MTW 2-1

2024年2月1日 14:50

Sp24HWSet2

Homework Problem Set 2 Iverson CH320N Due Monday January 29

NAME (Print): _____

SIGNATURE: _____

Chemistry 320N
Dr. Brent Iverson
2nd Homework
January 23, 2024

Please print the first three letters of your last name in the three boxes

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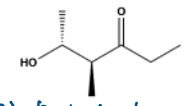
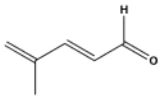
(3 pts each) Write an accurate IUPAC name for the following molecules.



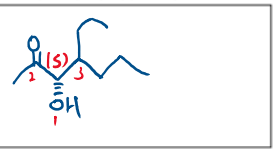
(4S, 5R) - 5 - hydroxy - 4 - methyl - 3 - hexanone

methylhexan - 3 - one



(3 pts each) Draw the correct structure for the given IUPAC name. Use wedges and dashes to show the appropriate stereochemistry where appropriate.

(*S*)-3-hydroxy-4-propyl-2-heptanone



(2R,4R)-2-bromo-4-methylpentanedial

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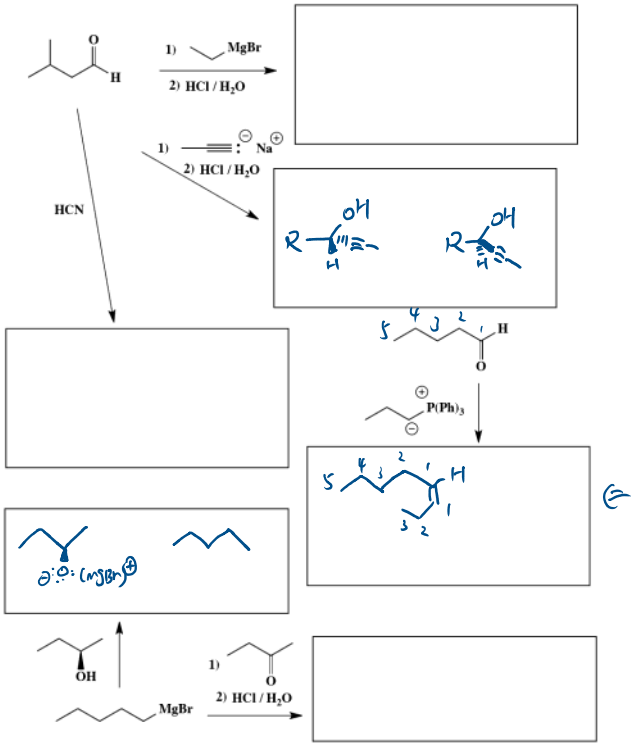
(3 or 5 pts each) Fill in the boxes with the structures that complete the reactions. Use wedges and dashes to indicate stereochemistry when appropriate. If a racemic mixture is formed, you must draw both enantiomers and write "racemic" next to the two structures.



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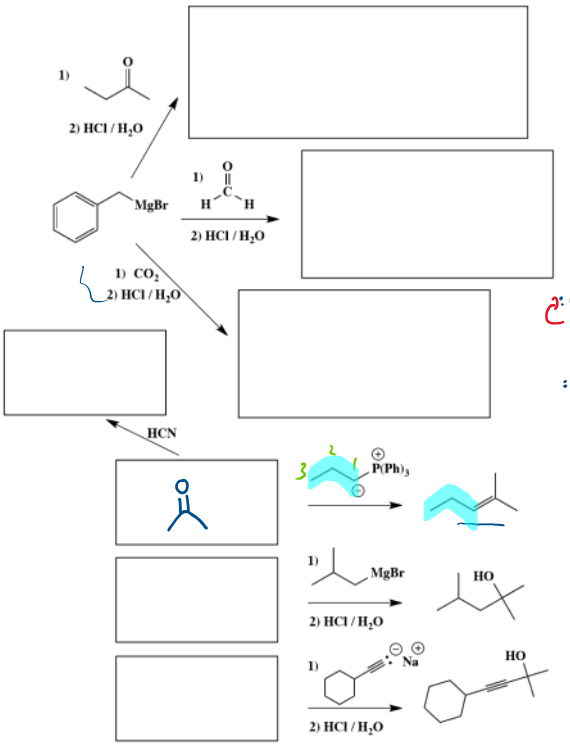

