

Office Hours: M 1:30pm - 3:00pm
(in Park 169) W 11:00am - 12:00pm
or by appointment (email me)
or just email me with questions!

TA Hours w/ Sodtugs: T&Th 7:00pm - 8:00pm
(in Park 273)

Q-center: <https://www.brynmawr.edu/inside/offices-services/q-center/q-center-schedule>

Naming Alkanes

Isomerism

9/11/2026

Exam 1 next Friday during lecture

Quiz 1 in Recitation today

Chemistry ice cream social

~~This Friday~~ 4pm in Park atrium courtyard

today

IUPAC systematic naming

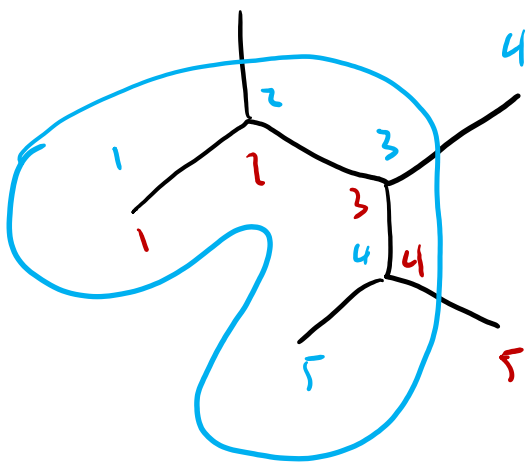
1. Identify the longest carbon chain (the "parent chain") in the molecule.

a. The **prefix** denotes the **number of carbons** in the parent chain.

b. The **suffix** for naming an **alkane** is "-ane". Other functional groups will get their own suffixes.



# of Carbon atoms in chain	prefix	Name of alkane	Drawing
1	meth -	methane	CH ₄
2	eth -	ethane	—
3	prop -	propane	
4	but -	butane	
5	pent -		
6	hex -		
7	hept -		
8	oct -		
9	non -		
10	dec -		
11	undec -		
12	dodec -		



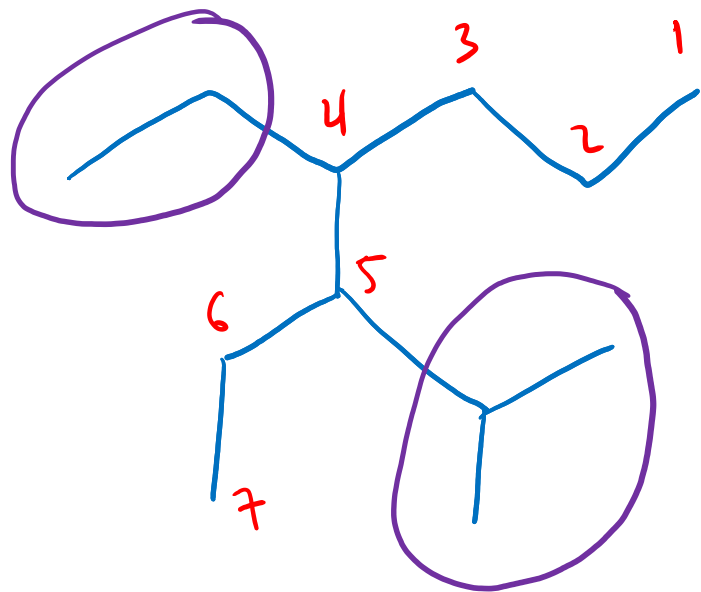
pentane

longest chain may "snake around" - be careful!

Not always straight / left to right.

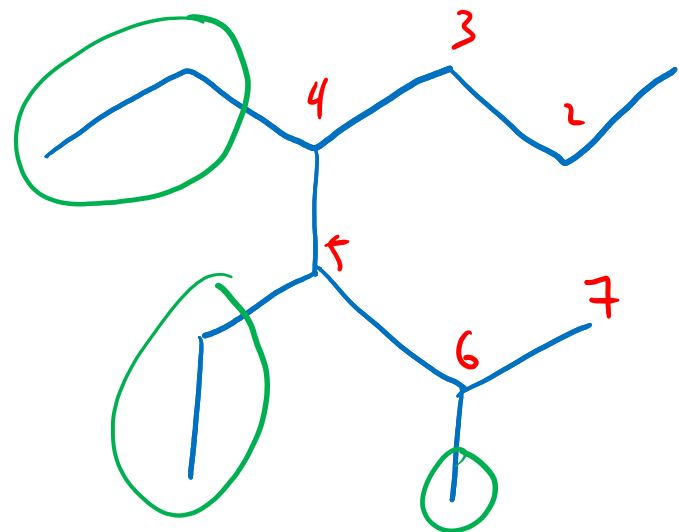
What if there are two possible “parent chains” that have the same length?

same molecule
↔



2 substituents

VS.

