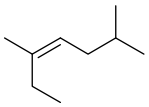
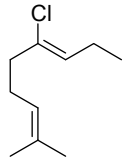
CHM 1321 A
Mid Term 2 Version 1 Answers

1. Name the following compounds (**6 points**):

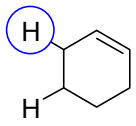
a) 

Z-3,6-dimethylhept-3-ene (3)

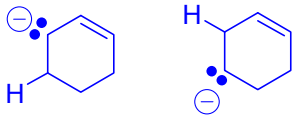
b) 

Z-6-chloro-2-methylnona-2,6-diene (3)

2. a. Compare the two hydrogens shown in this compound and circle the one that is more acidic. (**1 point**)

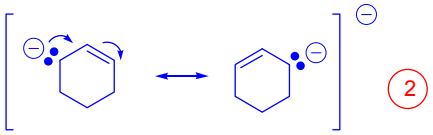


a. Draw the two possible conjugate bases (**2 points**).



b. For your answer above, identify which of the conjugate bases is more stable and briefly justify your answer (**4 points**)

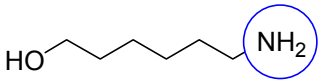
resonance is possible with the compound on the left (2)



(2)

resonance stabilizes conjugate bases by spreading out the charge

3. a. Compare the two nucleophiles shown in this compound and circle the one that is more nucleophilic. (**1 point**)



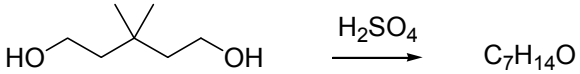
b. What is the most fundamental definition of a nucleophile? (**1 Point**)

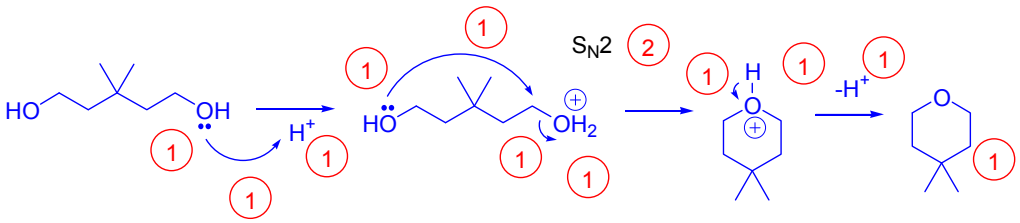
Electron pair donor

c. Justify your answer for part a (**4 points**)

Nitrogen is to the left of oxygen on the periodic table (1 Point)
Nitrogen is therefore less electronegative than oxygen (1 Point)
Nitrogen holds electrons less tightly than oxygen (1 Point)
Nitrogen donates electrons better than oxygen (1 Point)

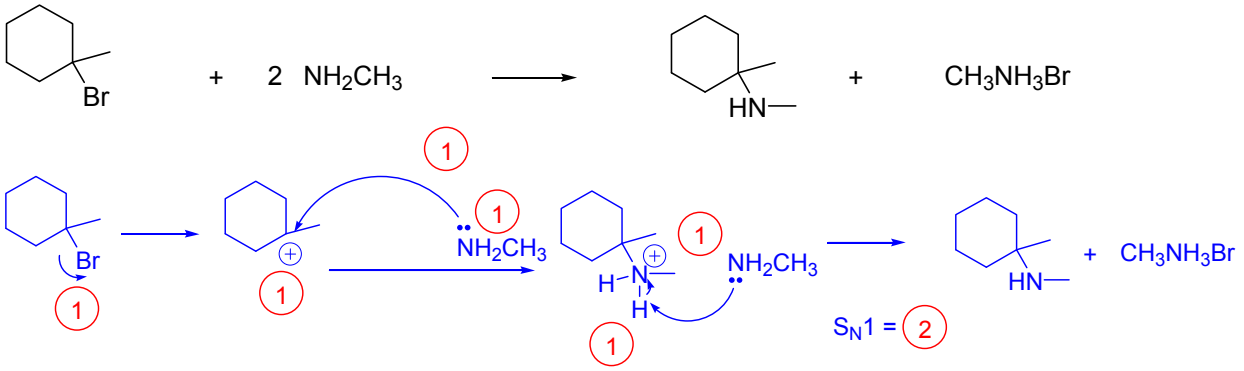
4. Write a detailed mechanism for this transformation (**13 points**).