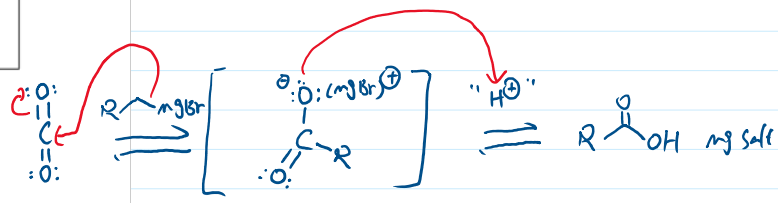

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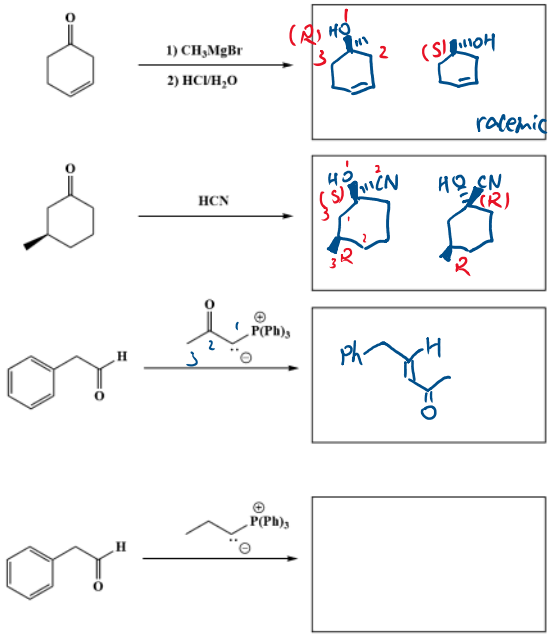
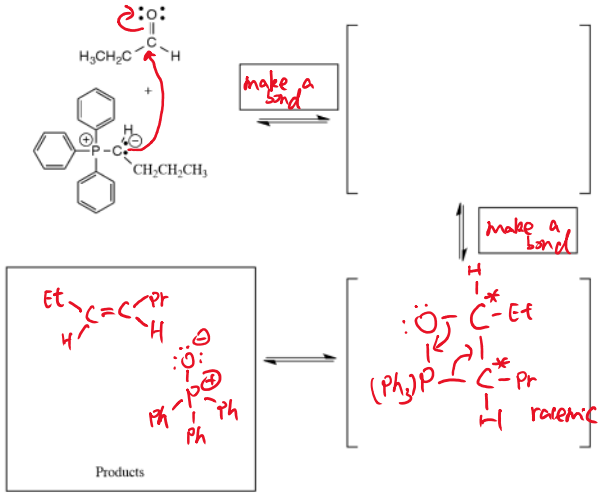
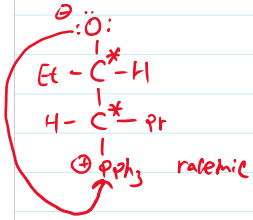


(18 pts. total) Complete the mechanism for the following Wittig reaction. **Be sure to show arrows to indicate movement of all electrons, write all lone pairs, all formal charges, and all the products for each step.** Remember, I said all the products for each step. **IF A RACEMIC MIXTURE IS CREATED IN AN INTERMEDIATE, MARK ALL CHIRAL CENTERS WITH AN ASTERISK AND WRITE RACEMIC. IF A RACEMIC MIXTURE IS CREATED IN THE FINAL PRODUCTS, YOU NEED TO DRAW BOTH ENANTIONMERS, AND WRITE RACEMIC.** I realize these directions are complex, so please read them again to make sure you know what we want.