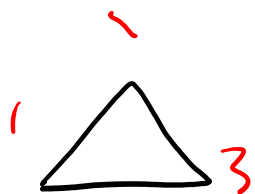


3 substituents

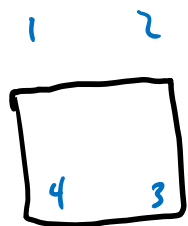
Choose the chain with the most substituents (groups that branch off the chain)

If the longest chain is a ring...

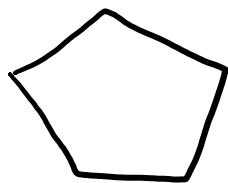
add "cyclo" in front of parent chain name



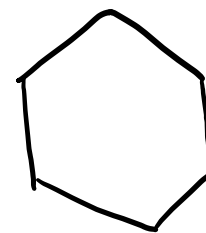
cyclo propane



cyclo butane

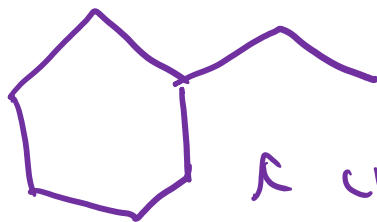


cyclopentane



cyclo hexane

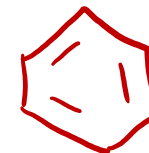
parent chain: longest chain OR ring. don't combine.



cyclohexane

different from

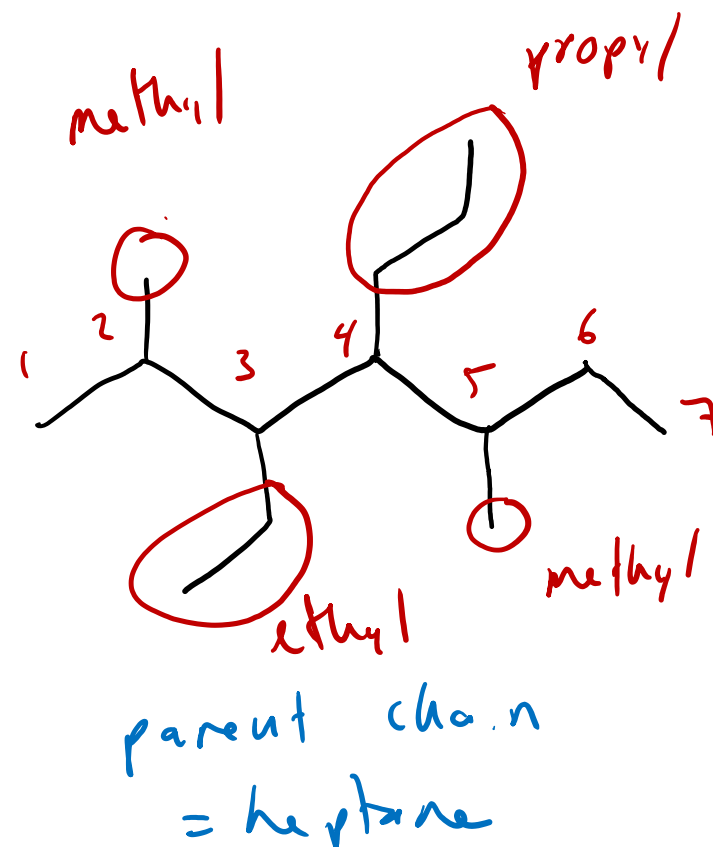
benzene.