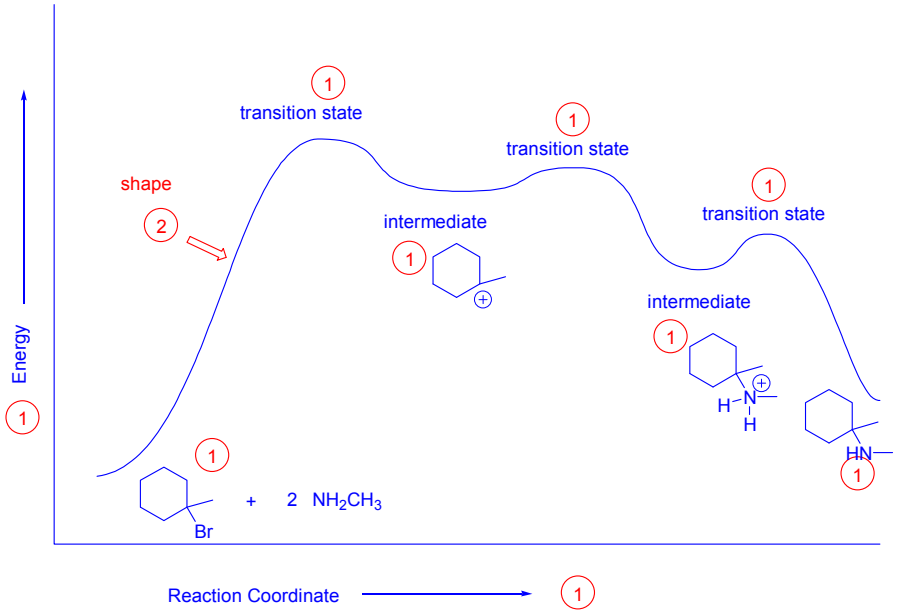
5.

(a)Write a detailed mechanism for the following process. (**8 points**)

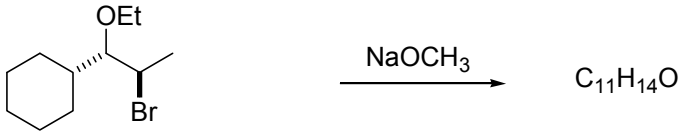


(b)

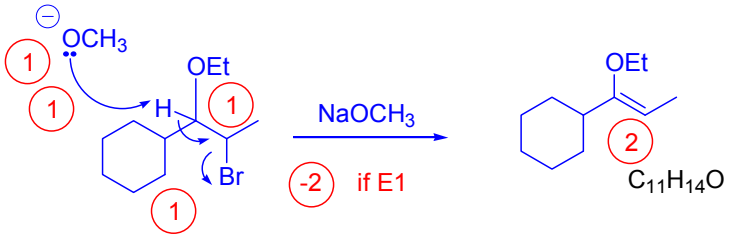
Draw the reaction co-ordinate diagram for the process shown above. Label the starting materials, products, transition state(s) and any intermediate(s). (**11 points**).



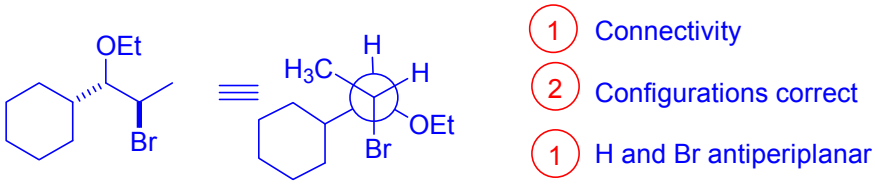
6. Consider the following reaction:



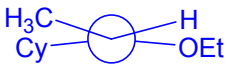
a) Draw the mechanism of the reaction and the structure of the product neglecting stereochemistry (**6 points**).



b) Draw the Newman projection of the starting material in its reactive conformation (**4 points**).



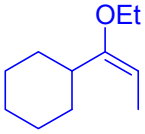
c) Draw the product using a Newman projection. (**3 points**).



1 Newman

2 Newman must match part b

d) Draw the starting material using line notation indicating the correct stereochemistry (**2 points**)



e) What is the stereochemical relationship between the hydrogen and leaving group in the transition state? (**1 point**)

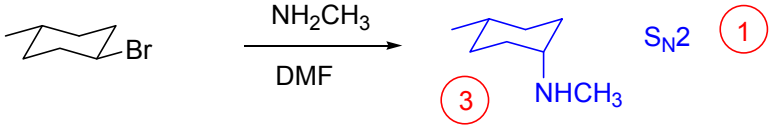
Antiperiplanar

f) What is the configuration of the alkene formed? (**1 point**)

E

7. Supply the missing products or starting materials as necessary. Indicate what type of reaction is occurring for each. (**16 points**)

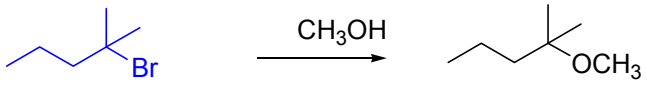
a.



