Hello y’all!

Looking for a low-pressure way to get moving and meet new people?

Hooked on Running is here to make that happen! No pressure, no experience, and no one gets left behind.

Scan to learn more and join us!

Hooked ON RUNNING

THE RUNNING ORG FOR longhorns

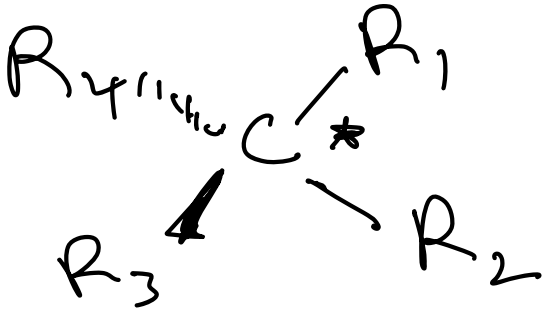
Stereoisomers ⟶ molecules with the same connectivity of atoms, but different orientations of groups in three-dimensional space

enantiomers

Stereoisomers that are mirror images of each other but not identical

diastereomers

stereoisomers that are NOT enantiomers



An sp^3 carbon atom that is tetrahedral with four different groups → it is chiral

⇒ Called a chiral center

Not superimposable on its mirror images

Really hard part → naming the enantiomers

R,S convention →

Cahn, Ingold, Prelog (CIP) rules

For a carbon with four different groups:

1) Assign atomic number priorities for each group, ranking them 1→4

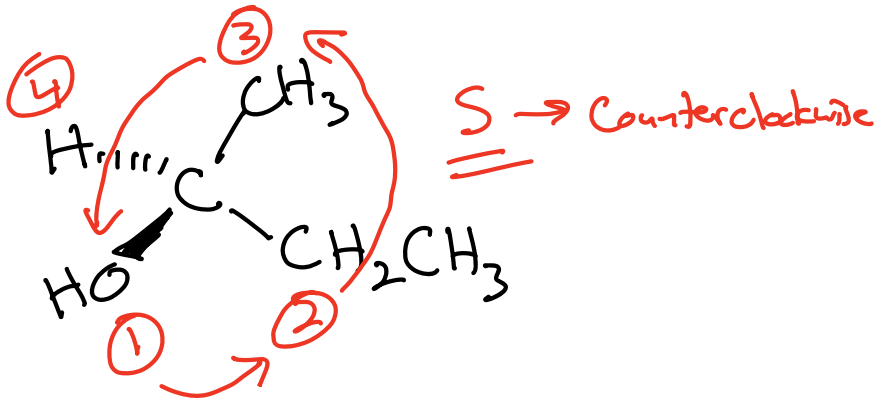
First point of difference wins

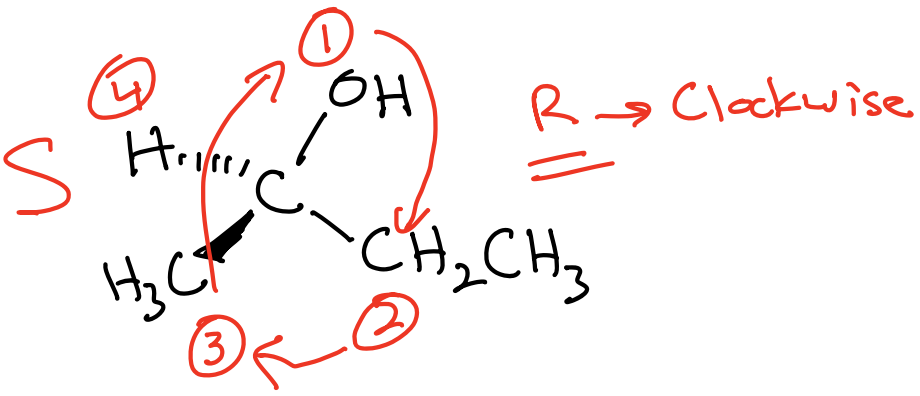
2) Position the molecule so you are looking down the C→4 bond