2 pts In the boxes provided adjacent to the first two sets of arrows, write which of the four basic mechanistic elements are involved (i.e. "Make a bond", "Add a proton", etc.

NOTICE THIS

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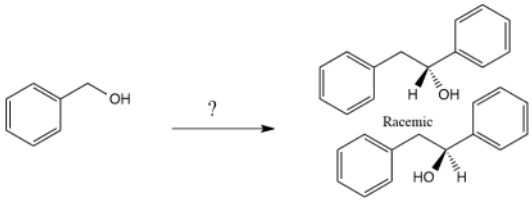
These are synthesis questions. You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned. Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry and stereochemistry preferences for each reaction.

(10 pts) **All of the carbon atoms of the products must come from the starting material for this one!**



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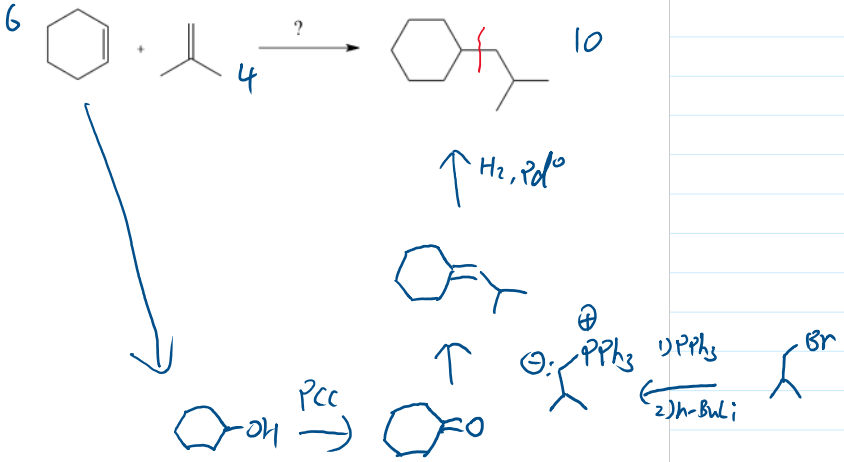
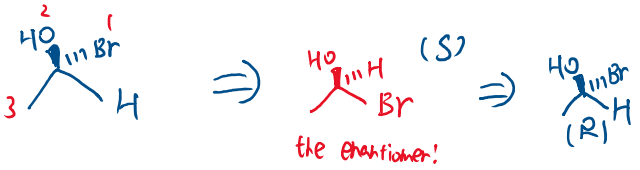
(12 pts) **All of the carbon atoms of the products must come from the starting materials for this one!**





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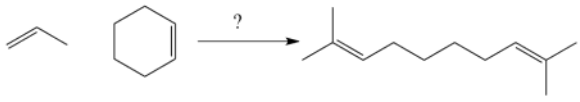

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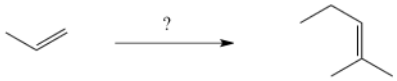
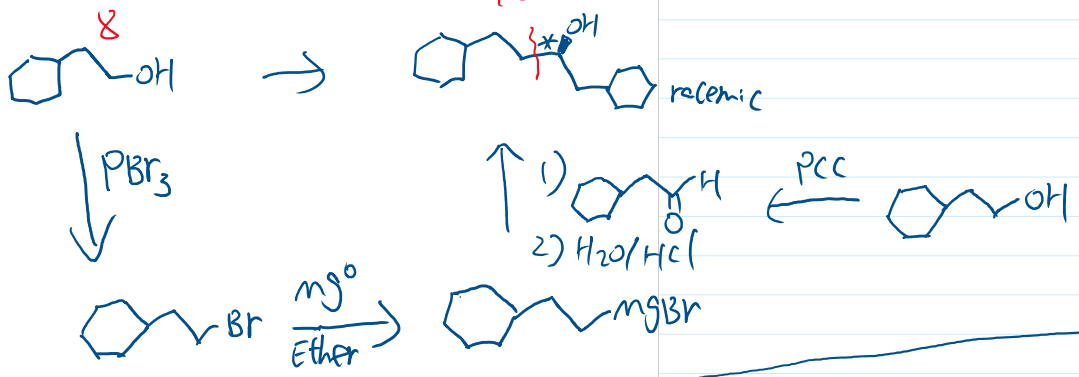
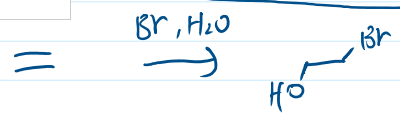
(15 pts) **All of the carbon atoms of the products must come from the starting material for this one!**



