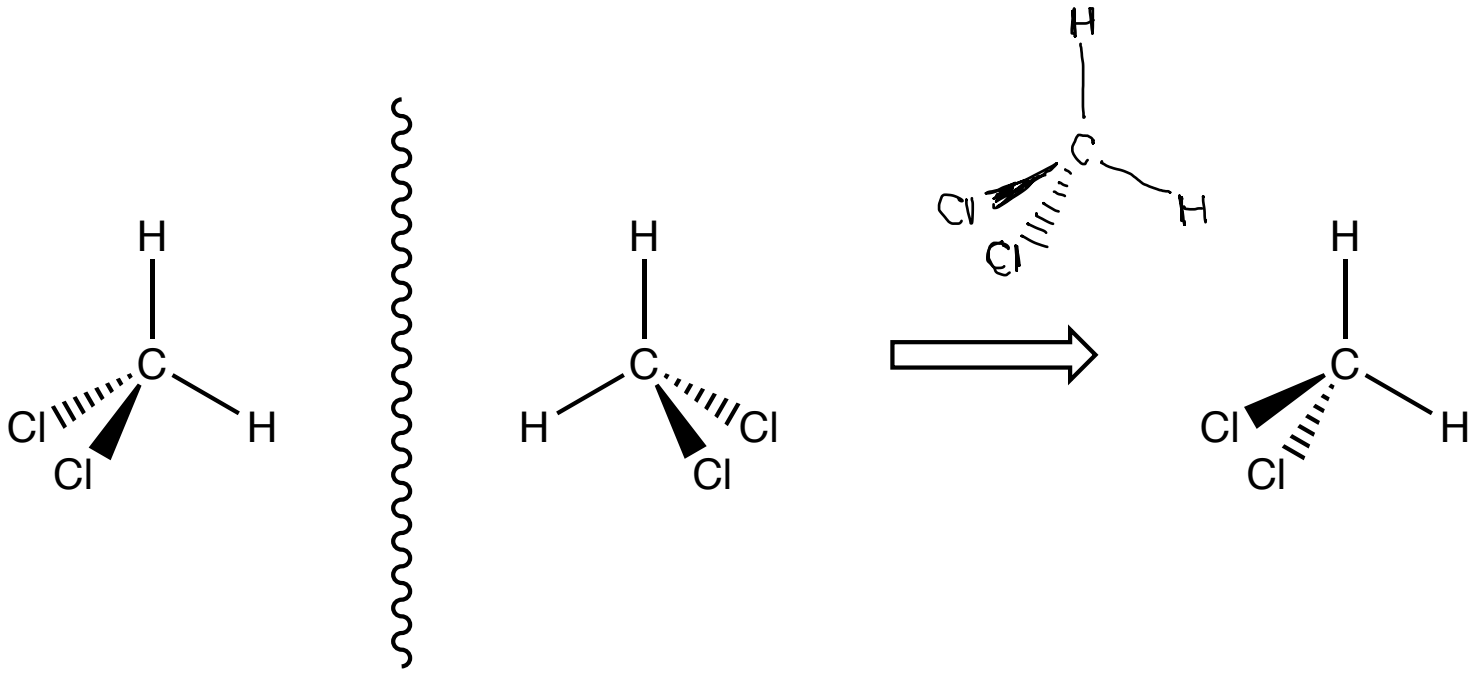
Identical?

yes

What makes your feet chiral?

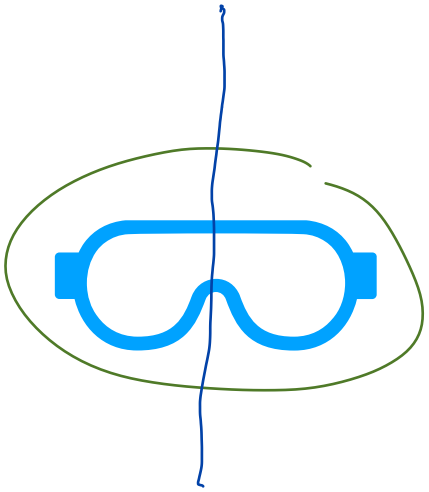
A chiral object has a non-superposable mirror image

Superposable means that when you superimpose the two objects everything lines up.