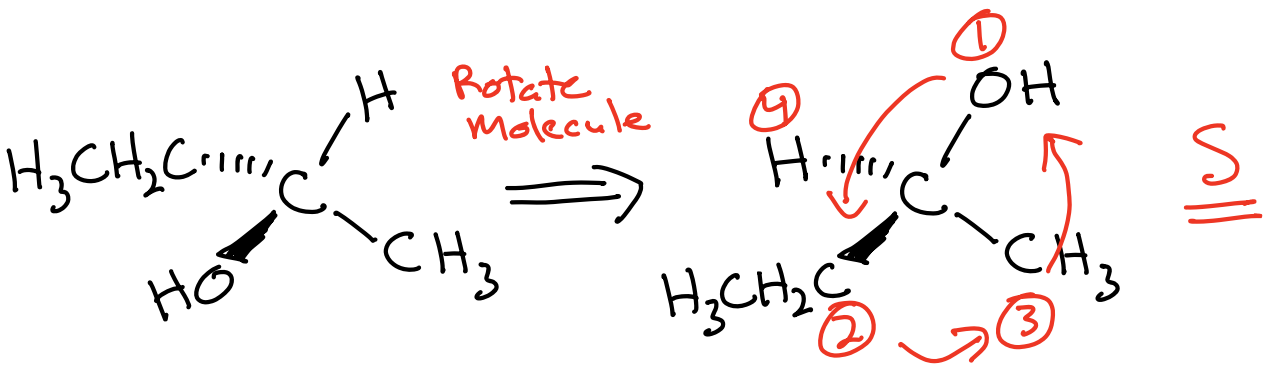
Lowest priority group, often an H atom

3) Count the remaining three groups in order → If 1→2→3 is clockwise → R

→ If 1→2→3 is counterclockwise → S







Diastereomer → stereoisomers that are not enantiomers

→ Applies to molecules with two or more chiral centers

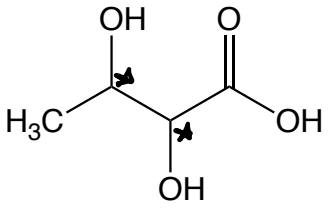
Molecules with 2 Chiral Centers

1) If a molecule contains n chiral centers there are 2^n possible stereoisomers → fewer if symmetry is present (see "meso")

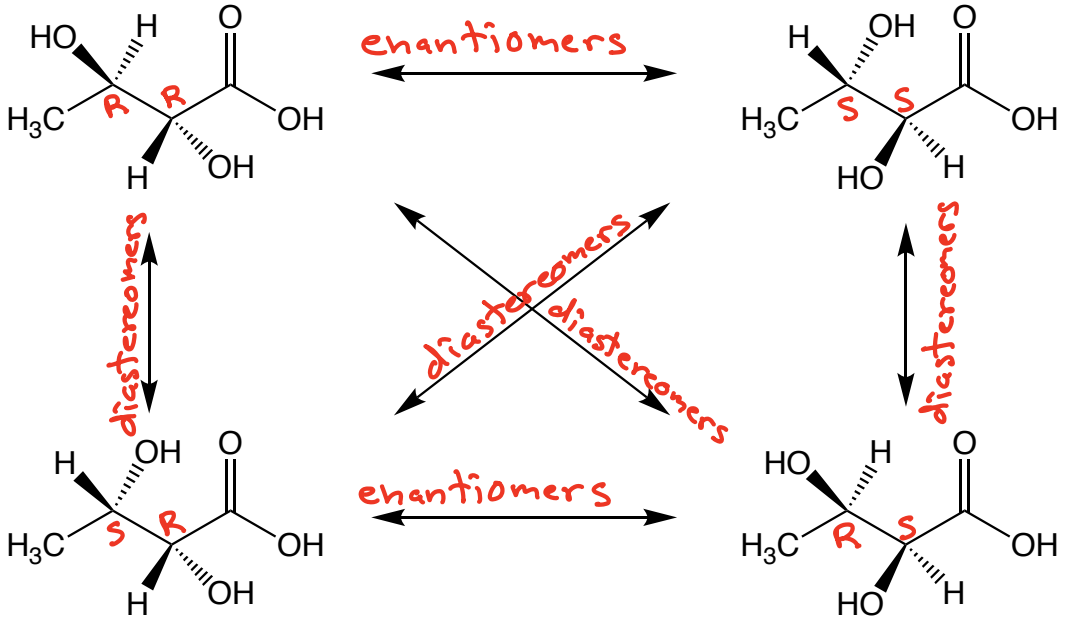
2) R,R and S,S are enantiomers
R,S and S,R are enantiomers
All other pairs are diastereomers (Ex. R,R and R,S)