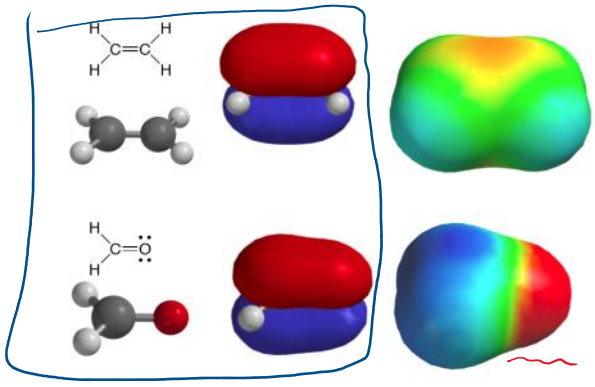
2017 midterm Q16 P15



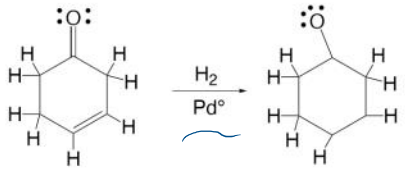
Week 3 Handouts



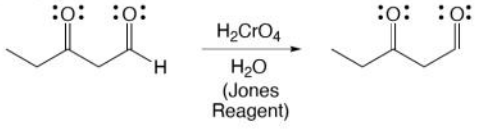
Detour: Hydrogenation and Oxidation of Aldehydes and Ketones



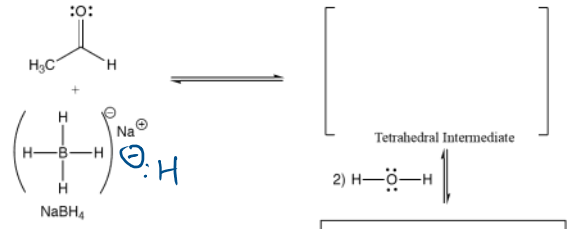
The pi bonds of carbonyls react the same as pi bonds of alkenes with H_2 in the presence of Pt°, Pd° or Ni°



Aldehydes are oxidized to carboxylic acids using the Jones Reagent (H_2CrO_4 in H_2O). Ketones do not react.



Sodium Borohydride Reacting with an Aldehyde or Ketone

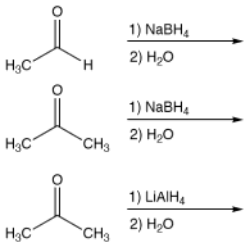


Tetrahedral Intermediate

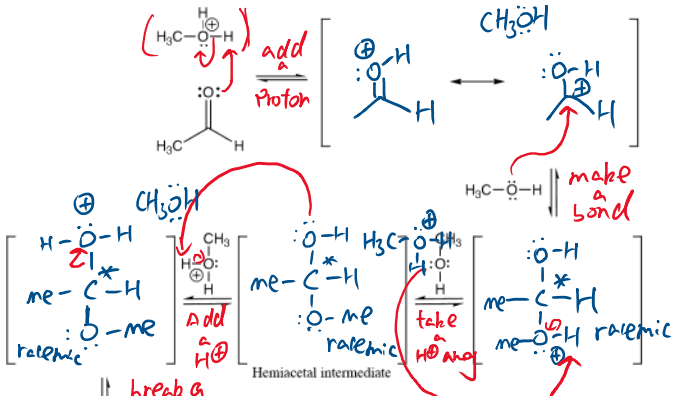
2) H—Ö—H

Key Recognition Element (KRE):

