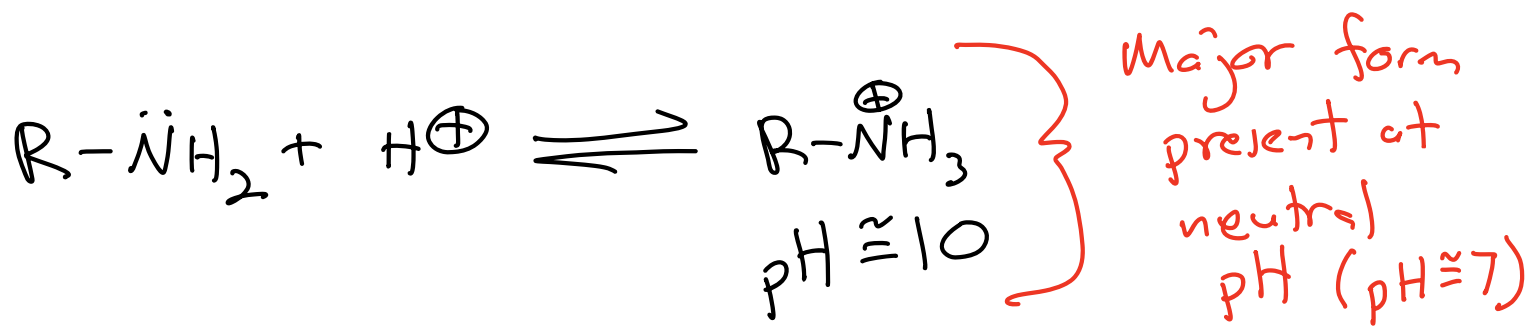
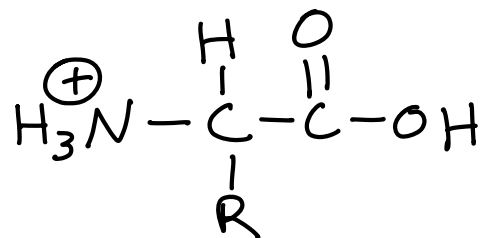


Amines \rightarrow Relatively strong bases
and relatively strong
nucleophiles

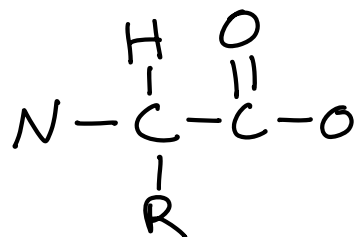


Amines are protonated and positively-
charged at neutral pH \Rightarrow Very
important in biochemistry!

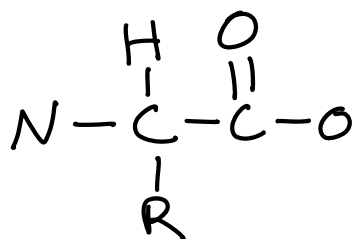
Amino Acids



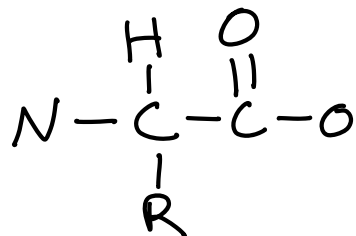
pH 1.0



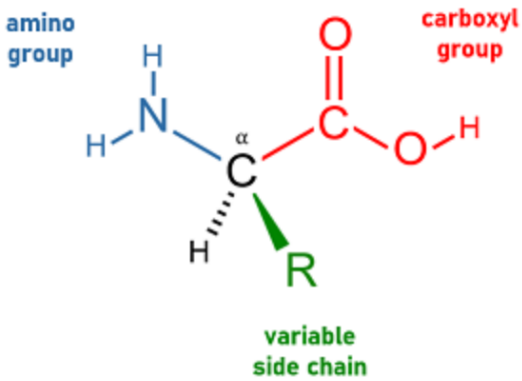
pH 7.0



pH 11.0



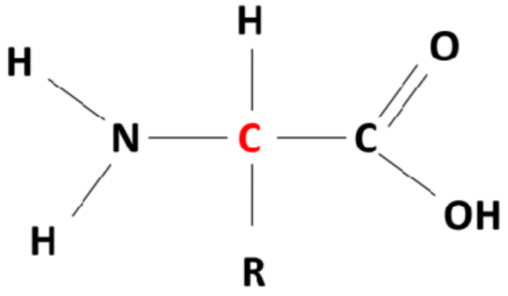
Wikipedia



File:Amino acid generic structure.png - Wikipedia

[Visit >](#)

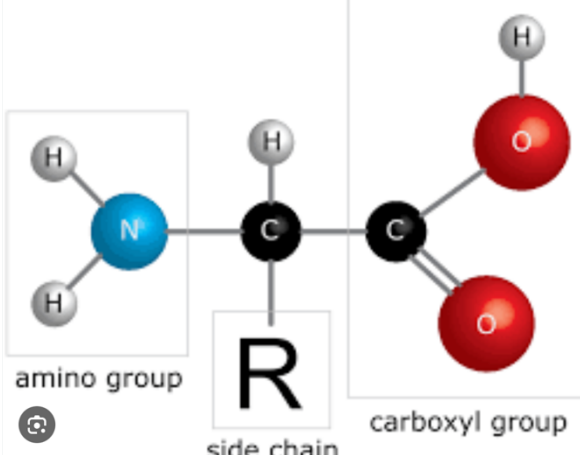
ResearchGate



amino acid structure | Download Scientific Diagram

[Visit >](#)

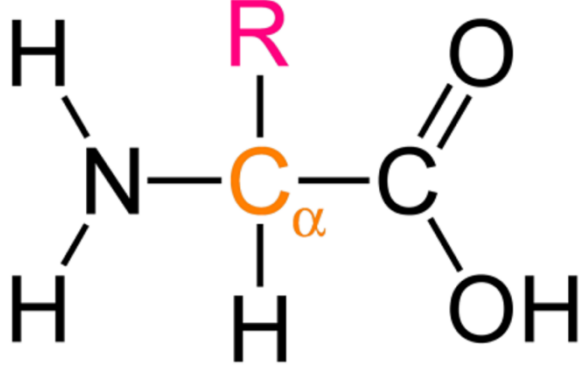
user.eng.umd.edu



Protein > Amino Acids

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Study.com



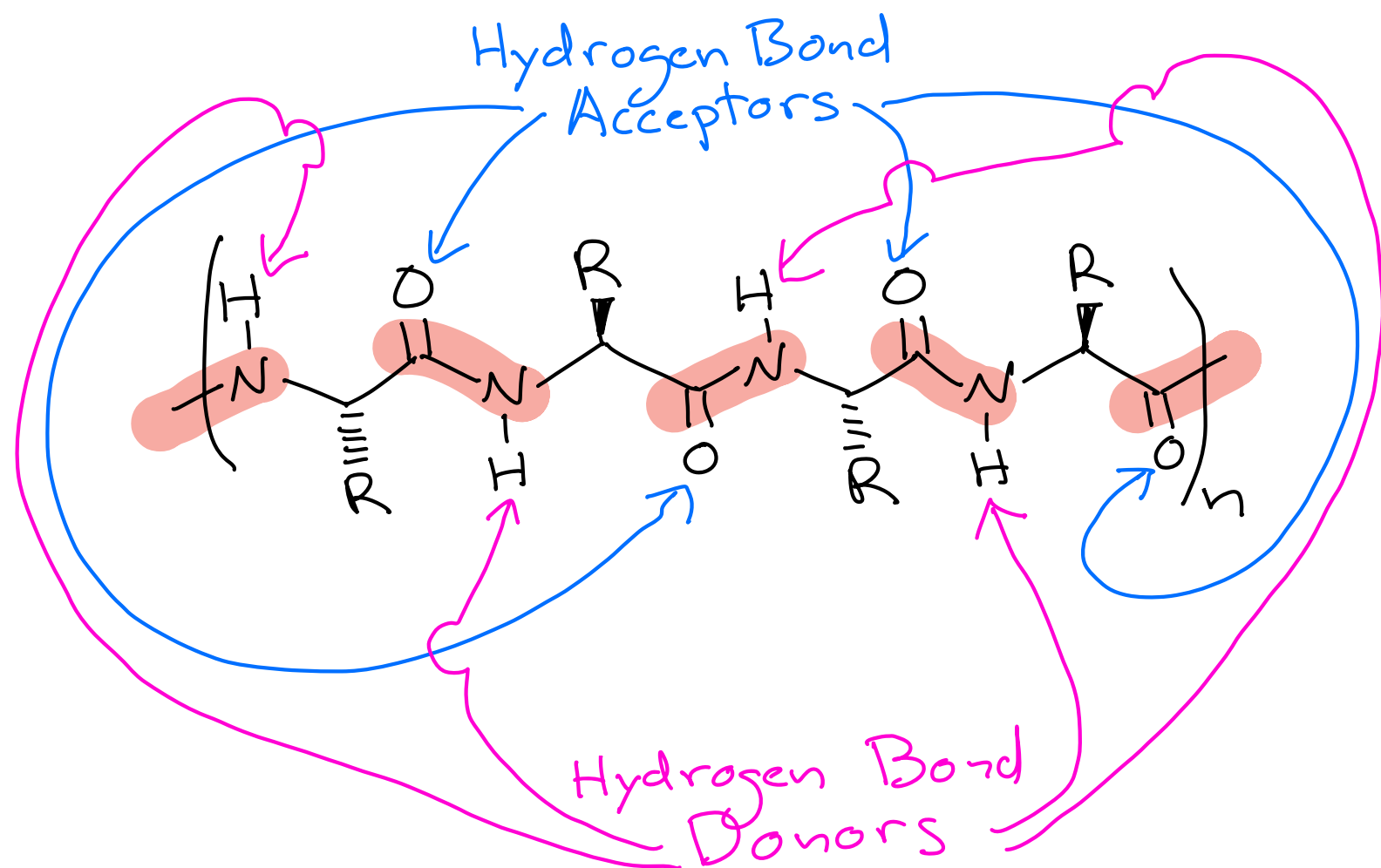
Proteins & Amino Acids | Formation, Structures & Sources - Lesson | Study.com

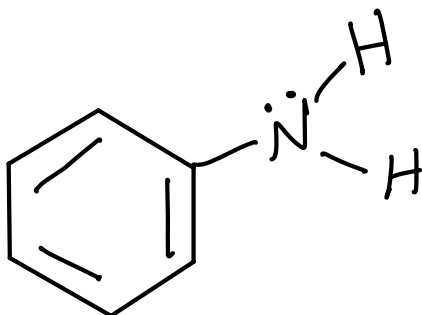
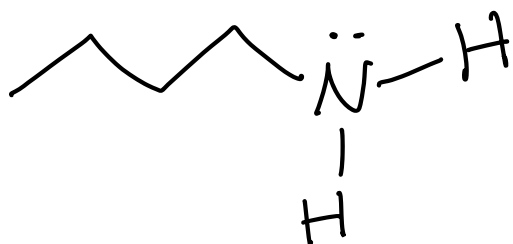
[Visit >](#)



What does this means for amides:

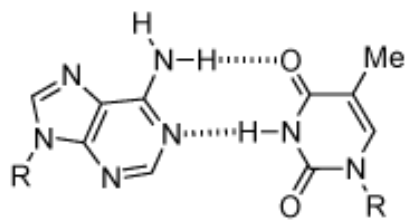
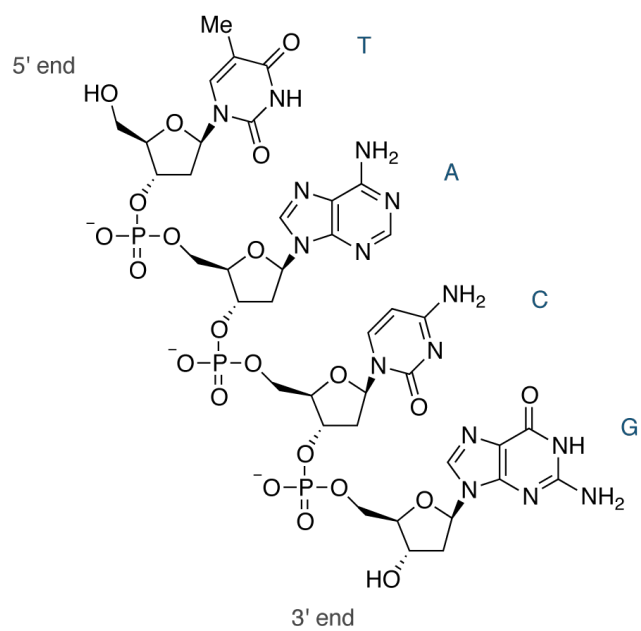
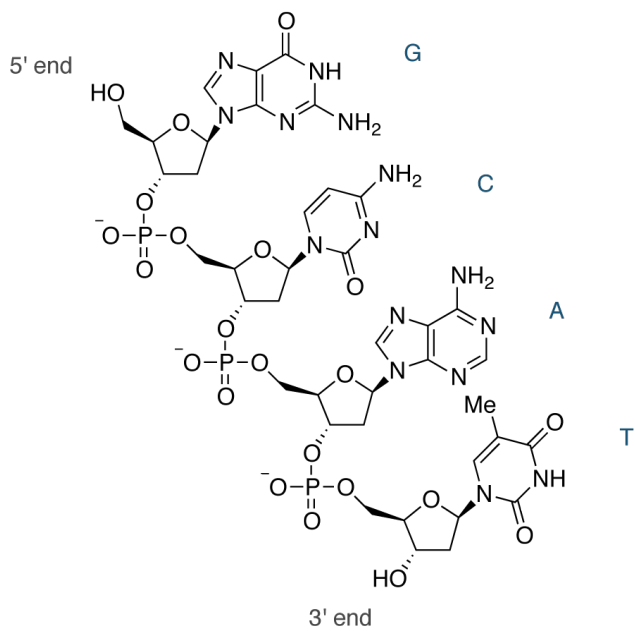
- 1) The amide group can make strong hydrogen bonds
- 2) The C-N bond **does not rotate** at room temperature