3) To identify stereoisomer relationships → assign R and S to each chiral center and see Rule 2) above

$2^2 = 4$ stereoisomers

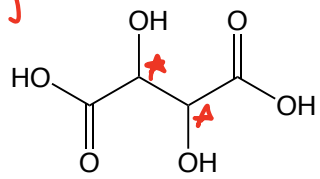


2 chiral centers → no overall symmetry

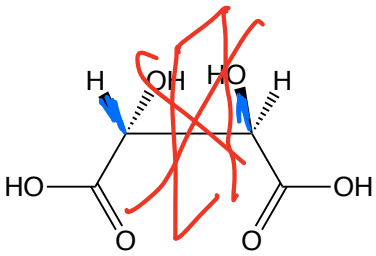


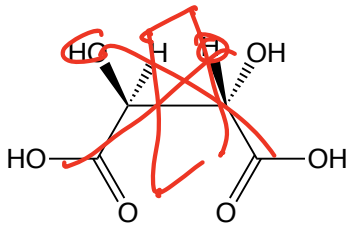
4) A meso compound has chiral centers but is not chiral due to symmetry (plane of symmetry)

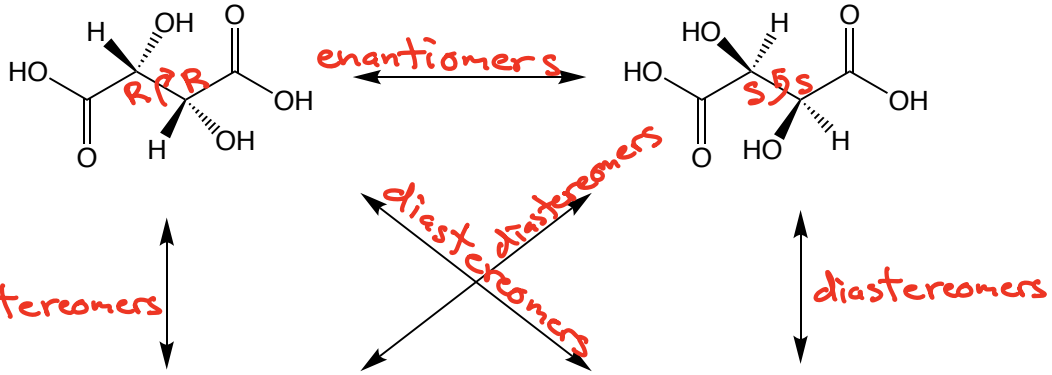
You need to draw the molecule in the most symmetric possible conformation to look for symmetry → eclipsed is OK



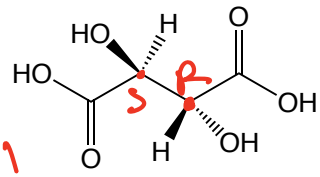
2 chiral centers → symmetry → both chiral centers have the same four groups



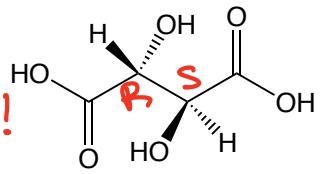


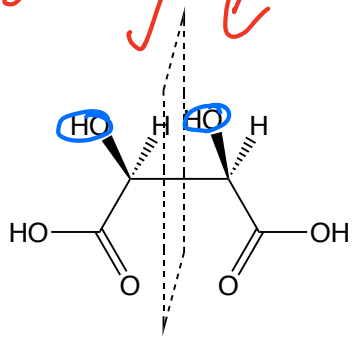


3 stereoisomers for this molecule!!

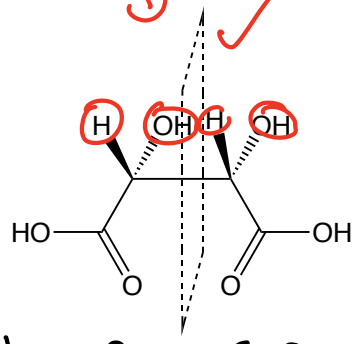


SAME MOLECULE!