Products



Acid Catalyzed Hemiacetal and Acetal Formation From an Aldehyde or Ketone



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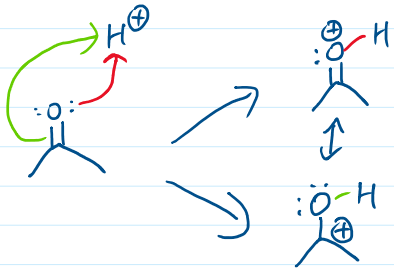
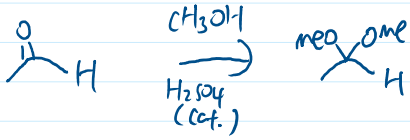
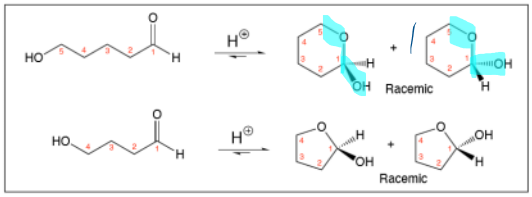
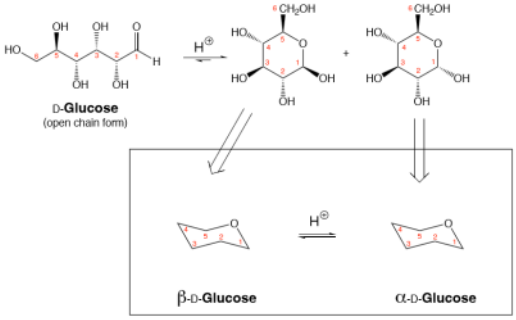
Products

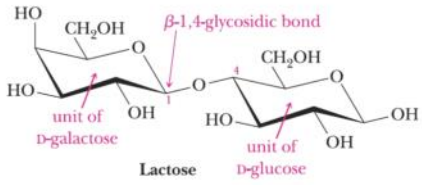


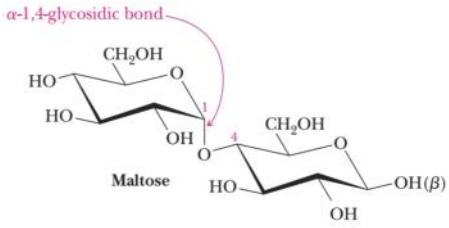


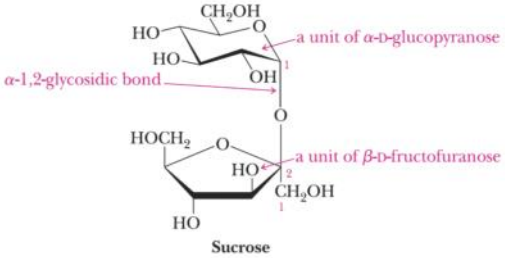
Cyclic Hemiacetals and Carbohydrates



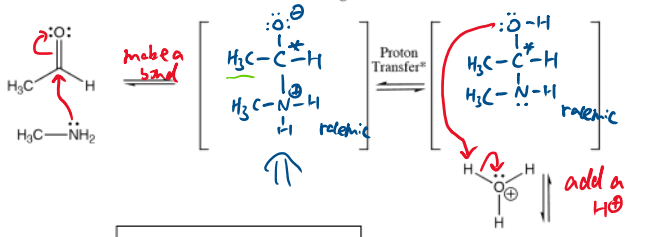




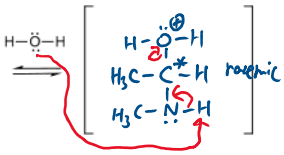




Formation if an Imine (Schiff Base) From an Aldehyde or Ketone Reacting with an Amine