2. Name the substituents attached to the parent chain.

# of Carbon atoms in substituent	Name of substituent	Drawing
1	methyl	
2	ethyl	
3	propyl	
4	butyl	etc.
5		
6		
7	etc.	
8		
9		
10		

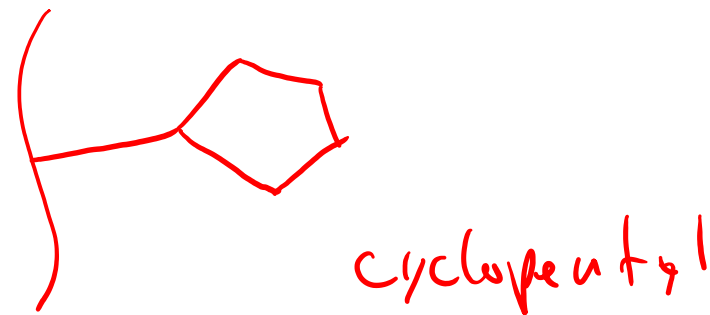
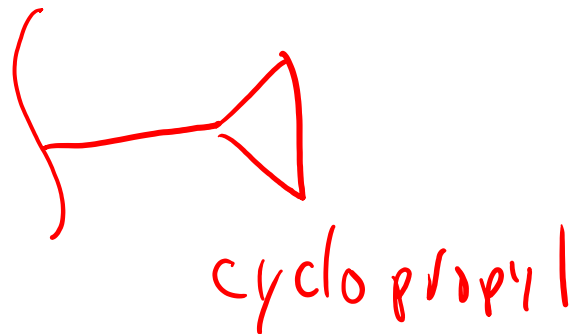
} ≡ parent chain



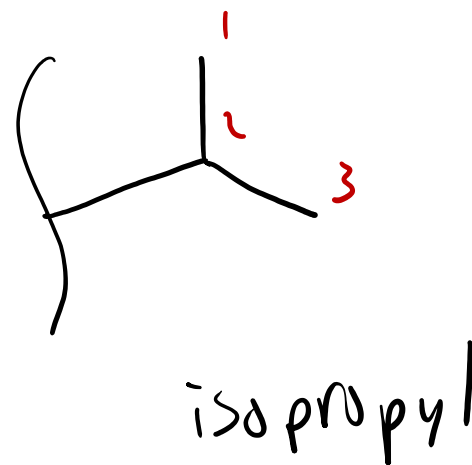
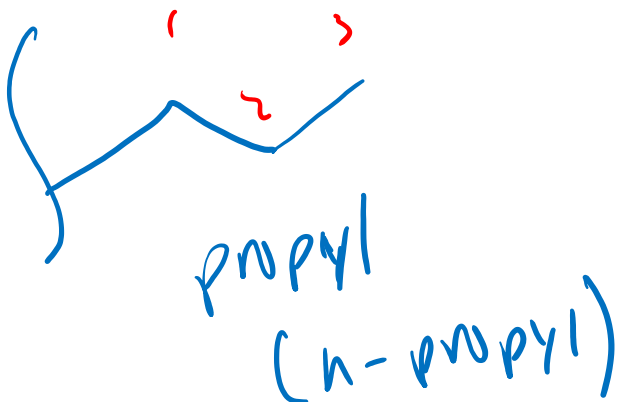
Other alkyl substituents

derived from alkanes
(no π -bonds)

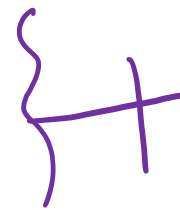
Cycloalkanes can be substituents:



The “propyl” group can have two different forms:



Other alkyl substituents

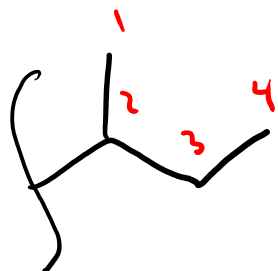


The "butyl" group has four different forms:



butyl

(or
n-butyl)



sec-butyl

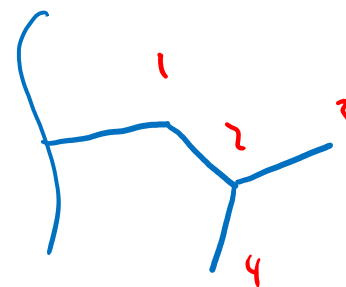
(attached

@ 2nd.

carbon

of butyl

substituent.)



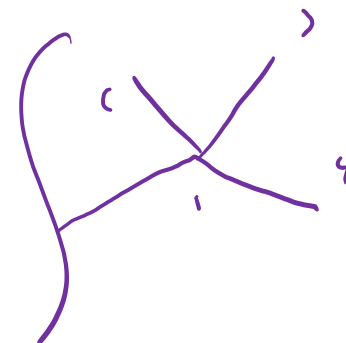
isobutyl

(looks like

isopropyl)