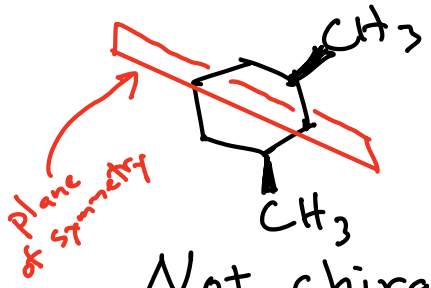
Not chiral



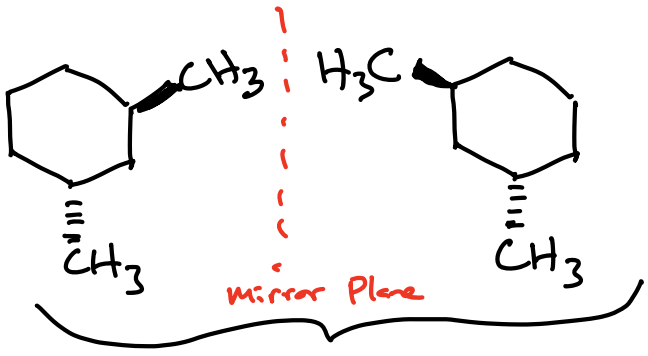
5) Meso compounds will always be the R,S = S,R stereoisomer if both chiral centers have the same four groups

Always use the most symmetric conformation when looking for planes of symmetry → don't worry about energy!

Pro tip → Use flat cyclohexanes to look for planes of symmetry



Not chiral (meso)



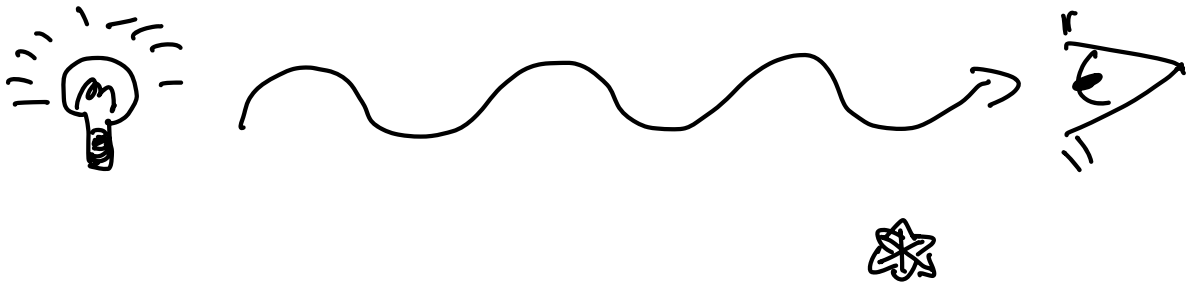
enantiomers → no plane of symmetry

diastereomers

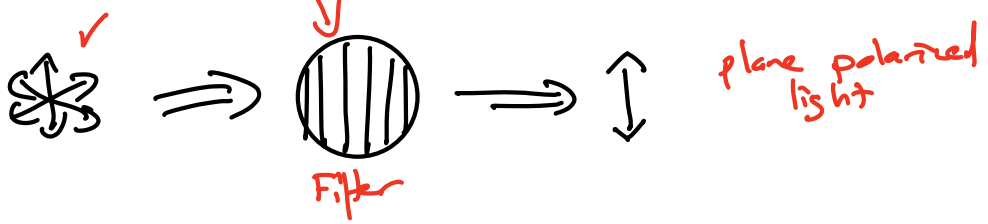
Enantiomers → identical physical properties
m.p., b.p., density

Diastereomers → DIFFERENT physical properties
m.p., b.p., density,

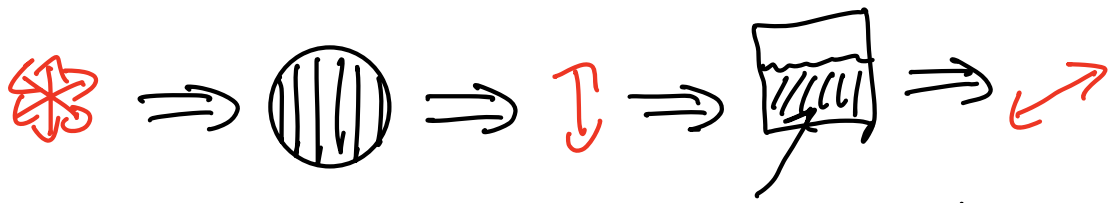
→ Can be distinguished if they are measured in a chiral way!



Polarizing filter → makes it so only light in a single plane gets through



A sample of a chiral molecule will rotate the plane of plane polarized light an amount and direction that is characteristic of that molecule → Its enantiomer will rotate the plane of plane polarized light the same amount but in the opposite direction!