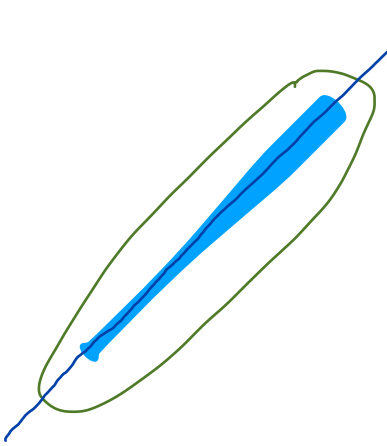
Think about the object, not the drawing

chiral



achiral

chiral

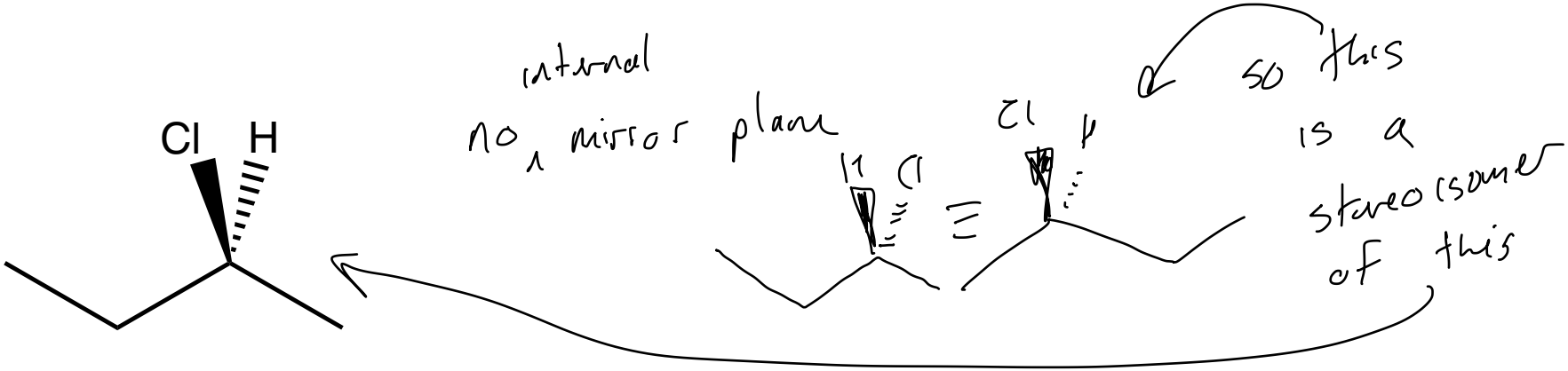


achiral

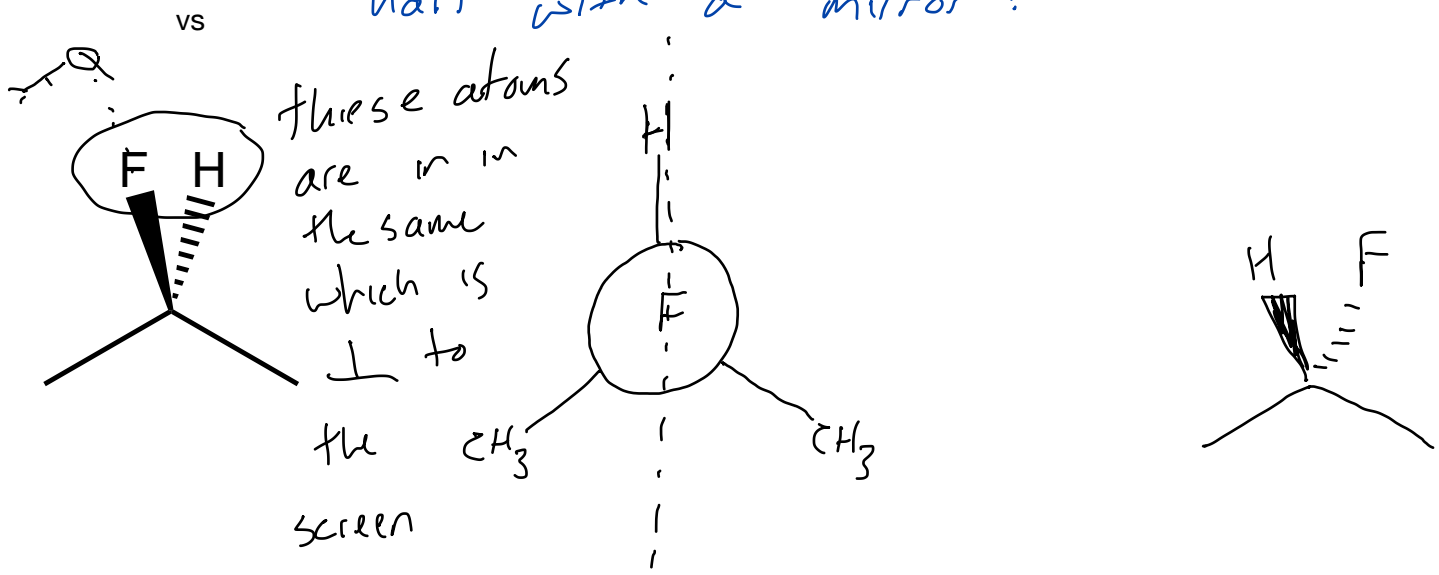
chiral

achiral object contain a mirror plane can be cut in half an replace the missing half with a mirror

A chiral object lacks an internal mirror plane (a.k.a. plane of symmetry)*



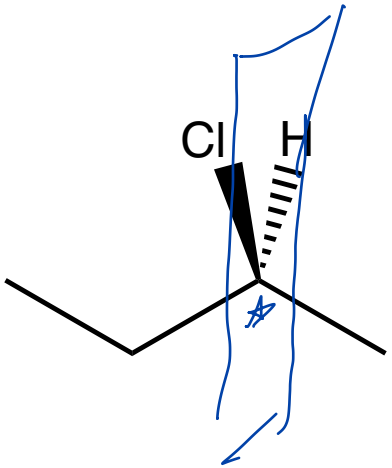
Can we cut the object in half an regenerate the missing half with a mirror?



*Technically it's an improper axis of rotation, but a mirror plane is an S_1 and a center of inversion is an S_2