w/ 1 more

C



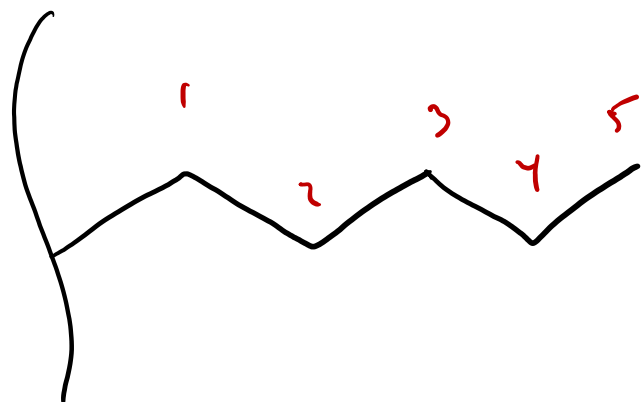
tert-butyl

(looks like a

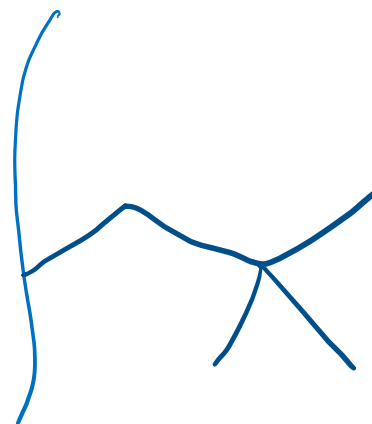
"+")

Other alkyl substituents

Pentyl has many different forms, but only two we will discuss:

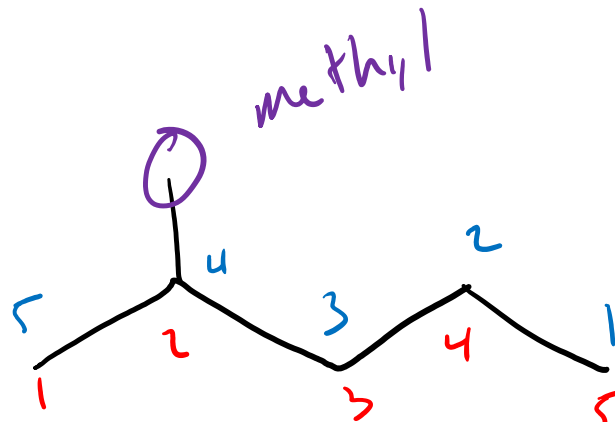


n-pentyl



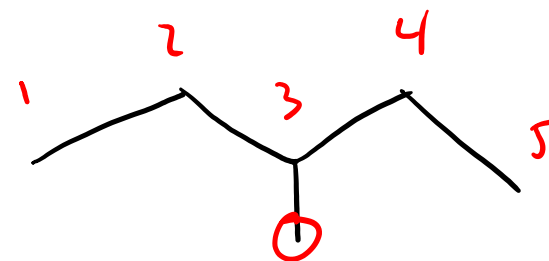
neopentyl

3. **Number the parent chain and assign a "locant" to each substituent**



~~4-methyl pentane~~

2-methyl pentane

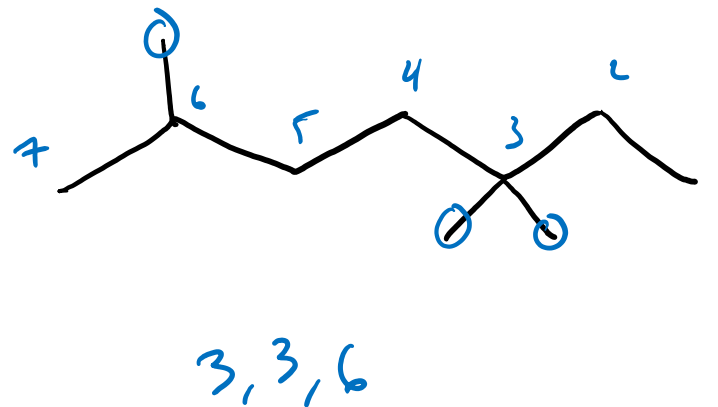
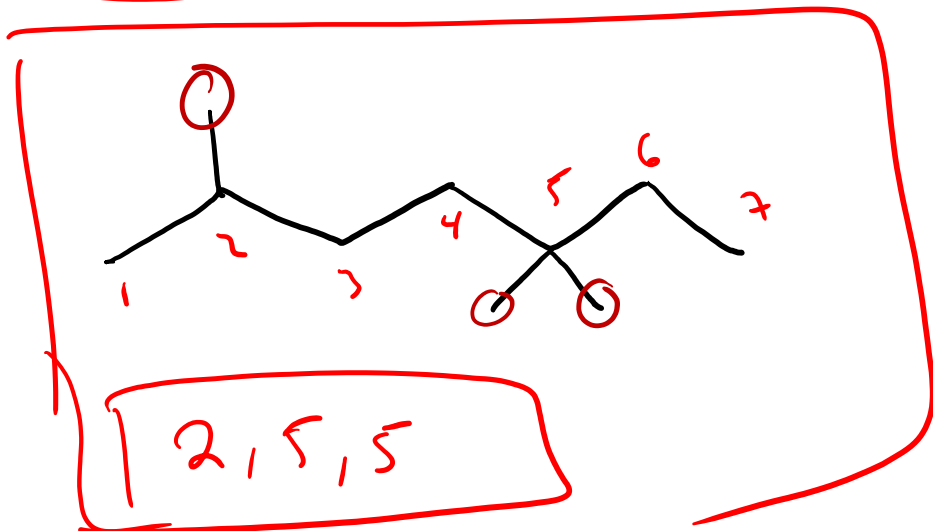