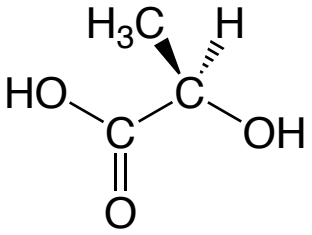


solution containing one enantiomer of a chiral molecule

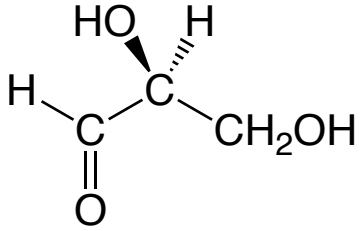
Clockwise rotation → "+"

Counterclockwise rotation → "−"

There is no direct connection between R and S and "+" and "−".



R-(-)-lactic acid



S-(-)-glyceraldehyde

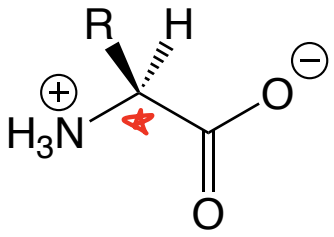
New definition → Racemic Mixture

1:1 mixture of enantiomers

Does not rotate the plane of plane polarized light ⇒ the directions cancel

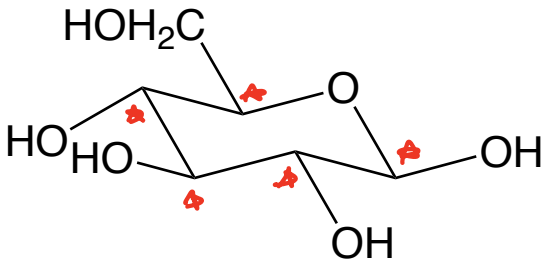
A meso compound → does not rotate the plane of plane polarized light

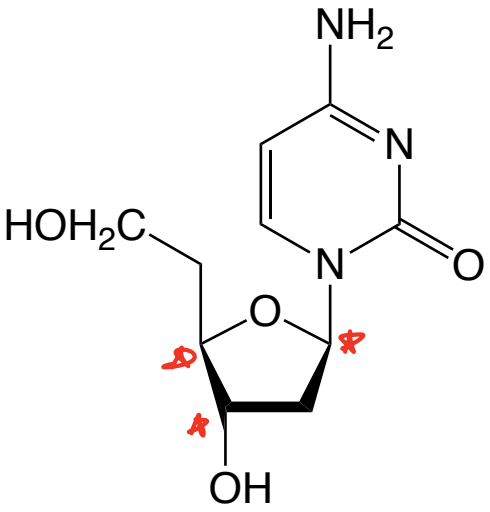
Not chiral!



R = 20 different things

Amino Acids

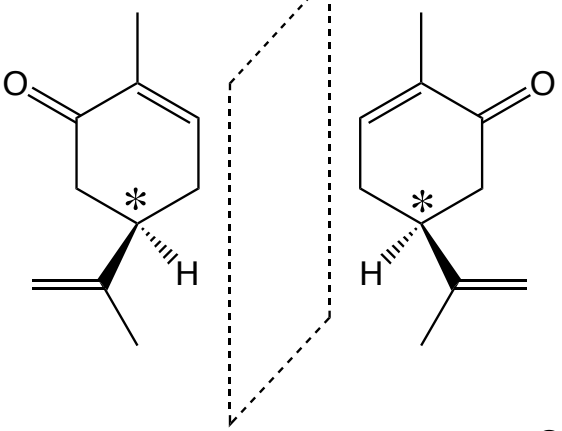




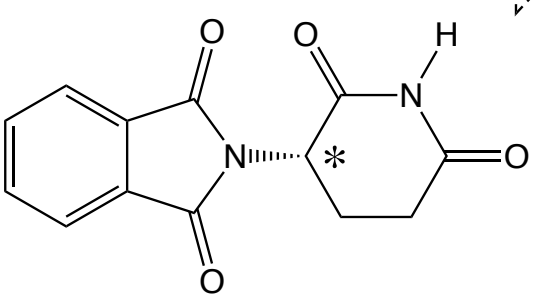
These are our molecular building blocks → they are present as single enantiomers in living systems including US!

WE ARE CHIRAL!!