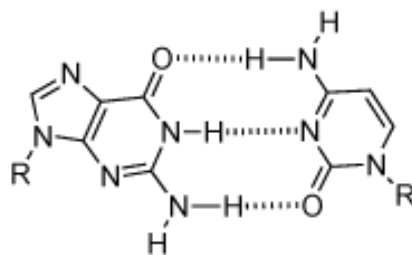


Golden rule:
N electrons
are more
stable when
delocalized

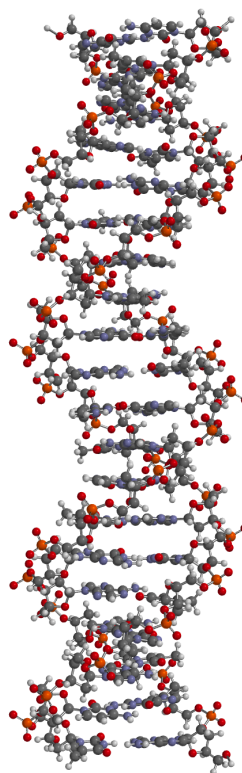
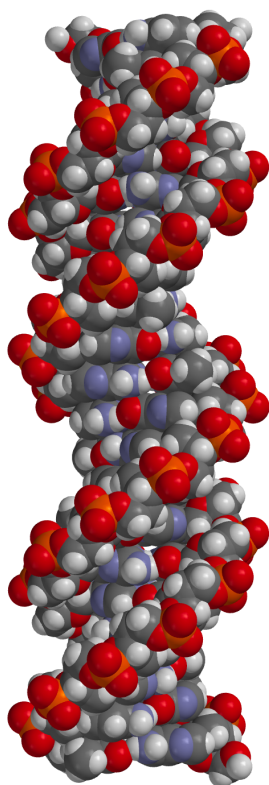
This is critical to DNA and RNA structure: DNA bases are aromatic and the -NH_2 groups on the bases are



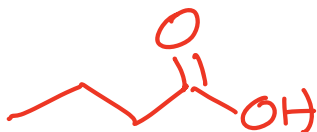
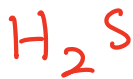
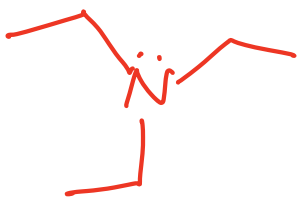
A·T base pair

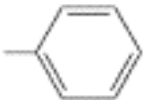


G·C base pair



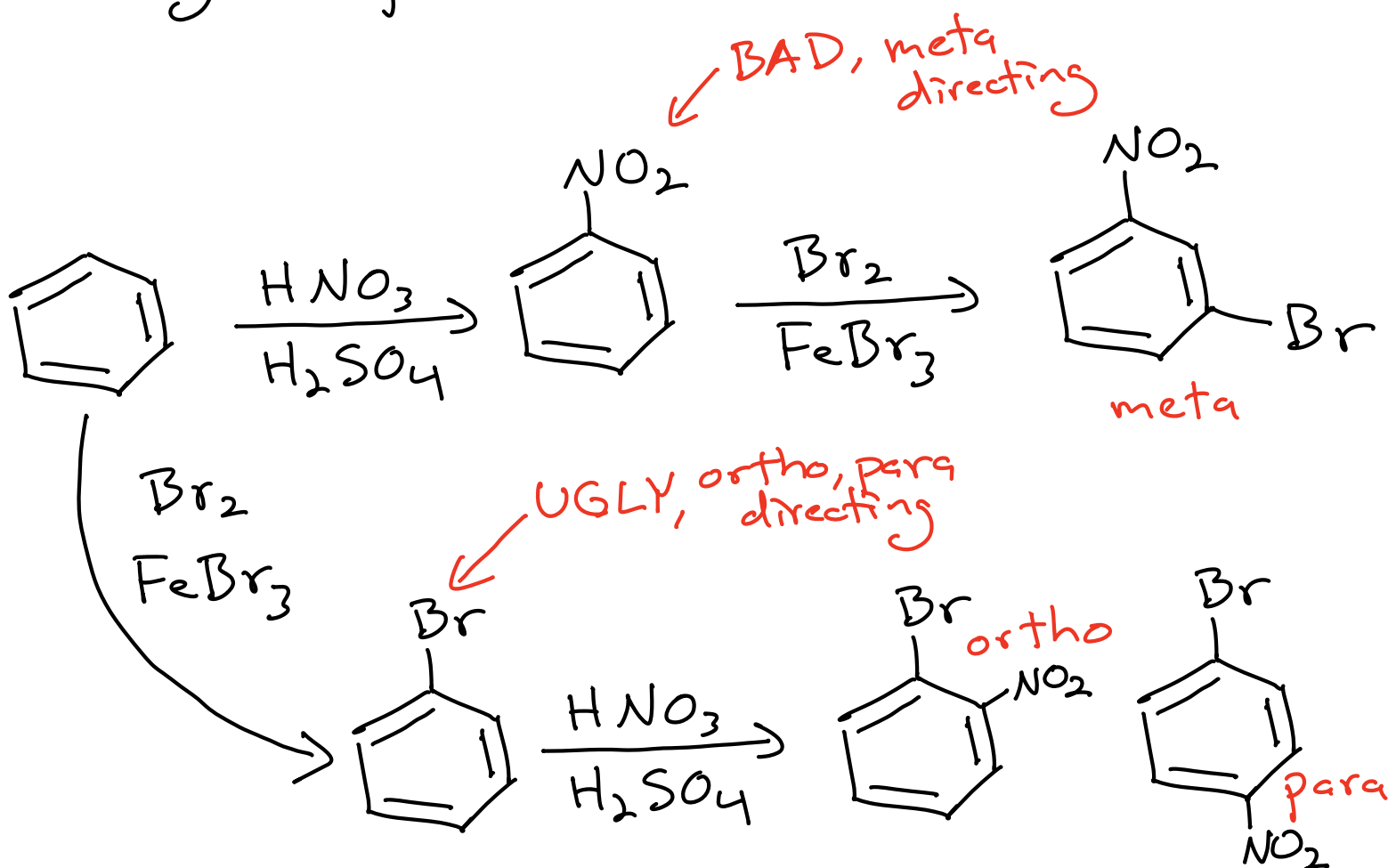
Our sense of smell is highly sensitive to certain molecules that are the result of decomposition of mammal and fish flesh among other things. Not only can we detect very small amounts of these "signal" molecules, we are hard wired to be highly nauseated when we smell them → evolutionary protection to keep us from eating what might look OK, yet would make us sick.



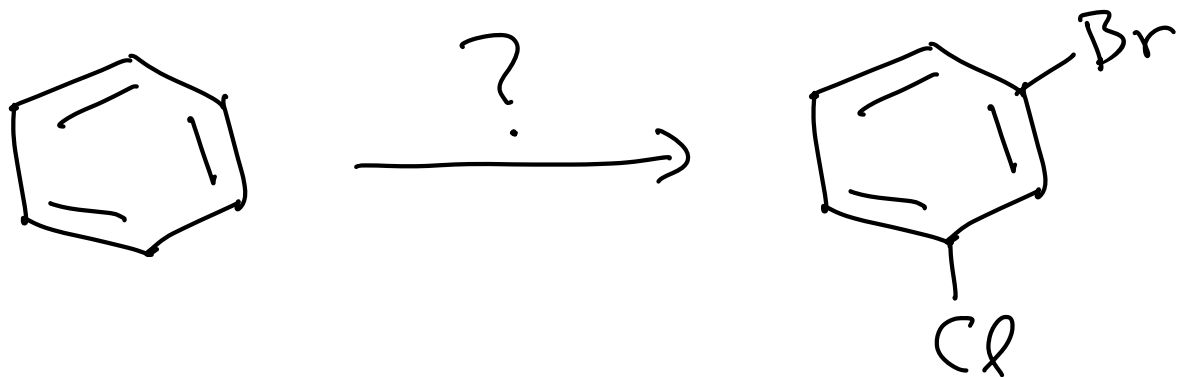
Ortho-Para Directing	Strongly activating	$-\ddot{\text{N}}\text{H}_2$ $-\ddot{\text{N}}\text{HR}$ $-\ddot{\text{N}}\text{R}_2$ $-\ddot{\text{O}}\text{H}$ $-\ddot{\text{O}}\text{R}$	<div>GOOD</div> <div>ortho, para directing activating</div>
	Moderately activating	$-\ddot{\text{N}}\text{H}\overset{\text{O}}{\parallel}\text{CR}$ $-\ddot{\text{N}}\text{H}\overset{\text{O}}{\parallel}\text{CAr}$ $-\ddot{\text{O}}\overset{\text{O}}{\parallel}\text{CR}$ $-\ddot{\text{O}}\overset{\text{O}}{\parallel}\text{CAr}$	
	Weakly activating	$-\text{R}$ 	
	Weakly deactivating	$-\ddot{\text{F}}:$ $-\ddot{\text{Cl}}:$ $-\ddot{\text{Br}}:$ $-\ddot{\text{I}}:$	<div>ortho, para directing deactivating</div> <div>UGLY</div>
Meta Directing	Moderately deactivating	$-\overset{\text{O}}{\parallel}\text{CH}$ $-\overset{\text{O}}{\parallel}\text{CR}$ $-\overset{\text{O}}{\parallel}\text{COH}$ $-\overset{\text{O}}{\parallel}\text{COR}$ $-\overset{\text{O}}{\parallel}\text{CNH}_2$ $-\overset{\text{O}}{\parallel}\text{SOH}$ $-\text{C}\equiv\text{N}$	<div>meta directing deactivating</div> <div>BAD</div>
	Strongly deactivating	$-\text{NO}_2$ $-\text{NH}_3^+$ $-\text{CF}_3$ $-\text{CCl}_3$	

Relative importance in directing further substitution

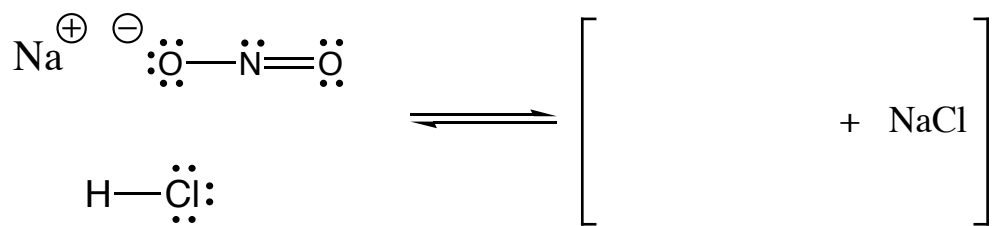
The order in which you add groups matters!