3-methyl pentane

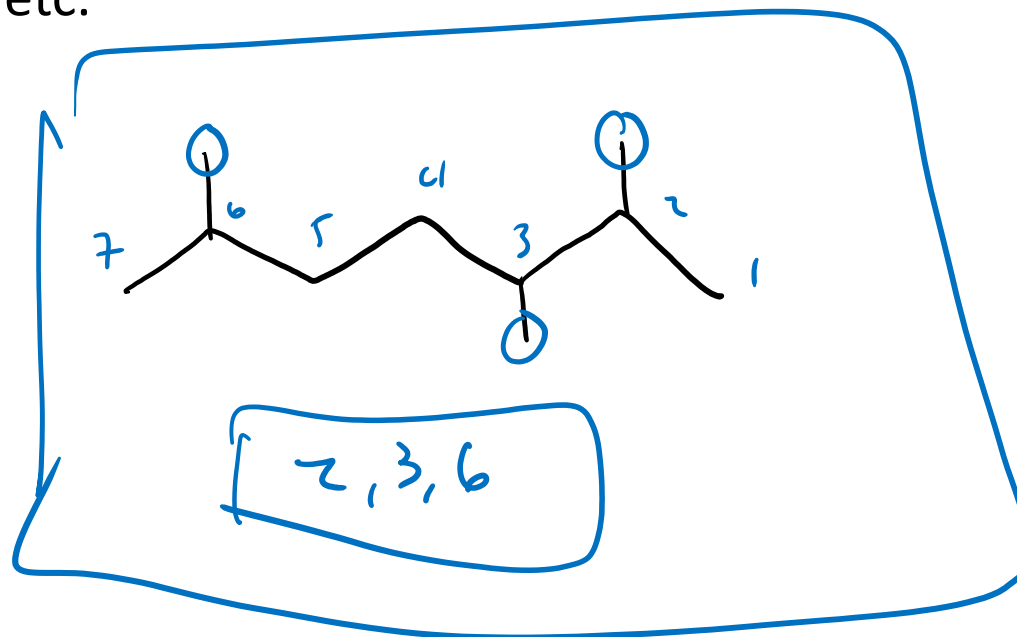
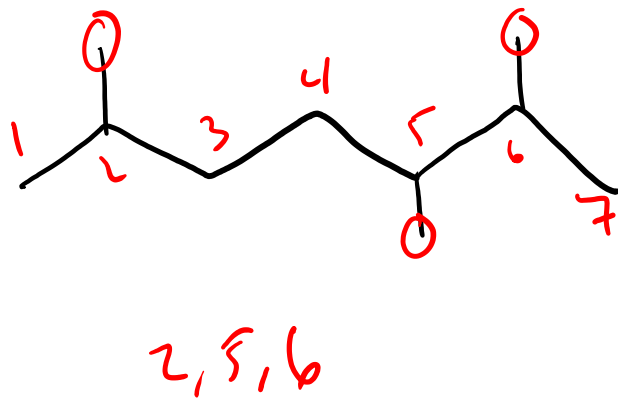
→ not always left to right!

Parent chain should be numbered so that substituent gets the smallest locant # possible.

When there are multiple substituents, number the parent chain so that the first substituent has the lowest locant # possible.