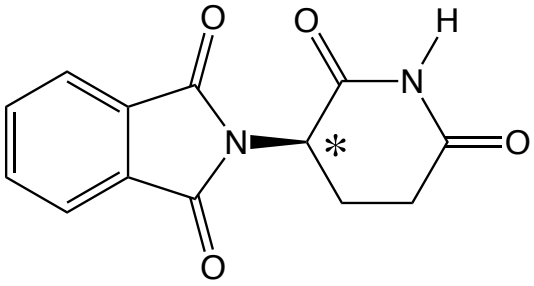
R-Carvone
Spearmint



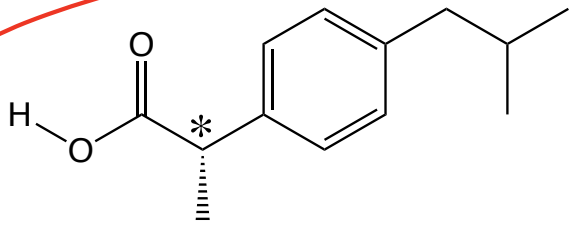
S-Carvone
Major component
of caraway seeds



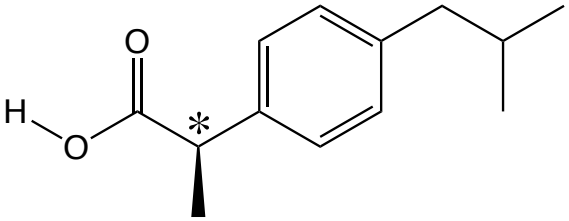
S-Thalidomide (Relieves morning sickness)



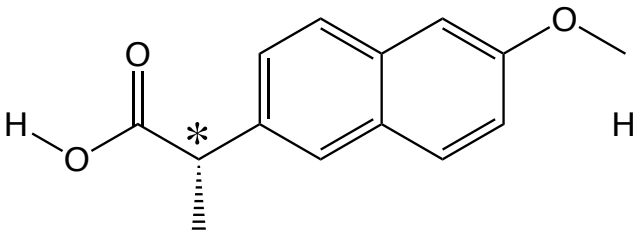
R-Thalidomide (Causes birth defects)



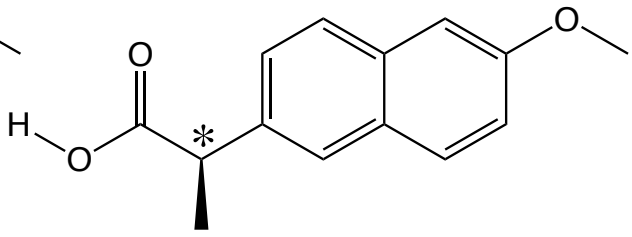
S-Ibuprofen (Advil, Motrin)



R-Ibuprofen (Inactive and relatively harmless)



S-Naproxen (Aleve)



R-Naproxen (liver toxin)

<u>Organic Chemistry</u> is the study of carbon-containing molecules.

This class has two points.

The first point of the class is to understand the organic chemistry of living systems. We will teach you how to think about and understand the most amazing things on the planet!!

Water is essential for life, you will learn why water has such special properties. 8/25/26

You will learn the secret structural reason proteins, the most important molecular machines in our bodies, can support the chemistry of life. 9/9/26

You will learn why when you take Advil for pain, exactly half of what you take works, and the other half does nothing. 9/21/26

You will learn how toothpaste works.

You will learn how a single chlorofluorocarbon refrigerant molecule released into the atmosphere can destroy many, many ozone molecules, leading to an enlargement of the ozone hole.

You will learn how medicines like Benadryl, Seldane, and Lipitor work.

You will learn how Naloxone is an antidote for an opioid overdose.

You will learn why Magic Johnson is still alive, decades after contracting HIV.

You will learn how MRI scans work.

The second point of organic chemistry is the synthesis of complex molecules from simpler ones by making and breaking specific bonds.

You will learn how to understand movies of reaction mechanisms like alkene hydration.

You will learn reactions that once begun, will continue reacting such that each product molecule created starts a new reaction until all the starting material is used up.

You will learn reactions that can make antifreeze from vodka.

You will learn a reaction that can make nail polish remover from rubbing alcohol.

You will learn how to look at a molecule and accurately predict which atoms will react to make new bonds, and which bonds will break during reactions.

You will learn how to analyze a complex molecule's structure so that you can predict ways to make it via multiple reactions starting with less complex starting molecules.