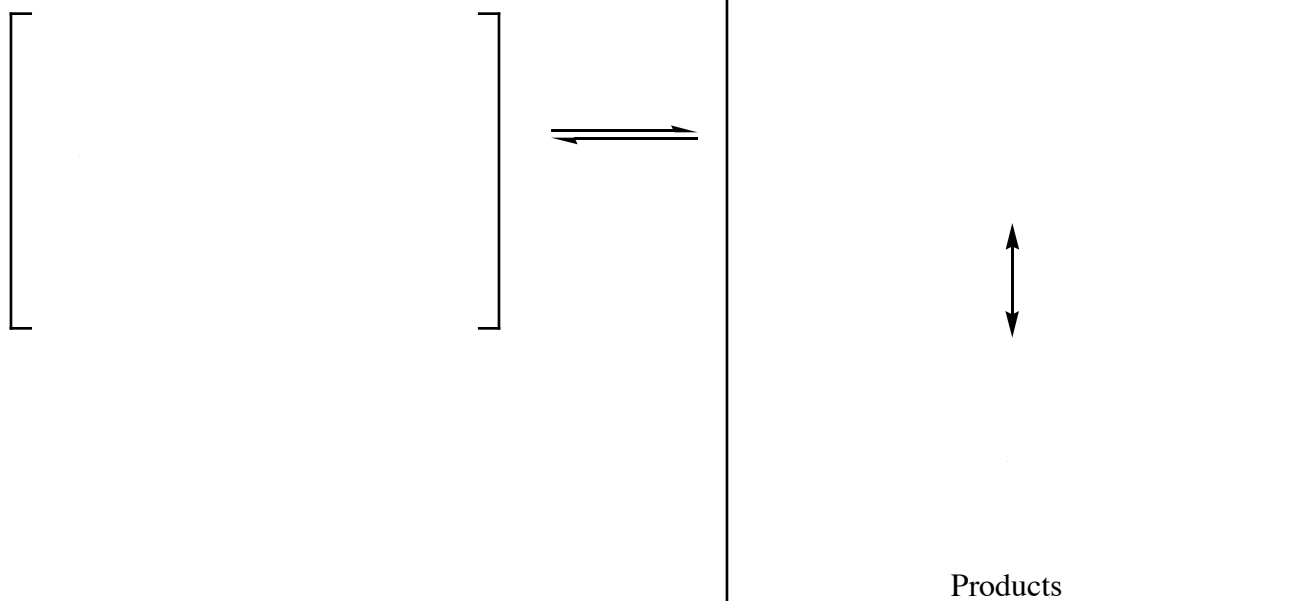
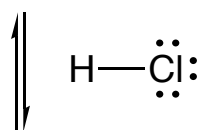
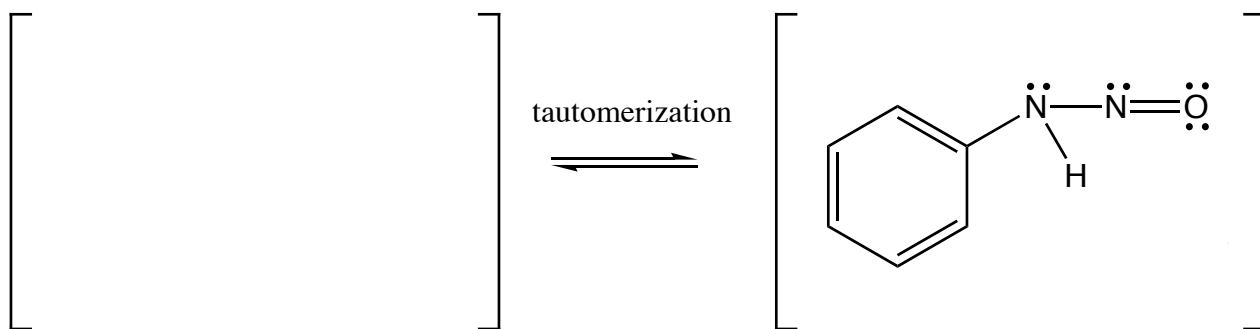
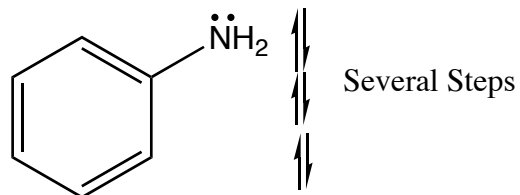
How do we carry out the following synthesis?

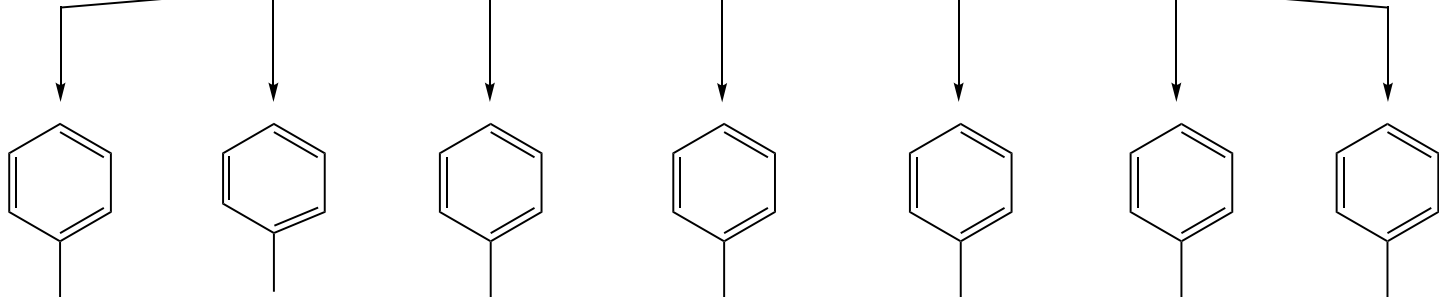
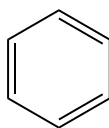
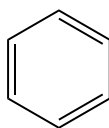
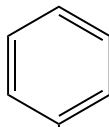
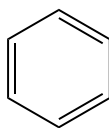


Preparation of Diazoniums, The "Mr. Bill" Reaction



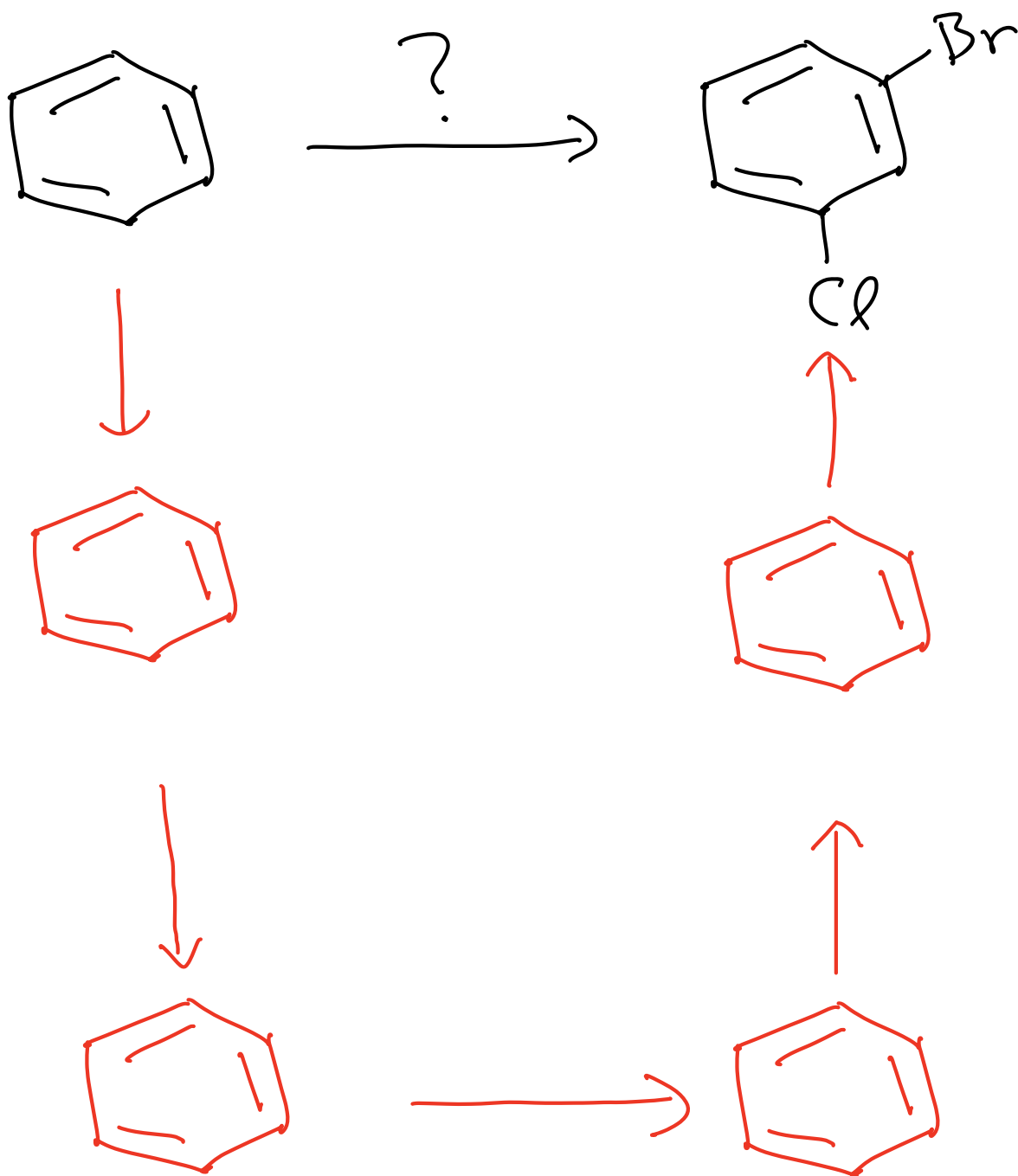
The Mr. Bill reagent



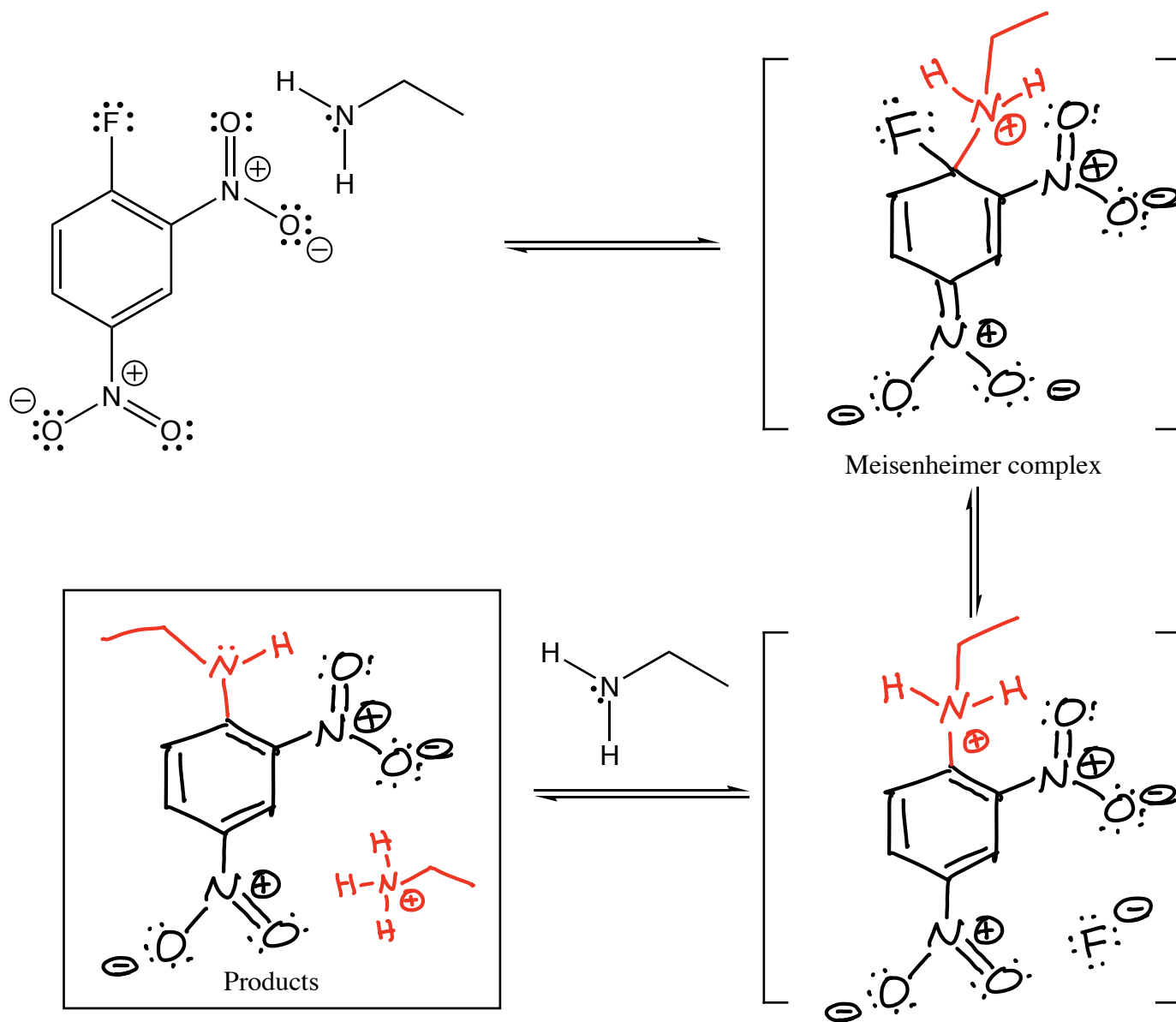


Sandmeyer Reaction

How do we carry out the following synthesis?