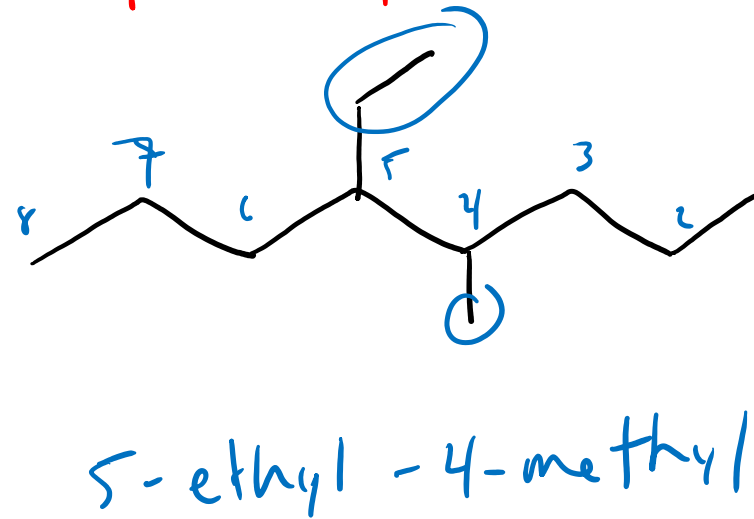
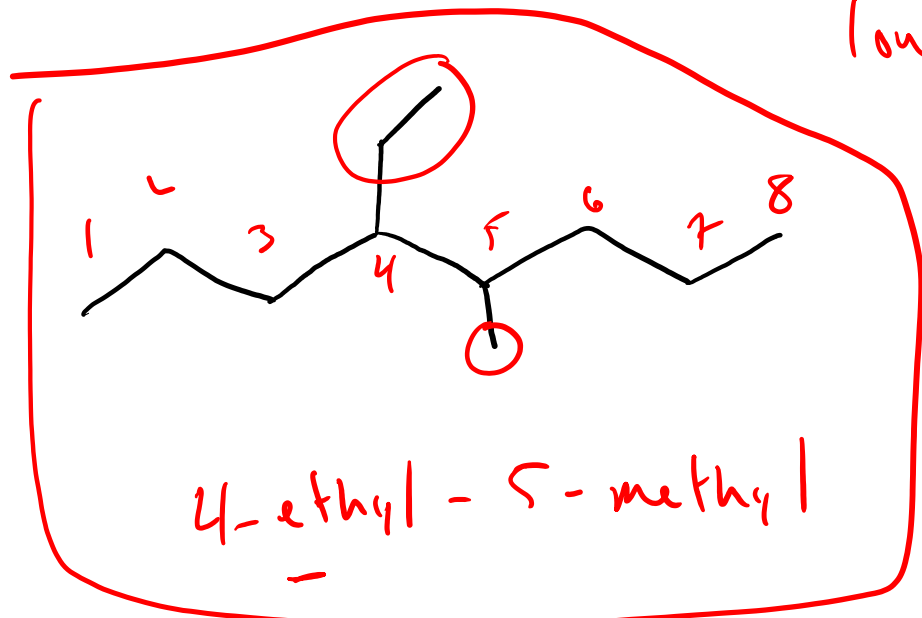


If there's a tie, go to the second substituent, etc.

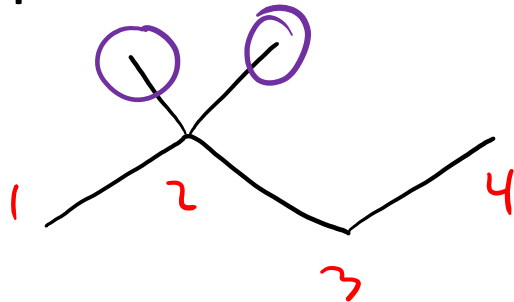


If there's still a tie after checking all substituents, go alphabetically.

lower # 1st alphabetically.



Multiples of the same substituent are denoted with di, tri, tetra, etc.



These prefixes **do not** count alphabetically (i.e. dimethyl vs ethyl)

4. Order substituents alphabetically in front of the parent chain name

not by locant # order!

