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CEM 351 –Quiz 2	
Fall 2025	
NAME	(●) DOT KEY

Score		

1	○	○	○	○	○	○	○	○
	○	○	○	○	○	○	○	○
	○	○	○	○	○	○	○	○
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●	○	○
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READ THIS!

Bubble in your PID in the space above. Write your answer for each question in the space provided.

LEAVE THIS COVER SHEET ATTACHED TO THE Quiz!

1. _____/10

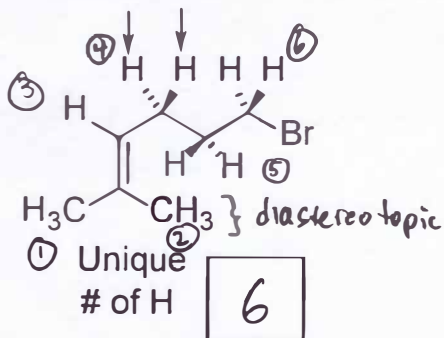
2. _____/14

3. _____/10

4. _____/16

TOTAL: _____/

1) How many kinds of nonequivalent protons (H) are present in the following? That is, how many different proton signals will you observe in a $^1\text{H-NMR}$? Hint: remember topicity and draw out new "molecules" with a "replacement atom" for H's, if you need to. (2 pts)



①/② - Diastereotopic
③ - Unrelated to any other H
④, ⑤, ⑥ - pairs are enantiotopic

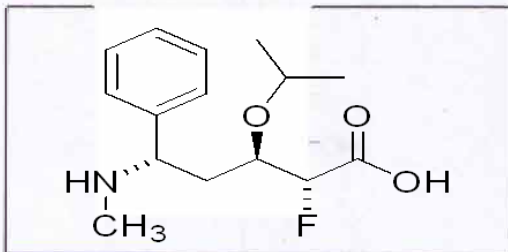
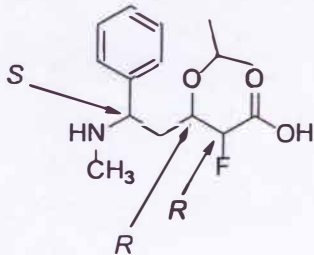
The arrows are for the next problem!

2) Identify the indicated sets of protons designated with arrows in the problem above as (U)nrelated, (I)dentical (also called Homotopic), (E)nantiotopic, or (D)iastereotopic (2 pts)

E

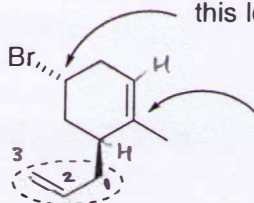
Write U, I, E, or D

3) CLEARLY Draw the compound below with wedged (\blacktriangle) and/or dashed (\cdots) lines to show the 3-D aspect of the chirality centers. (3 pts)



4) Naming: (3 pts)

What is the *R/S* stereoisomerism of this location? S



What is the location number for the attached substituent? # 1

What is the name of the circled substituent above?

(Hint: a number is included in the name)

(2)-propenyl

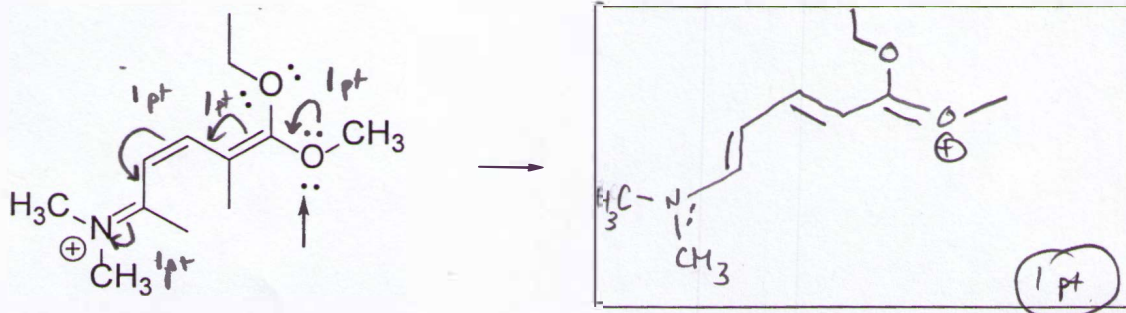
location of 1st C of $\text{C}=\text{C}$ "1" is attached to ring