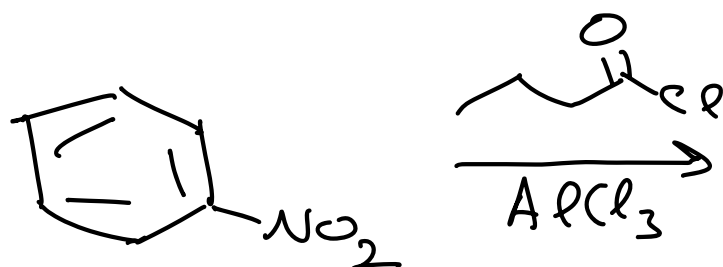


Nucleophilic Aromatic Substitution

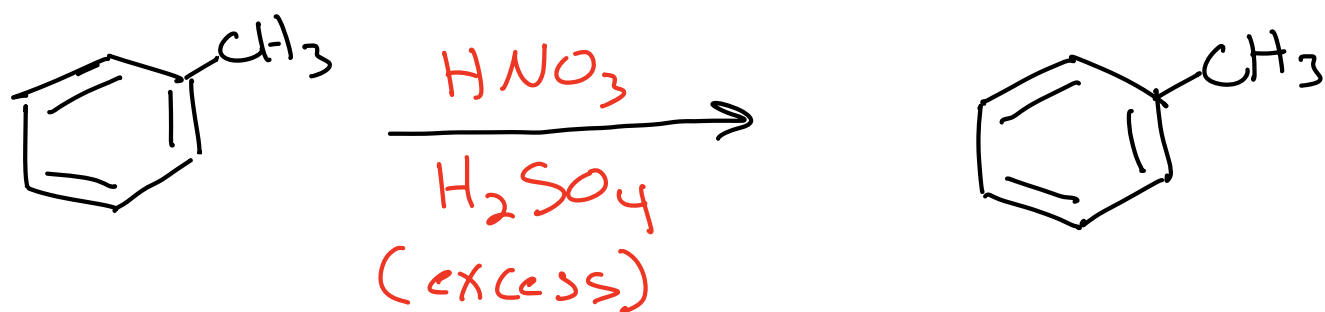


What you need to know
about electrophilic aromatic
substitution reactions:

1) Friedel-Crafts alkylations
and acylations



However \rightarrow Some reactions with harsh conditions will work:



Toluene



Solvent used
in model glue

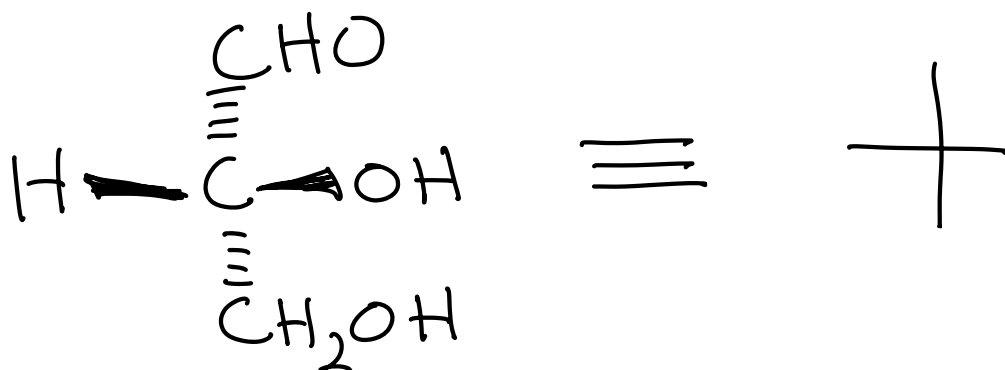
Carbohydrates

Monosaccharides \rightarrow 5 or 6 carbons
and are aldehydes and ketones

Ex.

Glucose is an

Stereochemistry



(R)-D-Glyceraldehyde

Called
Fischer
projection

Can I have
a hug please?

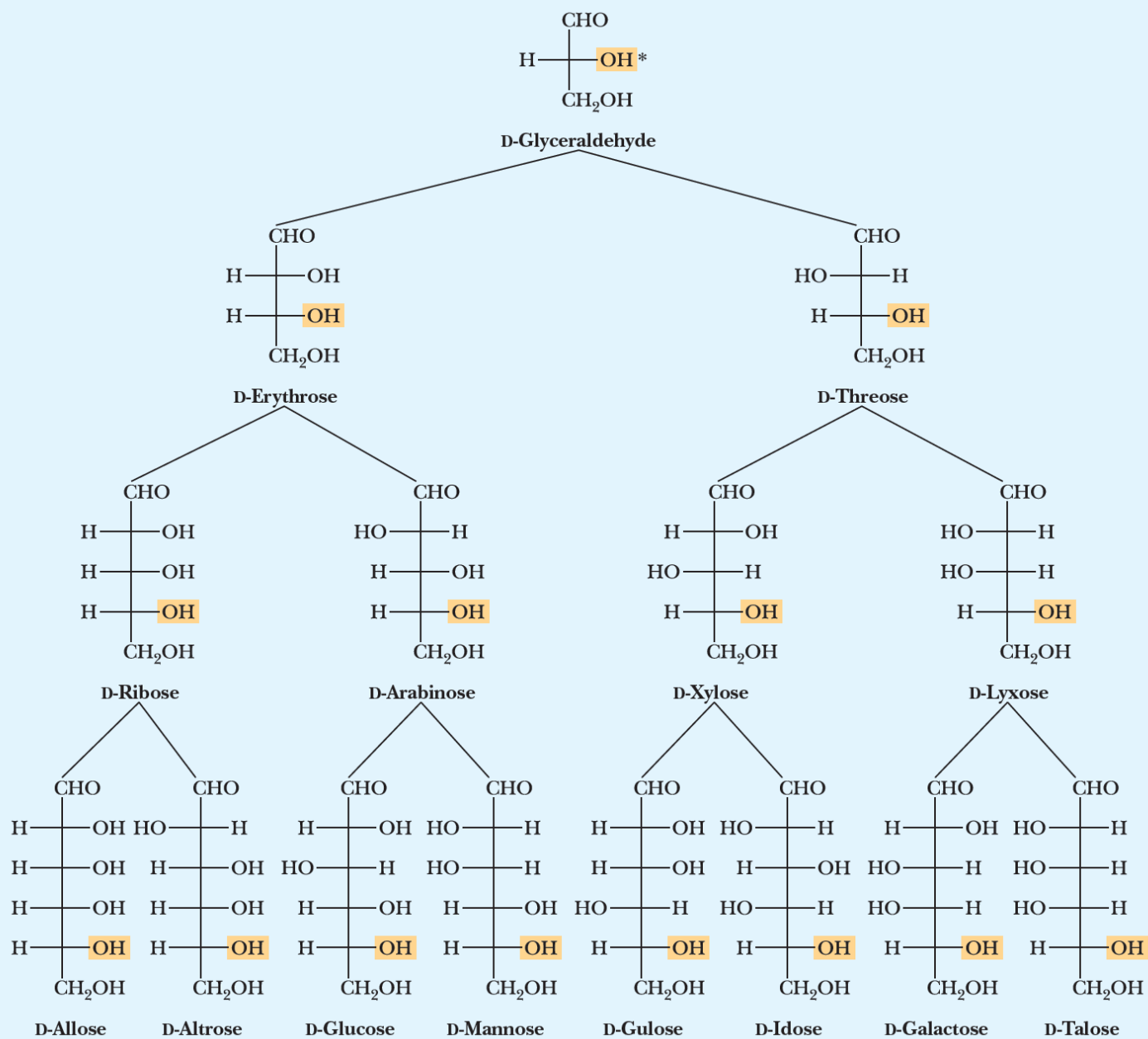


Stereochemistry defines the different carbohydrates

→ Due to the way carbohydrates are synthesized in cells → the common carbohydrates all have the same stereochemistry as D-glyceraldehyde at the carbon farthest from the carbonyl (aldehyde or ketone)

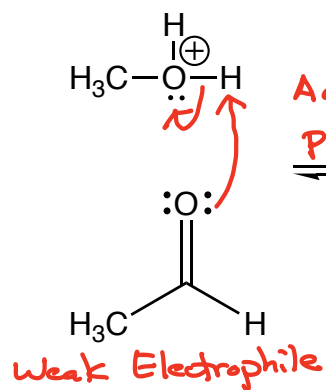
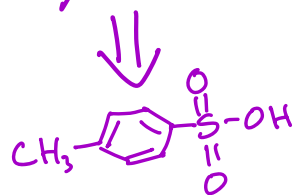
That is why they are called "D" carbohydrates

Table 25.1 Configurational Relationships Among the Isomeric D-Aldotetroses, D-Aldopentoses, and D-Aldohexoses





TsOH or H_2SO_4
 Tosylic Acid
 Acid Catalyzed Hemiacetal and Acetal Formation From an Aldehyde or Ketone

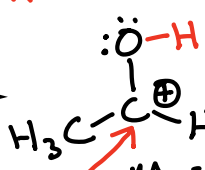
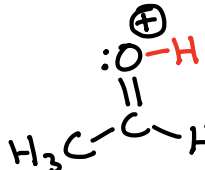


Add a proton

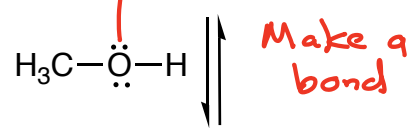
Mechanism
 VLD



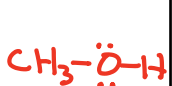
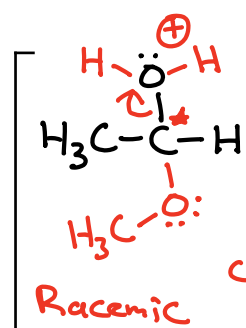
Red Hot Electrophile



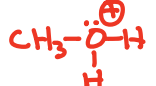
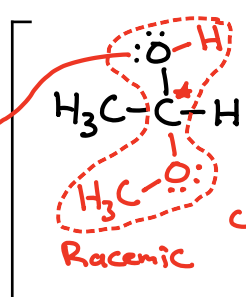
Major Contributor



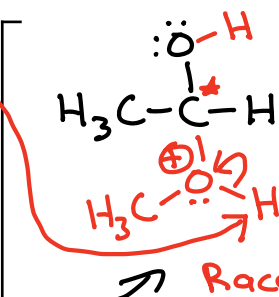
Make a bond



Add a proton



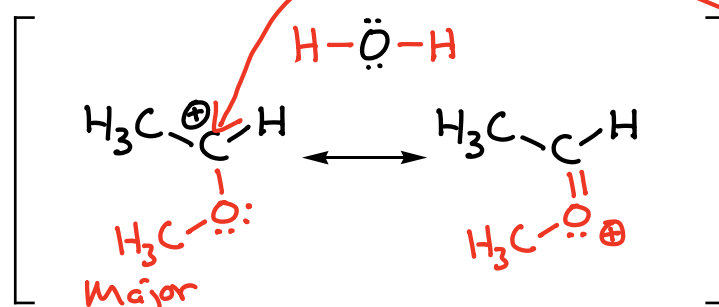
Take a proton away



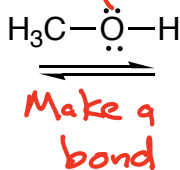
Hemiacetal intermediate

Not stable

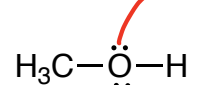
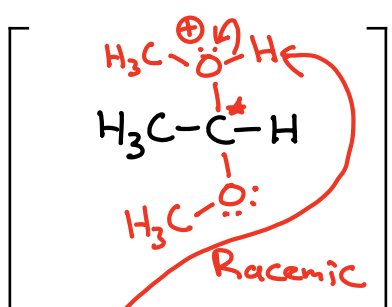
Break a bond



Stabilized by Charge Delocalization



Make a bond



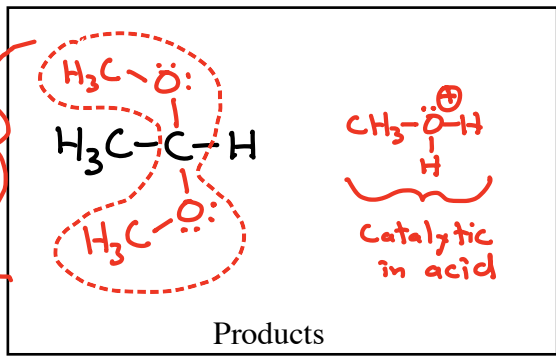
Take a proton away

Key Recognition Element (KRE):