A chiral object lacks an internal mirror plane (a.k.a. plane of symmetry)*

chiral
H
Cl
CH_3
CH_2CH_3

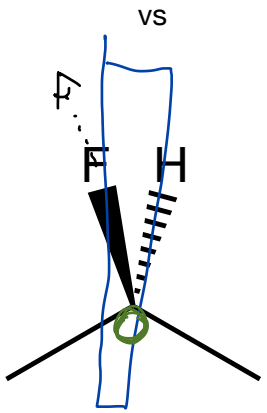


slicing the H + Cl in half doesn't represent a mirror plane because the CH_2CH_3 on left is not the same as the CH_3 on the right

Handedness.... chiral objects have nonsuperposable mirror images because they lack an internal mirror plane

H
F
CH_3
CH_3
achiral

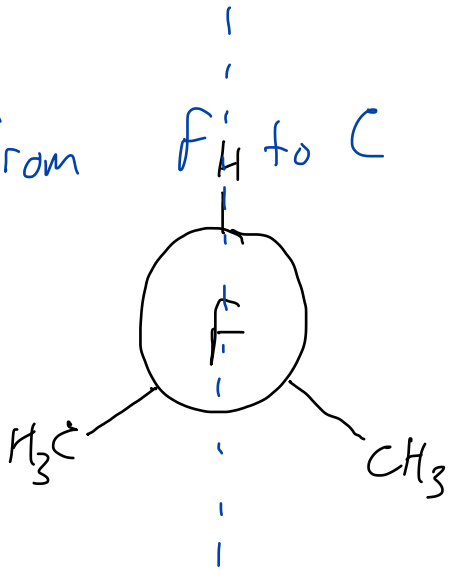
vs



F & H are in the same plane which is ⊥ to the screen.