These prefixes count alphabetically

iso

neo

cyclo

These do not count

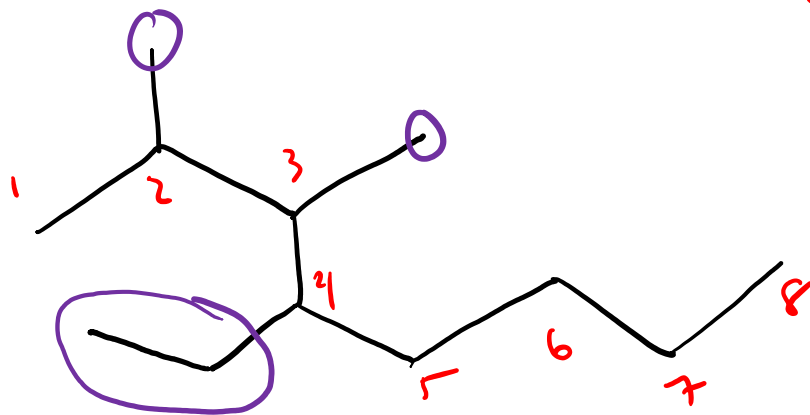
di

tri

tetra

sec-

tert-

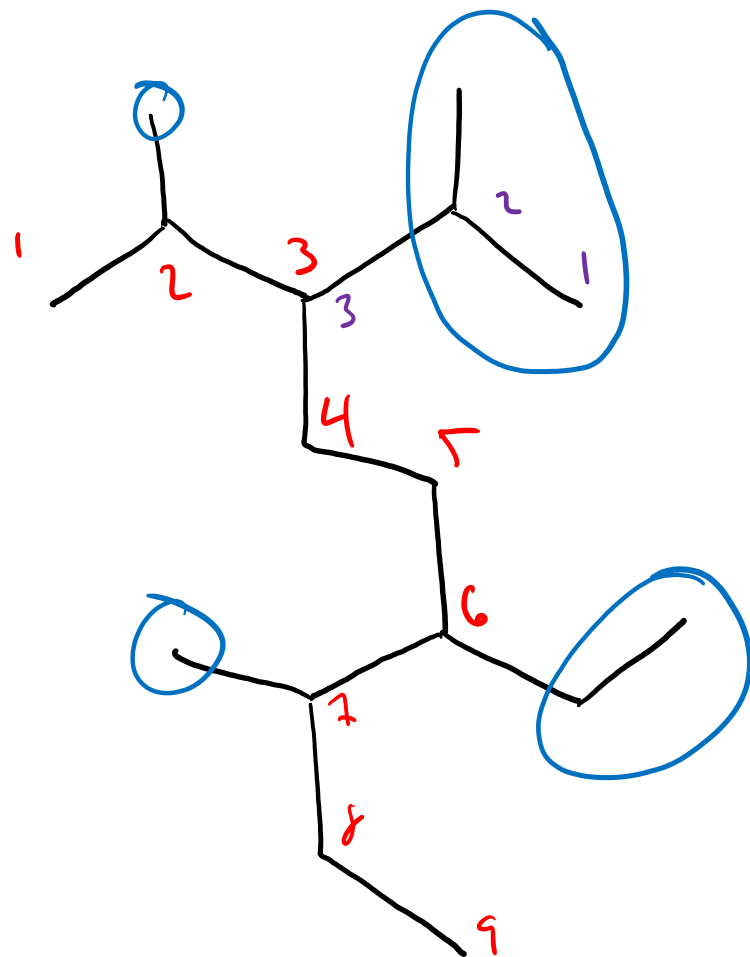


2,3-dimethyl

4-ethyl
octane

4-ethyl-2,3-dimethyloctane

Practice



nonane

2,7 - dimethyl

third

3 - isopropyl

second

6 - ethyl

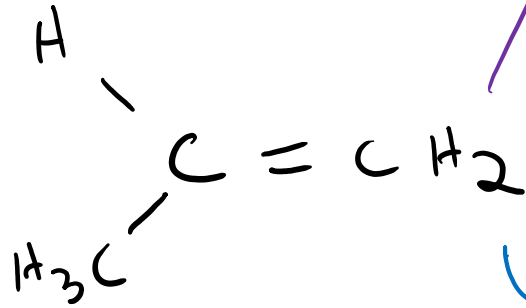
first

6-ethyl - 3 - isopropyl - 2,7-dimethyl
nonane.