Two bonds to O atoms from an sp³ C atom

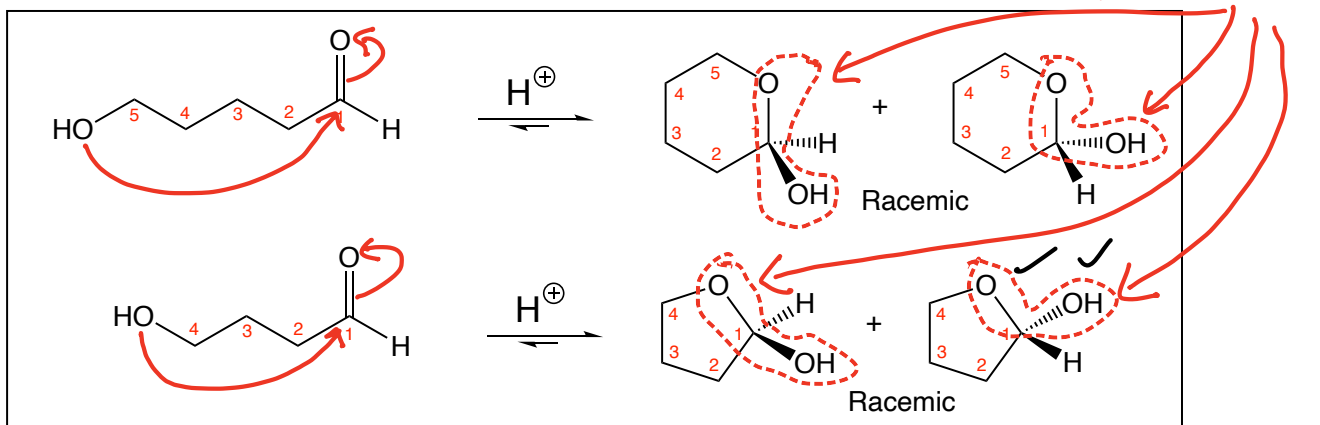
Definition of an acetal

An acetal

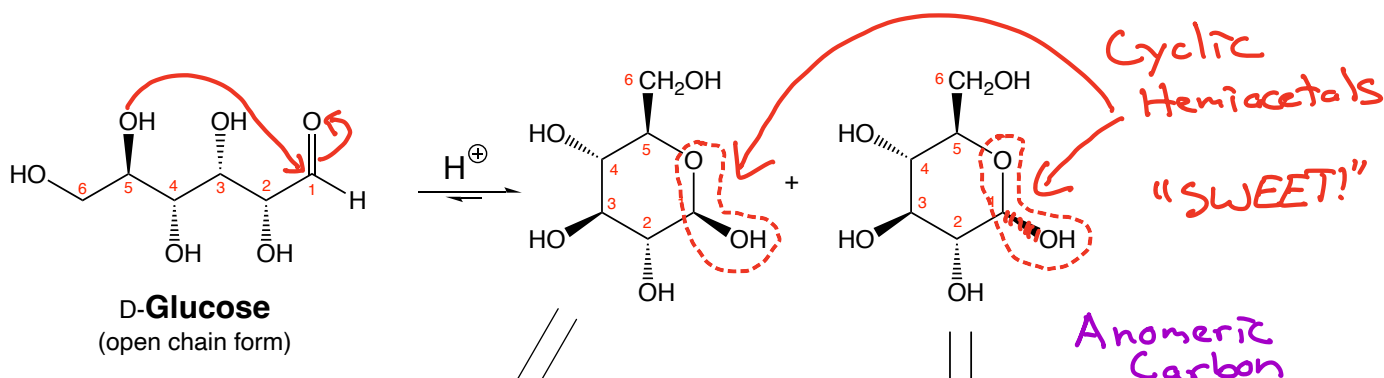


Products

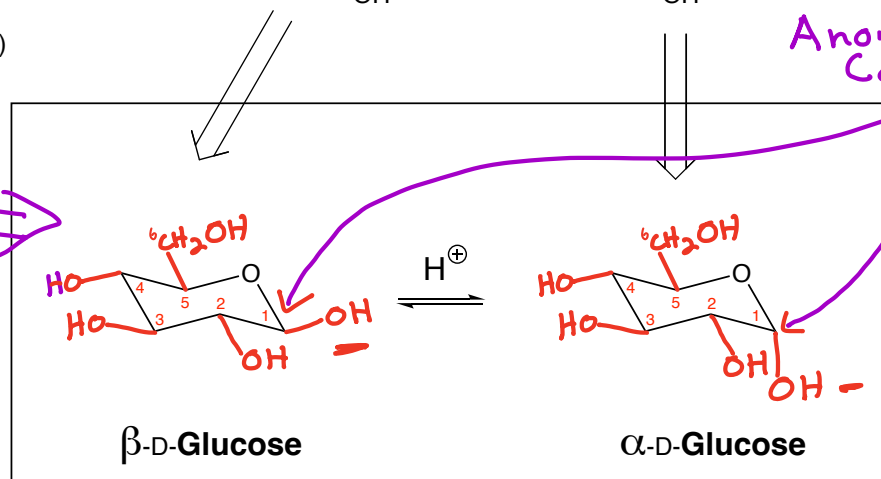
Cyclic Hemiacetals and Carbohydrates



The cyclic form of hemiacetals are stable - "SWEET!"
 → The chelate effect



This interconversion is called "mutarotation"



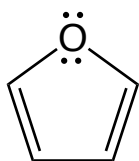
Biochemists call these two forms "anomers"

β-D-Glucopyranose
 means "6-membered ring"

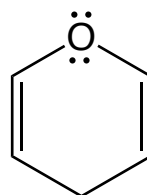
More stable → every group is equatorial!

α-D-Glucopyranose
 Less stable → one -OH is axial

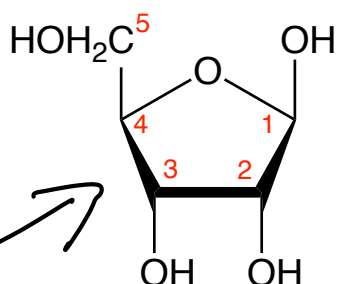
For Glucose:
 "α is axial!"



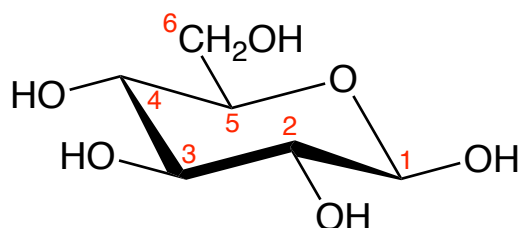
Furan



Pyran

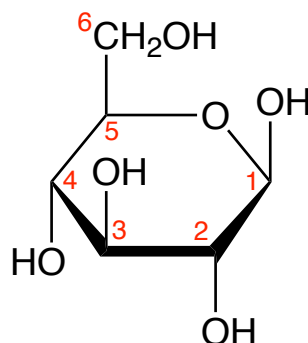


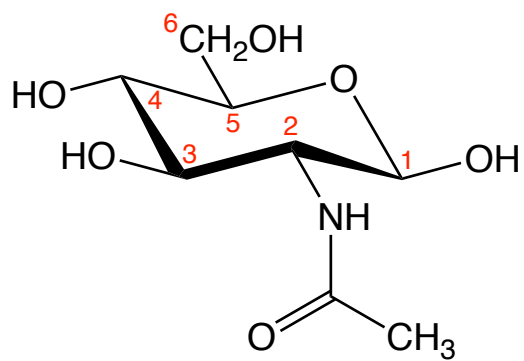
A furanose
 β -D-Ribose
or β -D-Ribofuranose



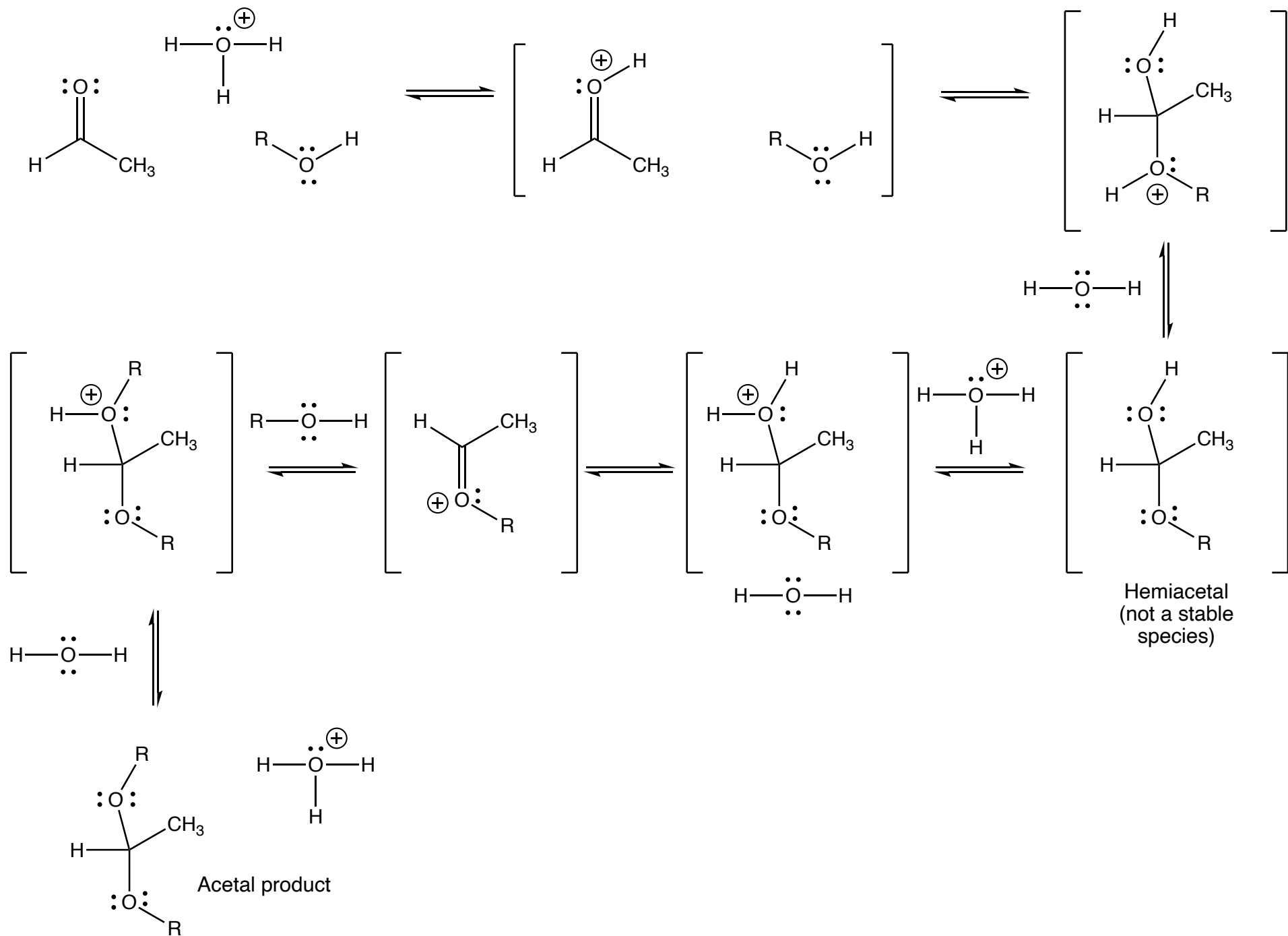
A pyranose
 β -D-Glucose
or β -D-Glucopyranose