If you can't "see" this convert to Newman projection

from H to C



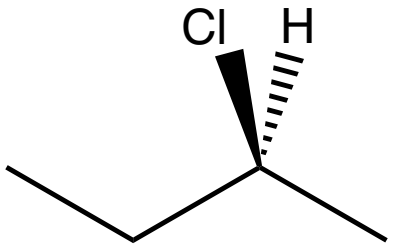
*Technically it's an improper axis of rotation, but a mirror plane is an S_1 and a center of inversion is an S_2

Finding

Centers of Chirality

Section 5.1 – 5.5

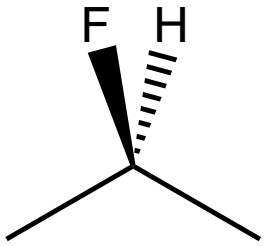
A chiral object lacks an internal mirror plane (a.k.a. plane of symmetry)*



Cl
H
CH_3
CH_2CH_3

4 different groups connected to a tetrahedral atom... no internal mirror plane at that atom a there for the atom is a chirality center

vs



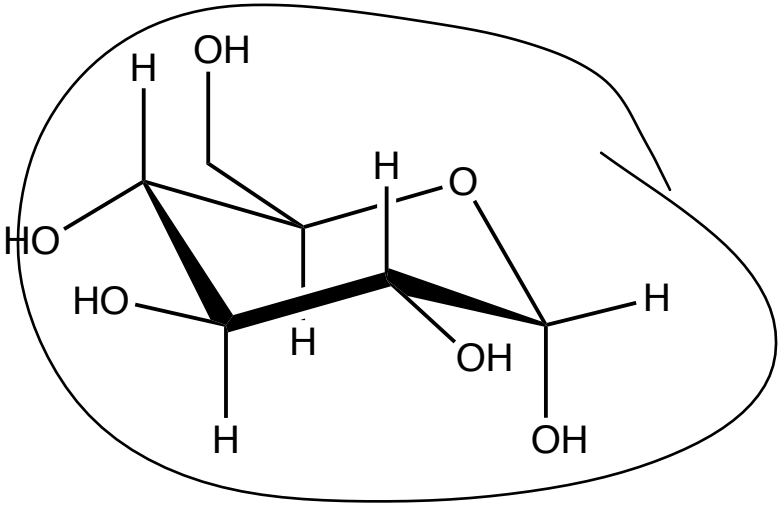
F
H
CH_3
CH_3

not 4 different groups 2 Me groups could be reflected by an internal mirror

*Technically it's an improper axis of rotation, but a mirror plane is an S_1 and a center of inversion is an S_2

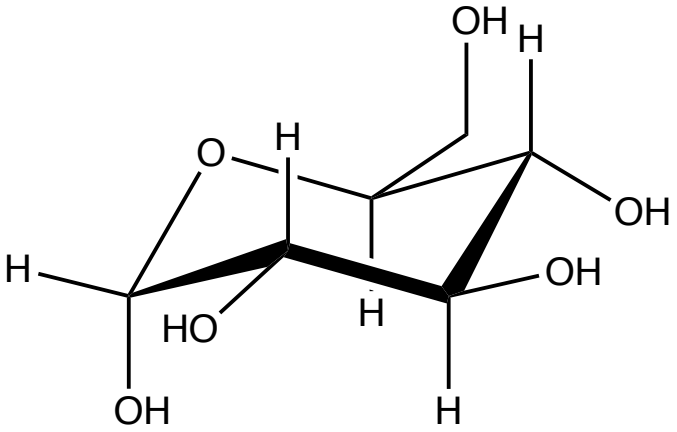
Why Do I care?