Isomerism

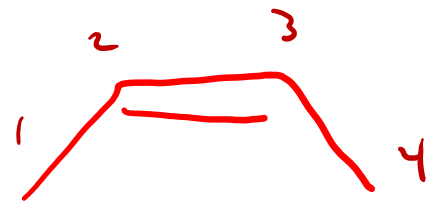
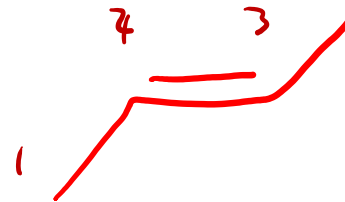
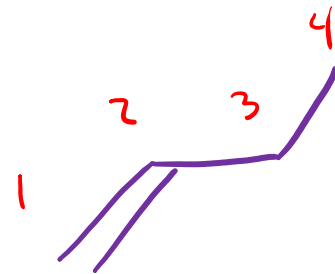
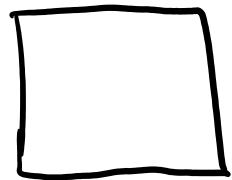
const. isomers.

HW Ch 1. #8e: Draw the [Lewis] structure of C_3H_6



same formula, different structures. isomers

C₄H₈

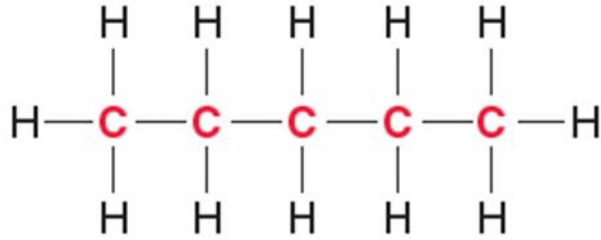


Stereoisomers → same connectivity, diff 3D shape.

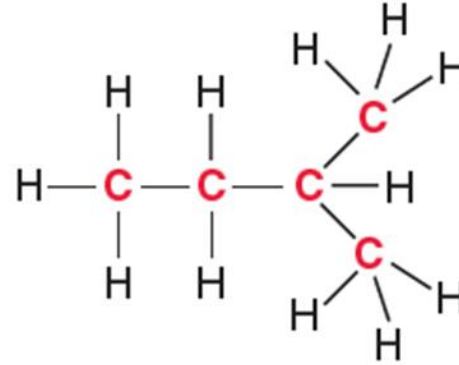
constitutional isomers - different connectivity

Constitutional isomers (structural isomers)

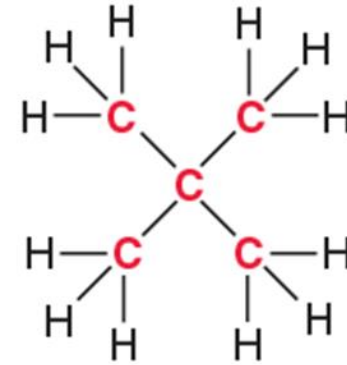
↳ differ in connections between atoms.



Pentane
Boiling point = 36°C



2-Methylbutane
Boiling point = 28°C



2,2-Dimethylpropane
Boiling point = 10°C

diff phys properties

Identifying Constitutional Isomers

1) Ensure the molecular formula is the same *not → then not isomers.*

2) Find the longest chain containing the most double/triple bonds

3) # the carbons as in naming

4) If there is **any** difference in...

→ the size of the longest chain,

→ #'s assigned to multiple bonds, and/or

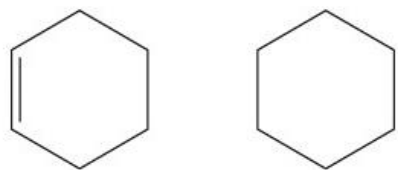
→ #'s assigned to the C's with substituents

Then the connectivity is different and they **are constitutional isomers.** *←*

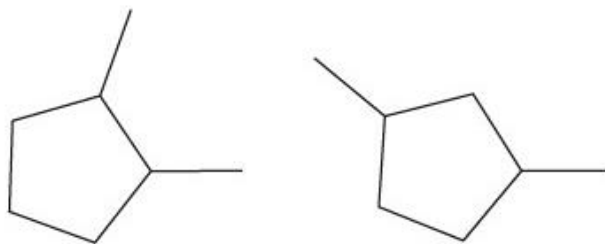
Poll

pollev.com/timcook653 or text timcook653 to 22333
Or use Android/iPhone app

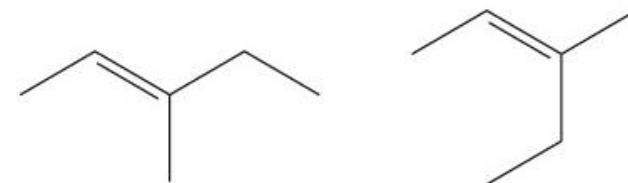
Which of these pairs of molecules are constitutional isomers?



A



B



C