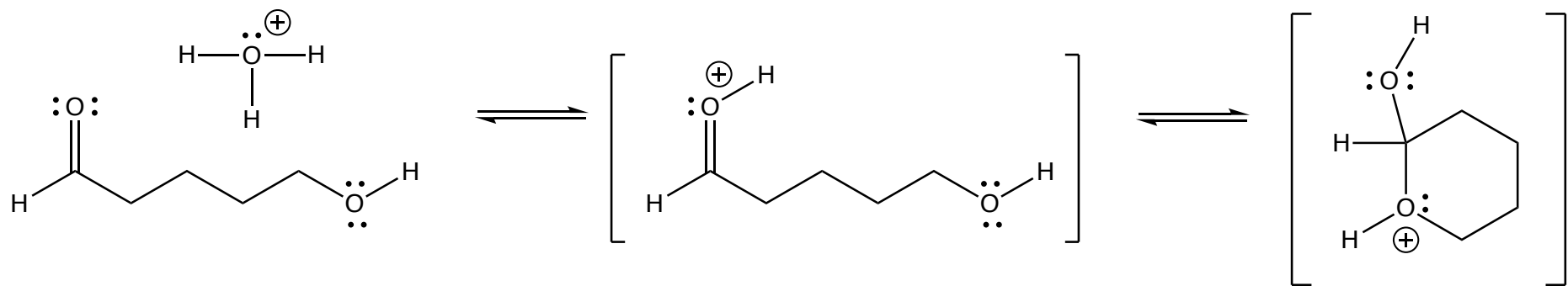
This is called a
Haworth projection



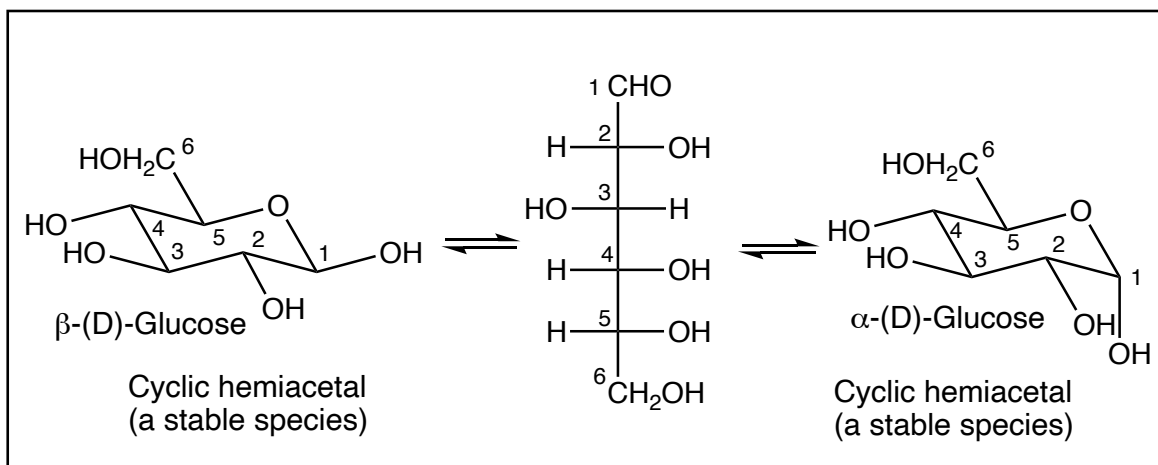
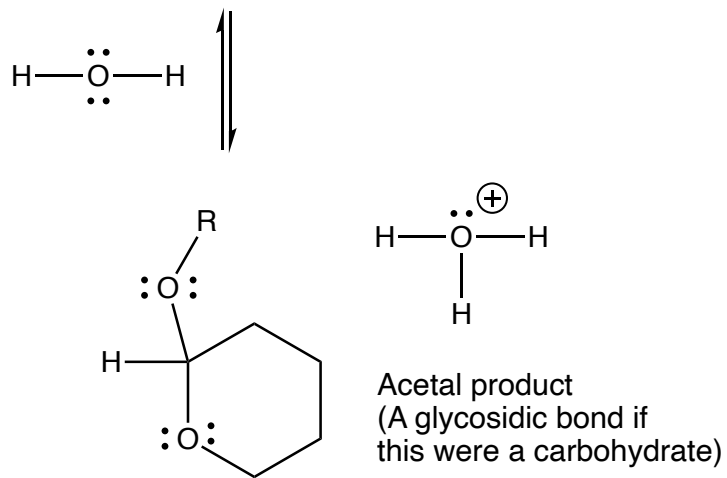
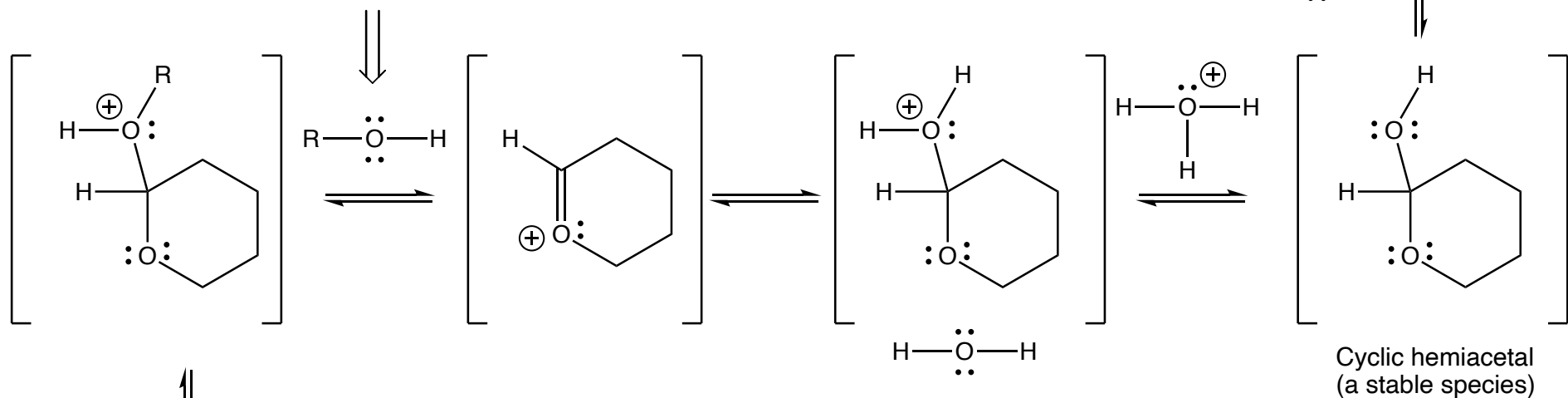


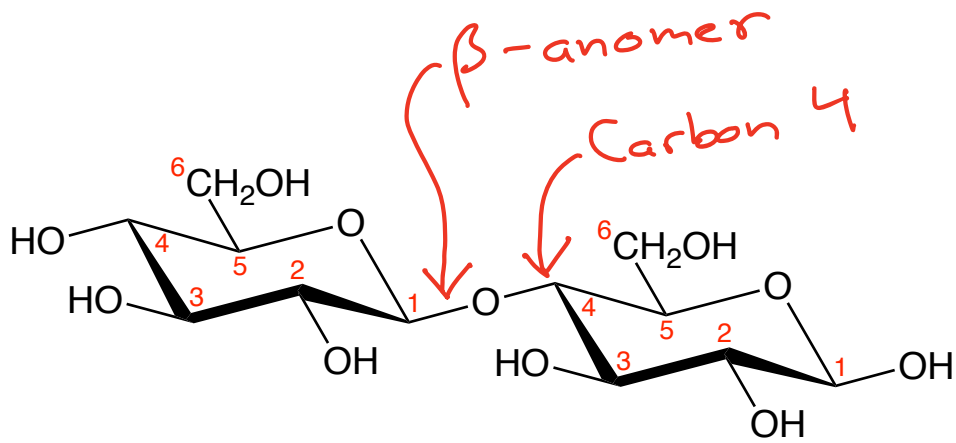
N-Acetyl-D-Glucosamine
(GlcNAC)



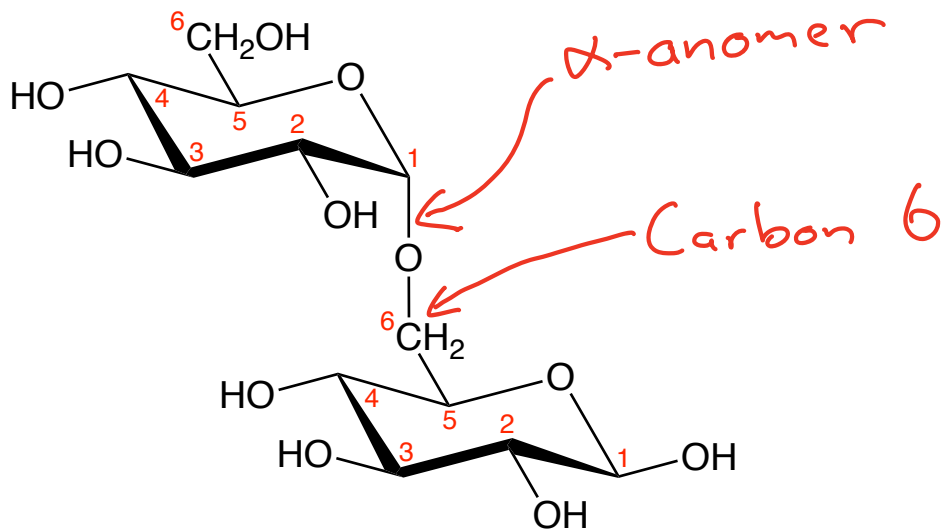


This can be another sugar!



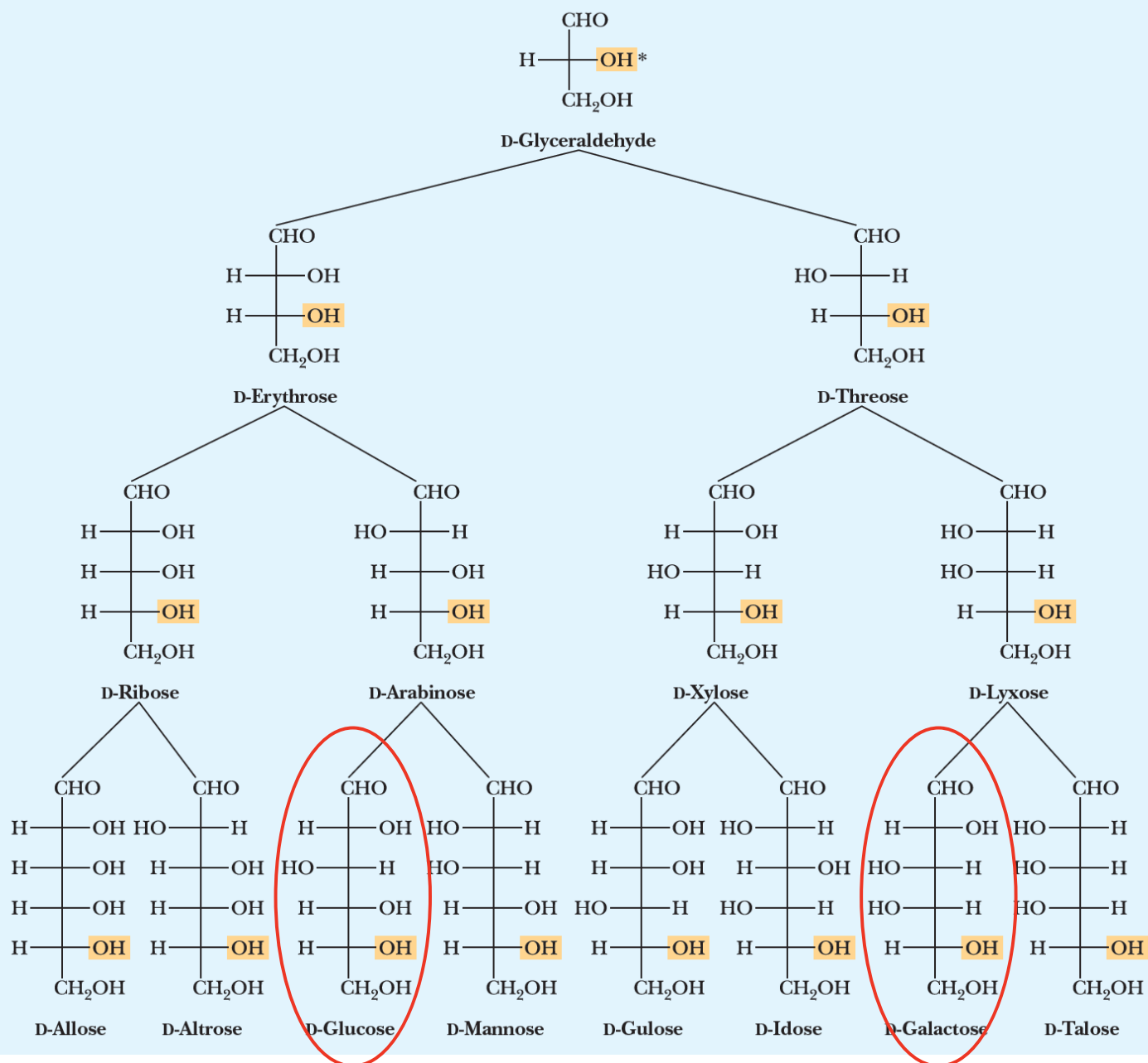


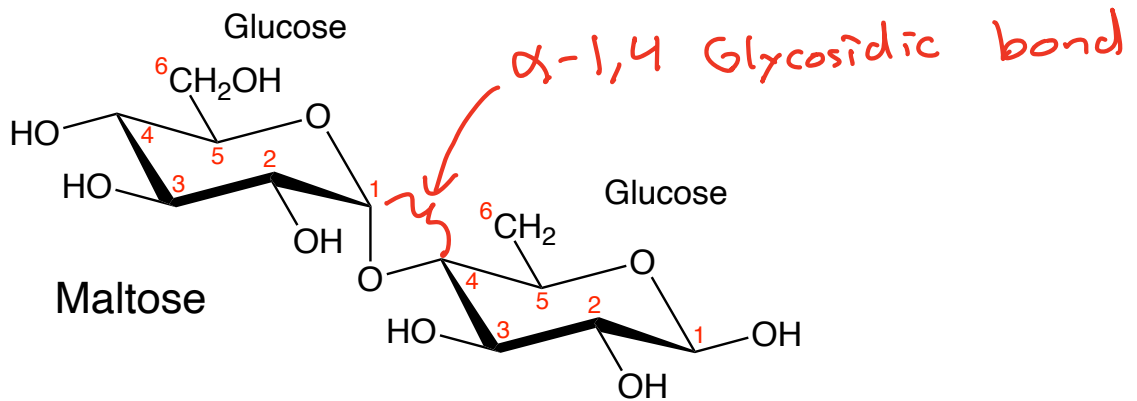
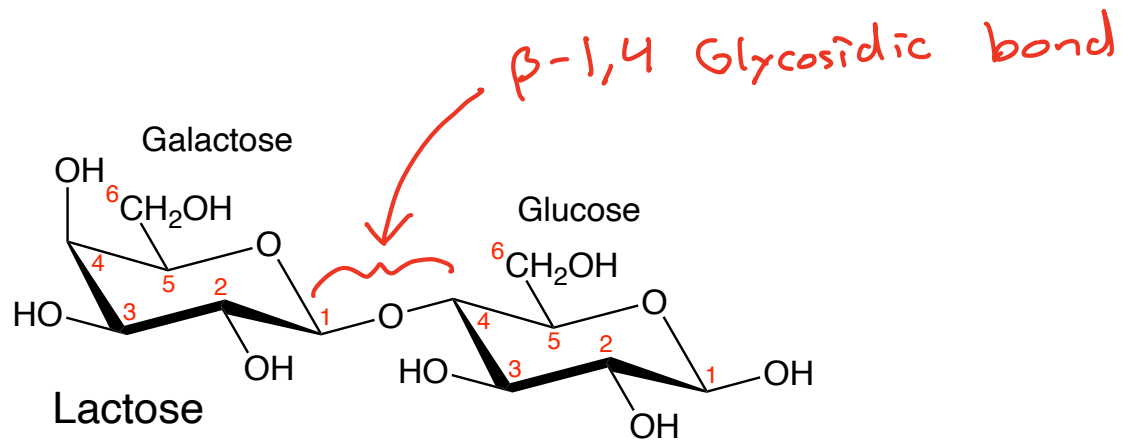
This is a β -1,4-Glycosidic Bond