suffix required because this is a substituent

1A

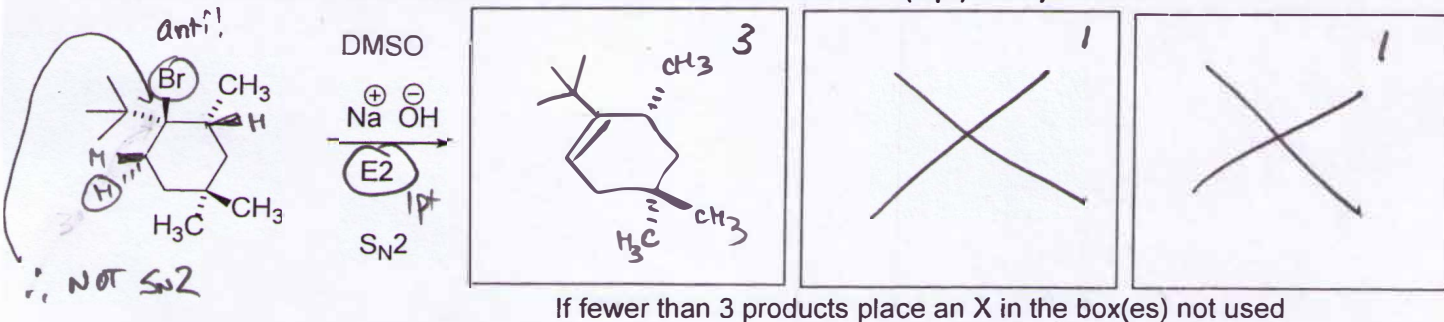
NOT 2-propene (incorrect for substit)

5) (5 pts total) Resonance Revisited. Draw a resonance structure in the box (1 pt) where the oxygen (arrowed) gains a formal charge and the nitrogen loses its charge – no other atom should gain a charge. Draw CURVED ARROWS on the structure on the left to show the movement of electrons that yield the resonance structure you drew. (5 pts)



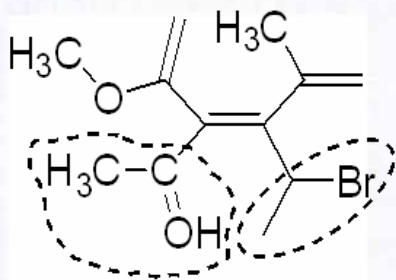
6) (6 pts total) Using the conditions shown, draw ALL the product(s) for the MOST LIKELY reaction mechanism below (E2 or S_N2 below) (Include stereoisomerism, if necessary). (5 pts)

Circle the MORE FAVORABLE reaction mechanism below the arrow . (1 pt) Take your time.