Section 5.1 – 5.5



D-glucose
11¢ per gram

naturally occuring glucose



L-glucose
$130 per gram

not naturally occuring

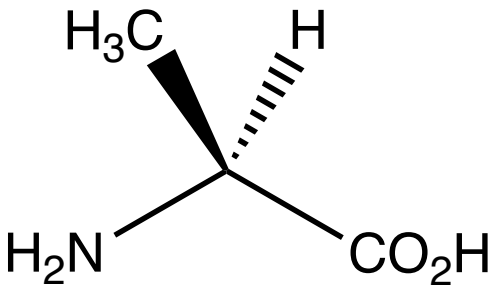
Fisher Scientific, 2024

Why Do I care?

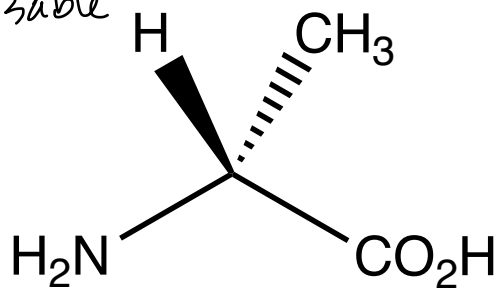
Section 5.1 – 5.5

mirror images

not superposable



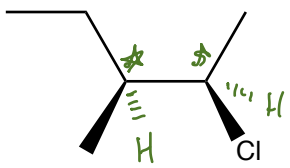
L-alanine



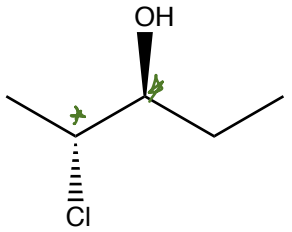
D-alanine

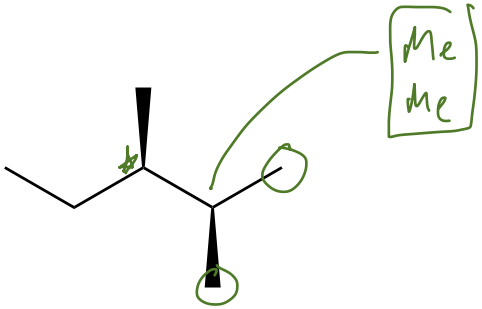
Practice Recognizing centers of chirality

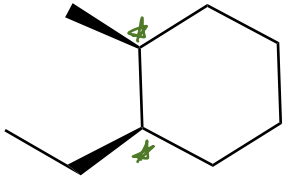
Et
Me
H
$CHCl_2CH_3$

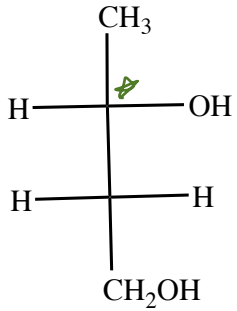


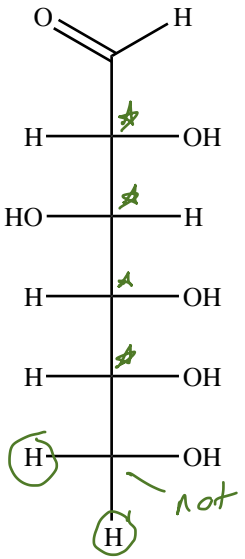
H
Me
Cl
other stuff





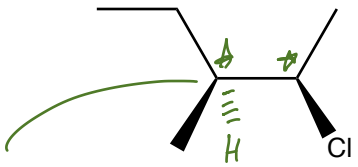




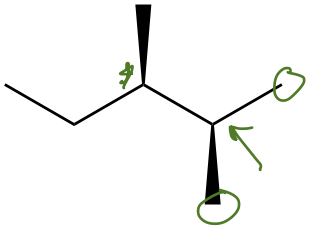


Practice Recognizing centers of chirality

Section 5.1 – 5.5



H
CH_3
CH_2CH_3
$CHClCH_3$



CH_3
CH_3
H
other stuff