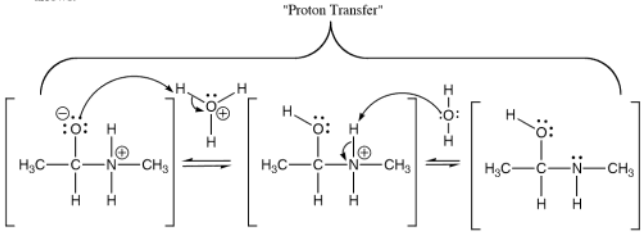
Imine (aka Schiff Base) Products



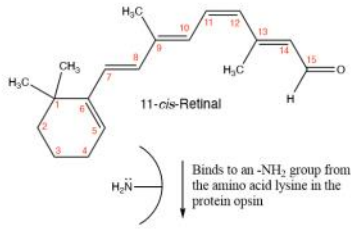
Key Recognition Element (KRE):

Note: this last step might actually occur as two steps in some cases.

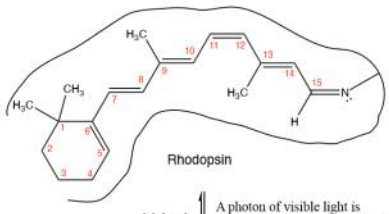
* "Proton Transfer" refers to a situation in which a proton moves from one part of a molecule to another on the SAME MOLECULE. We do not draw arrows for proton transfer steps because that would be deceptive. In some cases, the same proton may move from one part of the molecule to the other directly, but in other cases, solvent molecules may be involved as indicated in the following scheme. To make things even more interesting, the following two steps might even be reversed in some cases. Becuase of all the ambiguity, we just write "Proton Transfer" and do not bother with arrows.



How vision works

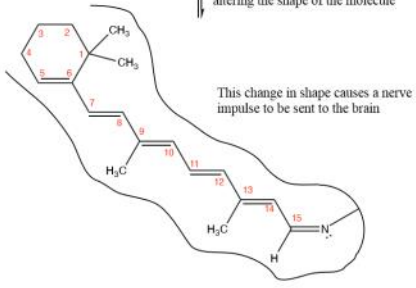


Binds to an -NH_2 group from the amino acid lysine in the protein opsin



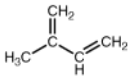
Molecule resets

A photon of visible light is absorbed by the retinal, isomerizing the *cis* bond to *trans*, dramatically altering the shape of the molecule

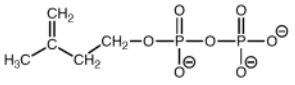


This change in shape causes a nerve impulse to be sent to the brain

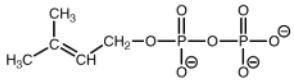
Terpenes



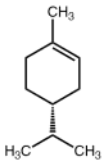
Isoprene



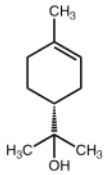
Isopentanyl diphosphate



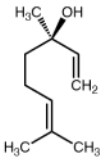
Dimethylallyl diphosphate



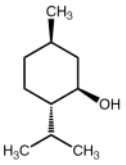
Limonene
(citrus flavor)



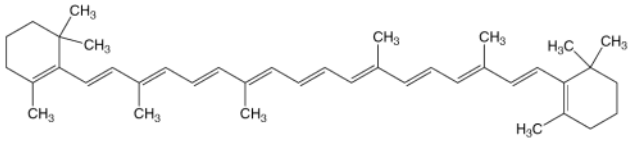
α-Terpineol
(from lilacs, used in perfume)



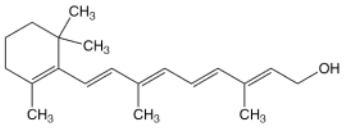
(*R*)-(-)-Linalool
(from lavender, used in perfume)



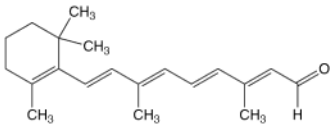
(-)-Menthol
(common flavoring from peppermint)



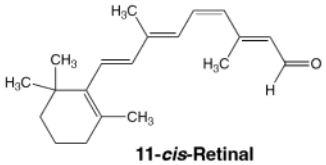
β-Carotene



Vitamin A



All *trans* Retinal



11-*cis*-Retinal