CIRCLE THE MORE FAVORABLE MECHANISM ABOVE

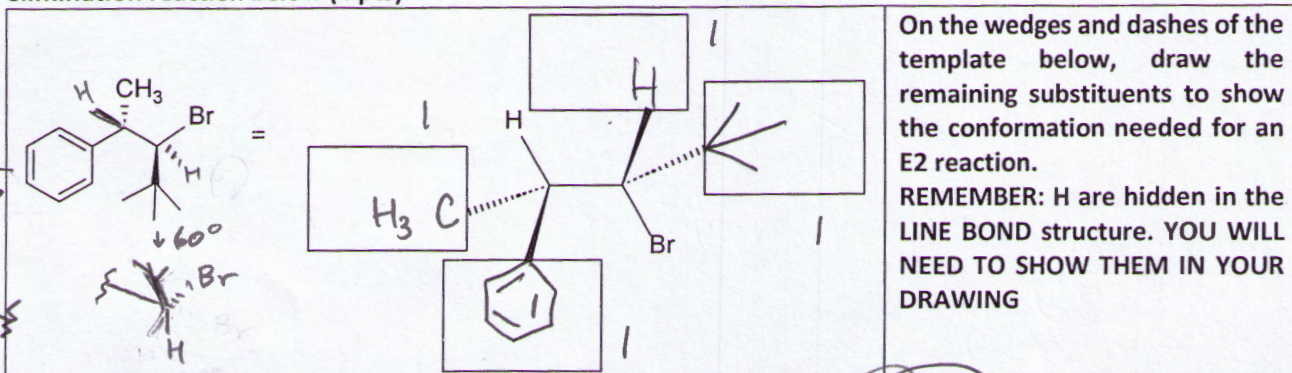
7) Assign E or Z configuration (1 pt each). CIRCLE the highest priority group attached to each sp² Carbon used to assign the configuration. (1 pt for each circle) (3 pts total)

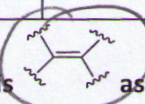


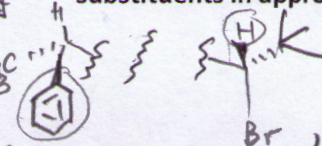
Z





REM: CIRCLE the highest priority groups

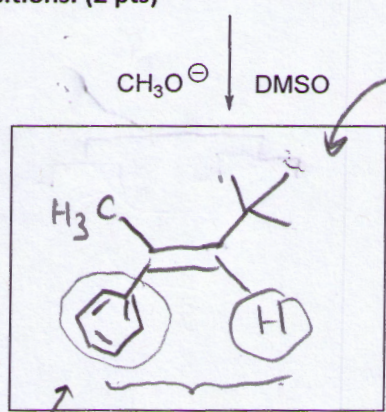
8) Rotate the molecule so that the H and Br are *anti* in the plane-of-the-paper (like this ) for the elimination reaction below (4 pts)



9) Now, draw the E2 product from the starting material (above) (like this ) as shown in class) with substituents in appropriate positions. (2 pts)




NOTE
 / H on same side w/  (wedges)
 CH₃ /  on same side w/  (dashes)



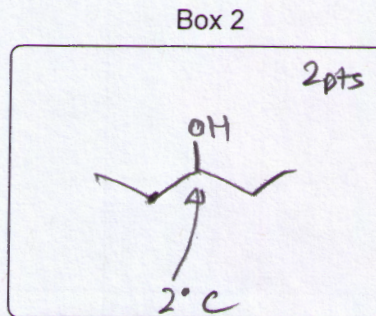
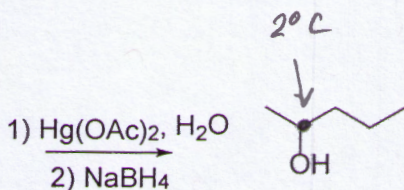
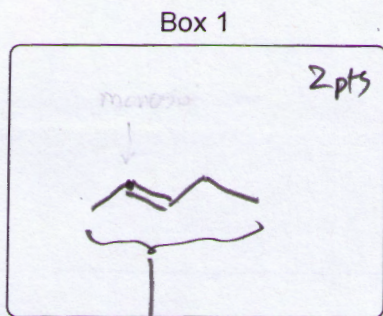
NOTE consistency in drawing as per instructions

NO penalty at this stage of class if drawn geom. incorrect

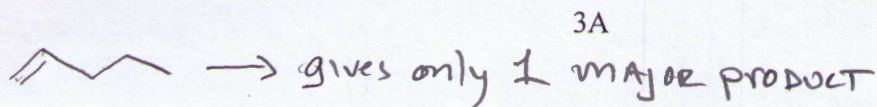


Therefore alkene  Same side of alkene

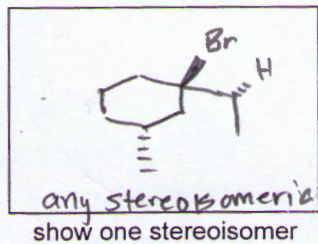
10) (4 pts total) Draw the alkene reactant in BOX 1 that can give the product shown as one MAJOR. (2 pts) In BOX 2, what is the other alcohol obtained, as an equally MAJOR product, from the alkene you drew in BOX 1 (2 pts)?