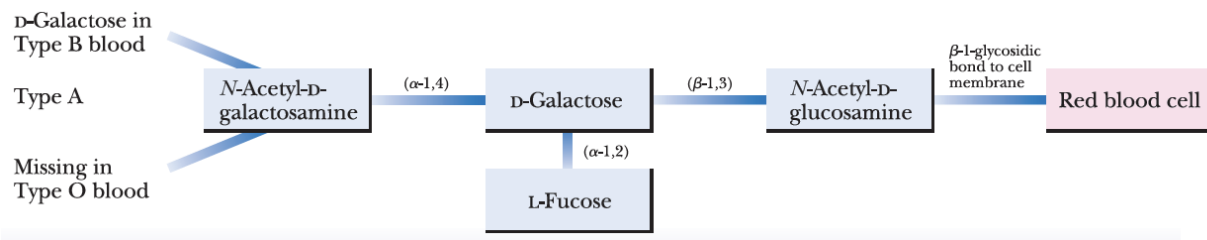
This is an α -1,6-Glycosidic Bond

Table 25.1 Configurational Relationships Among the Isomeric D-Aldotetroses, D-Aldopentoses, and D-Aldohexoses





We can link more carbohydrates together, always at Carbon 1, with α or β linkages at carbons 2, 3, 4 or 6

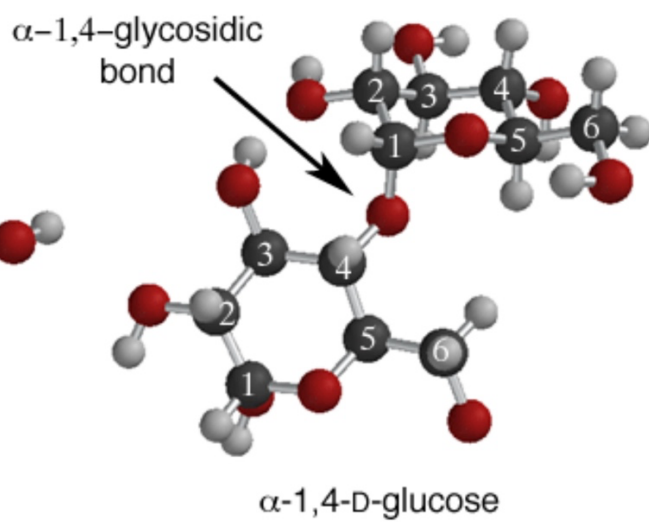
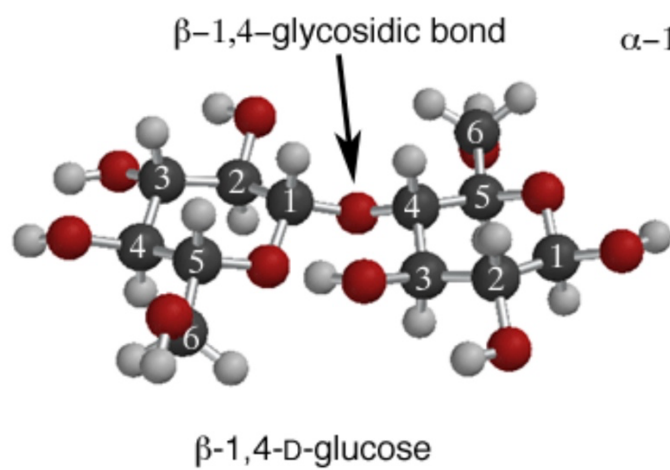
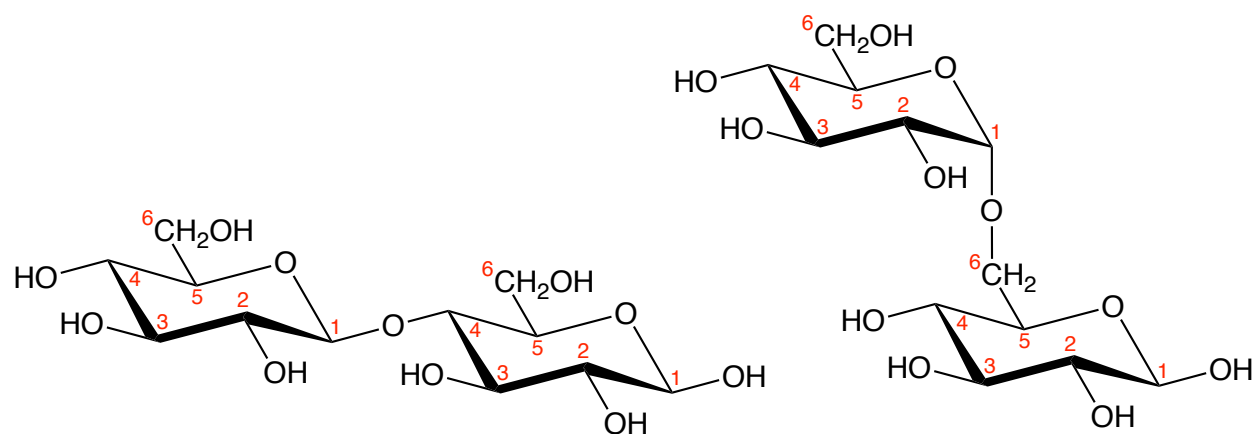


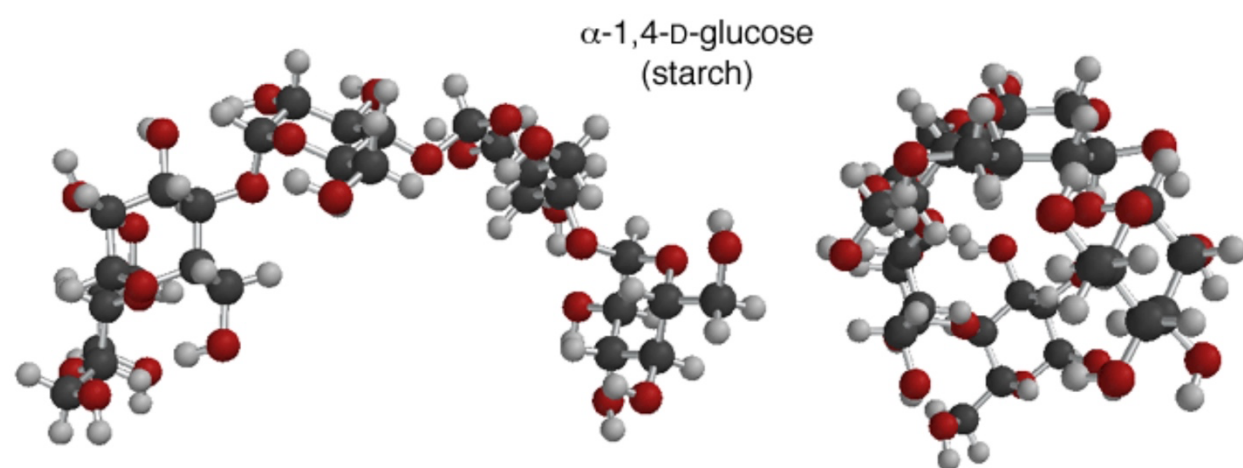
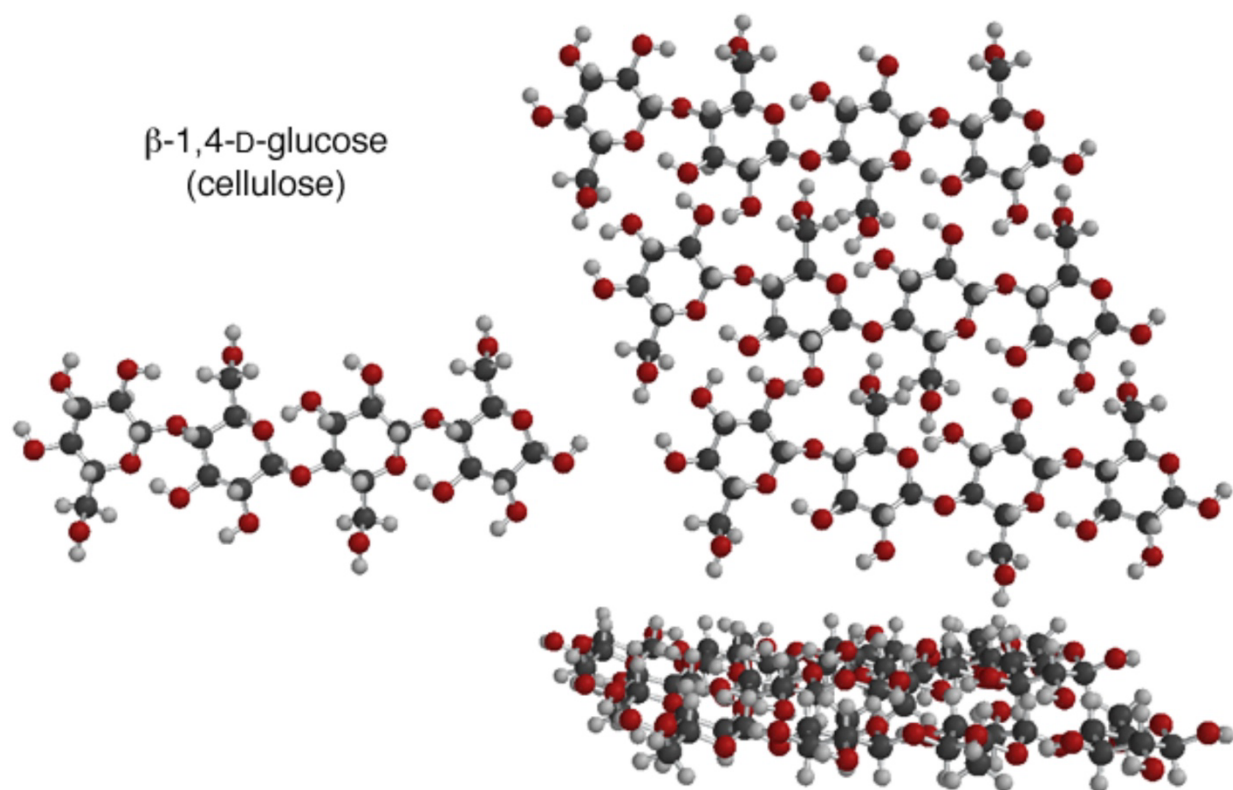


VS.



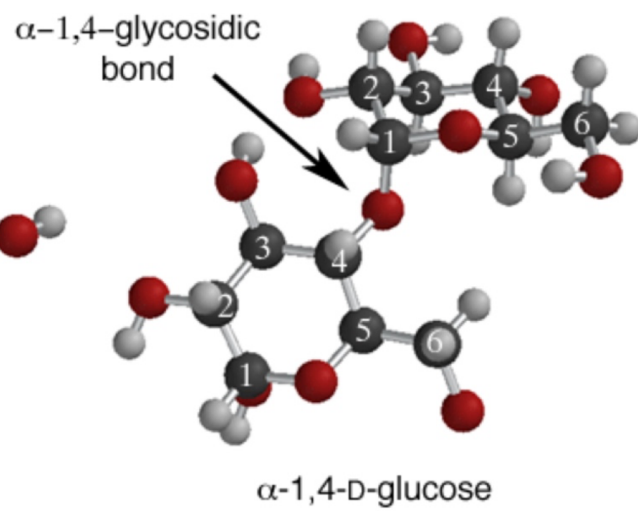
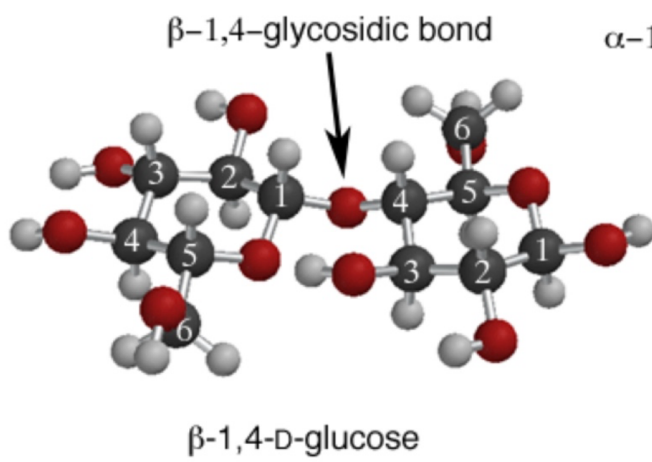
What is the difference —
They are both polymers
of D-Glucose

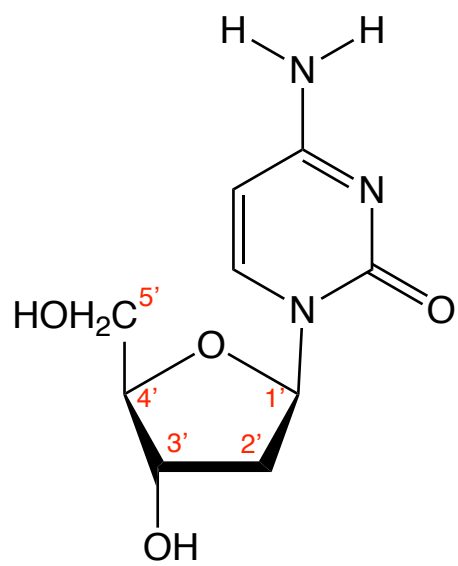
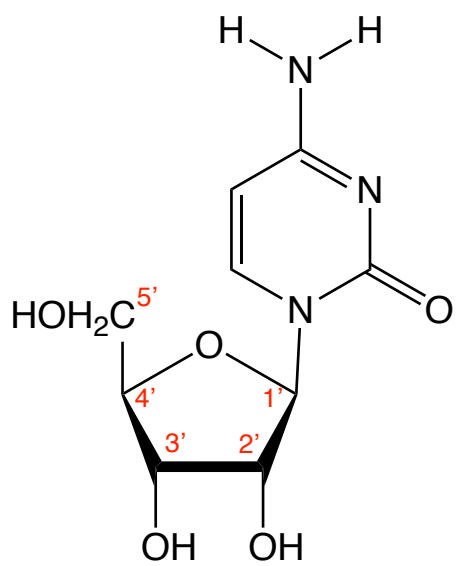


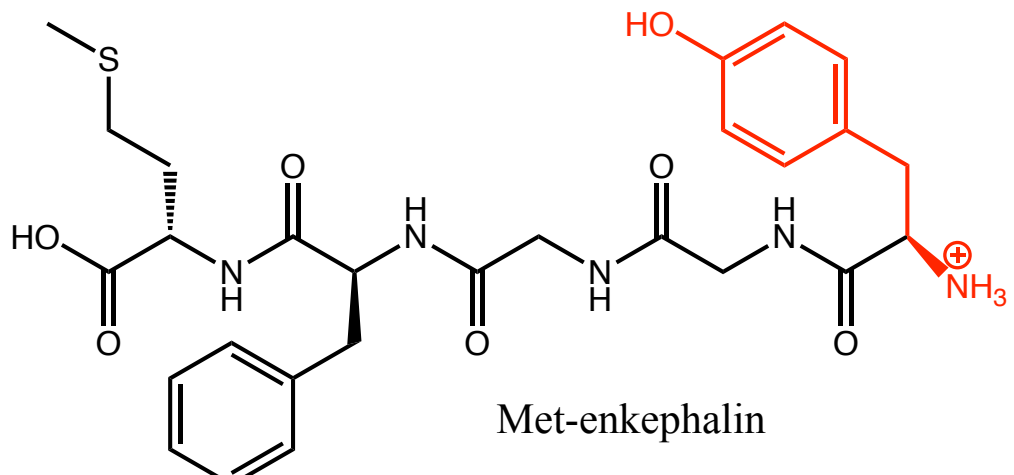




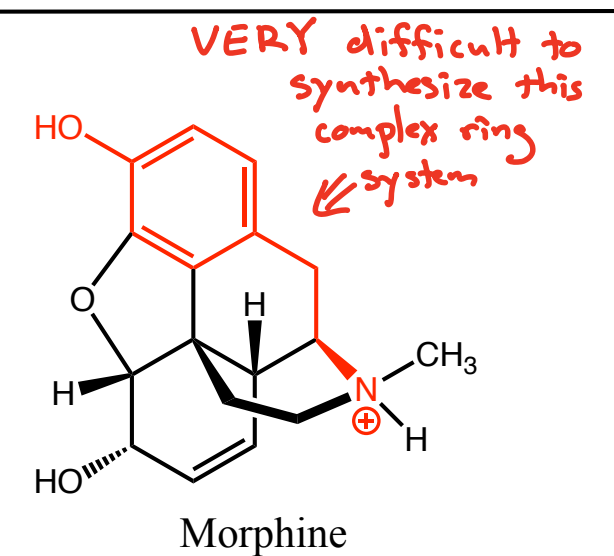
vs.







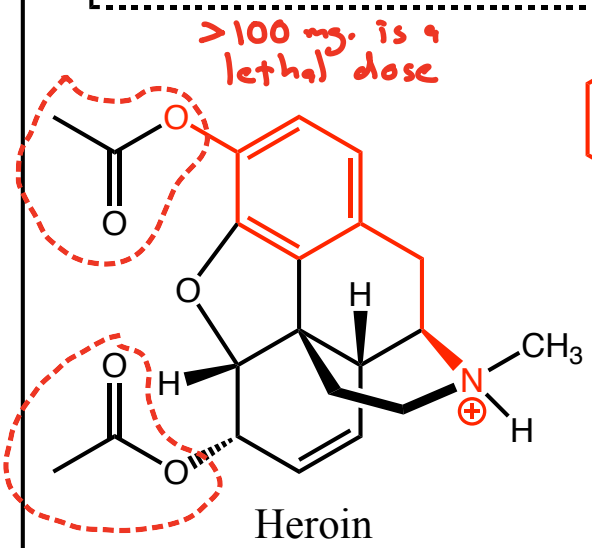
Met-enkephalin



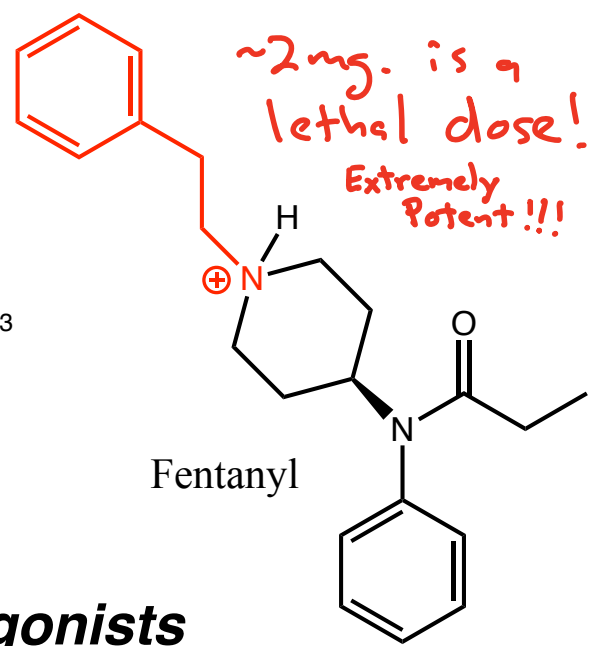
VERY difficult to synthesize this complex ring system

Morphine

Isolated from poppies grown in the Middle East

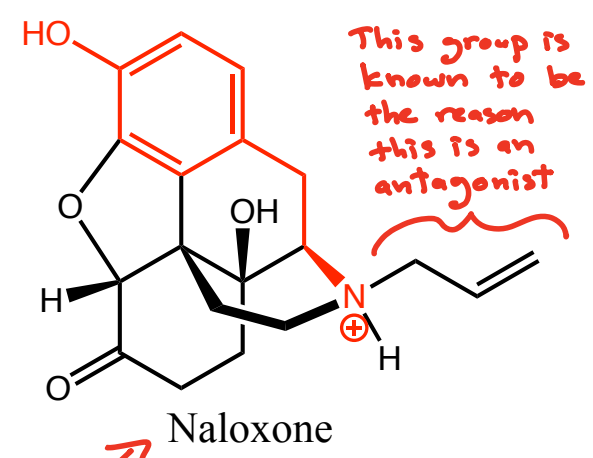


Heroin



Fentanyl

Mu-Receptor Agonists



Naloxone

Antagonist

This group is known to be the reason this is an antagonist

Means it binds to receptor and activates it

Too easy! { VERY easy to make!

Synthesized from natural morphine analog in a couple of easy steps

Means it binds to receptor but does not activate it

HEALTH

Why fentanyl is deadlier than heroin, in a single photo

By Allison Bond Sept. 29, 2016

[Reprints](#)



Menu

ONE PILL CAN KILL

DEA Fentanyl Seizures in 2024

In 2023, DEA seized more than 79.5 million fentanyl-laced fake pills and nearly 12,000 pounds of fentanyl powder. The 2023 seizures are equivalent to more than 376.7 million lethal doses of fentanyl.

The 2024 fentanyl seizures represent over 93.7 million deadly doses. *

17,900,000+

1,813+ lbs.

Millions of Fentanyl
Pills Seized

Pounds of Fentanyl
Powder Seized

* 2 mg of fentanyl equates to a potentially deadly dose





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PRESS RELEASE

13 Arrested in Connection with an LSD, Fentanyl and Methamphetamine Trafficking and Money Laundering Scheme Occurring in the West Campus Area of the University of Texas at Austin

Friday, December 4, 2020

Share



For Immediate Release

U.S. Attorney's Office, Western District of Texas

Jake Ehlinger's family releases statement saying Texas player died of accidental overdose



Brian Davis
Hookem

Published 4:56 p.m. CT Oct. 21, 2021 | Updated 3:54 p.m. CT Oct. 22, 2021



Remembering Texas linebacker Jake Ehlinger

Jake Ehlinger, younger brother of former Longhorns quarterback Sam Ehlinger, was found dead on May 6, Austin police said. *Austin American-Statesman*

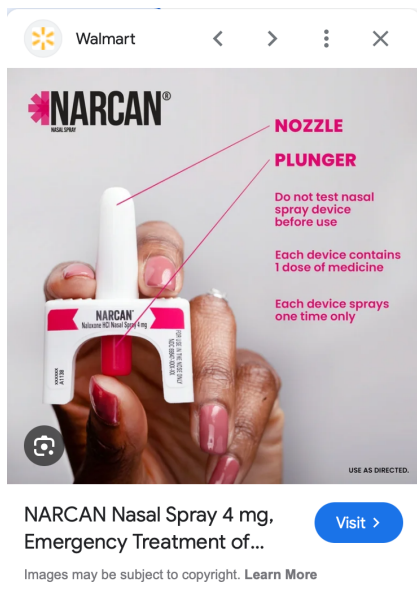


SHIFT is ready for a different conversation.



For decades substance use and college campuses have been talked about as an inevitable rite of passage for college students, creating a norm that can far out shadow the dynamic pursuits of college students that revolve around academics and future opportunities.

SHIFT engages the community in dialogue that changes the culture of campus substance use from one of misuse to one of well-being.



Should I carry naloxone?

Sometimes it can be difficult to imagine how one person can have an impact on the culture of substance use – but you can! By carrying naloxone and learning the right way to administer it to someone having an opioid overdose, you have the potential to save a life. Even if you don't personally know anyone using opioids, you may find yourself in a situation where having naloxone on hand could make a huge difference. By showing that you care and taking the time to learn, you're helping to raise awareness about how important it is for each of us to play a part in shifting the culture of substance use.

How do I use naloxone?

Okay, so now you know what naloxone is, and why it's so important – but how do you actually use it on someone experiencing an opioid overdose? Great question – luckily, Operation Naloxone at UT provides free trainings for students, staff, and faculty. Email shift@utexas.edu for more information. [Request an Operation Naloxone training.](#)

How do you administer the nasal spray version of naloxone (Narcan)?

- Open the Narcan package, place the nozzle in the person's nostril and press the plunger.
- [View the CDC video](#) on how to administer Narcan.

Where can I find naloxone?

- Naloxone is available for distribution to all students, faculty, and staff at the Perry-Casteneda Library security front desk, the Longhorn Wellness Center (SSB 1.106), and the Center for Students in Recovery (Belmont 222).
- Naloxone is available for emergency access at all residence hall front desks, Sid Richardson Library, the Life Sciences Library, the Perry-Casteneda Library, and through UTPD.
- Many pharmacies dispense naloxone without a prescription, but there may be a copay depending on the insurer. You can call your insurance provider in advance to learn more about the potential copay cost.
- In Texas, you can request free naloxone via mail at MoreNarcanPlease.com.
- [Map of free naloxone access sites in Austin.](#)