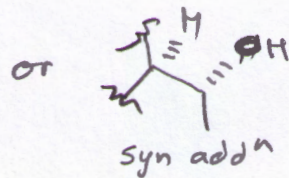
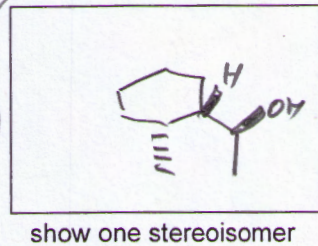
only this alkene gives 2 major products



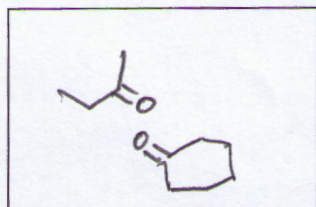
11) Draw the MAJOR (most abundant) product made in the reaction. USE WEDGED AND DASHED BONDS TO DEMONSTRATE SYN/ANTI ADDITION. (16 pts)



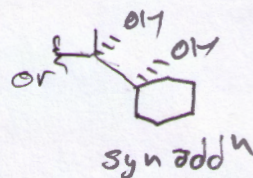
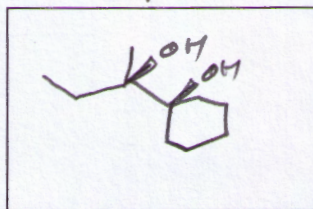
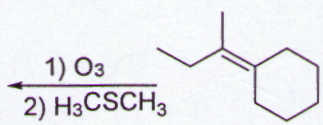
NOT STEREOSPECIFIC BUT REGIOSPECIFIC
 HBr
 addⁿ would work



stereospecific + regio specific

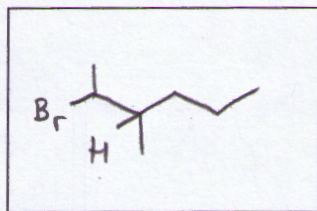


Draw all final products coming from alkene skeleton

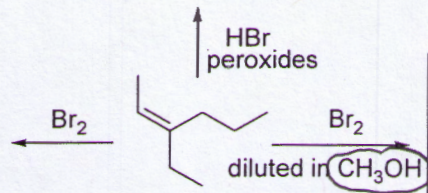
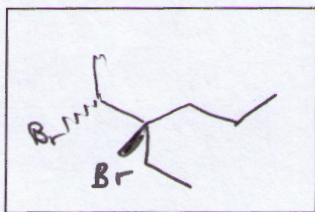


stereospecific

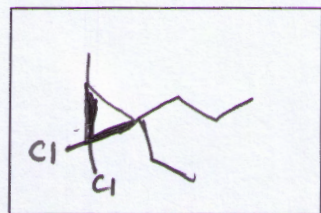
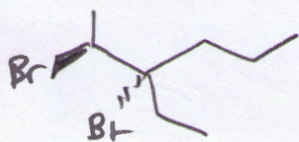
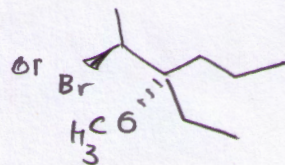
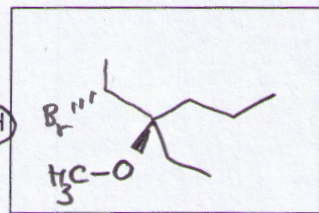
Show More Abundant Product



Regiospecific, non-stereospecific
 "ANTI-MARKOVNIKOV"



anti-addⁿ and regio specific



carbene addⁿ