S_N2 1

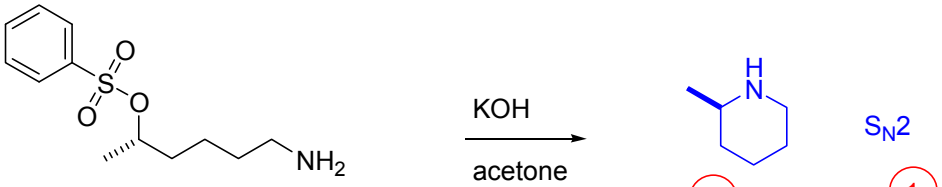
3

b.



3 S_N1 1

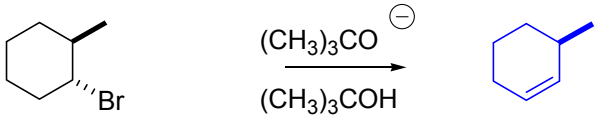
c.



S_N2 1

3

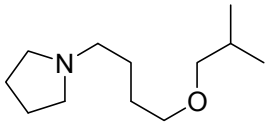
d.



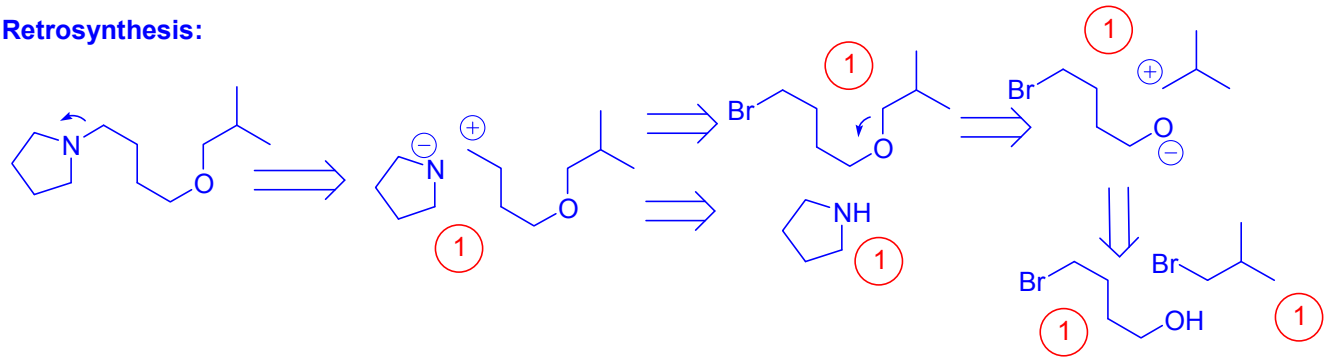
3 Structure

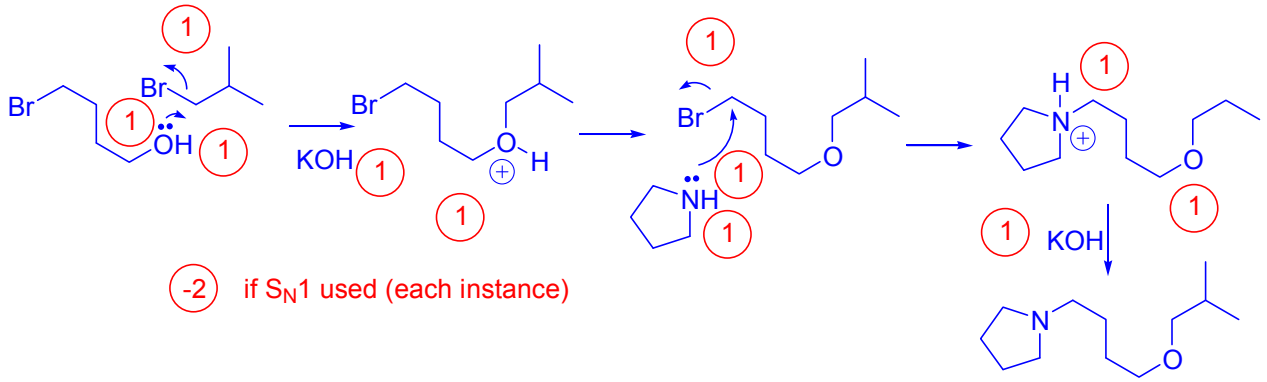
1 E2

8. Suggest a synthesis of the following compound. You may use any starting material containing four carbons or less. Be sure to include a retrosynthesis. (**17 points**)



Retrosynthesis:

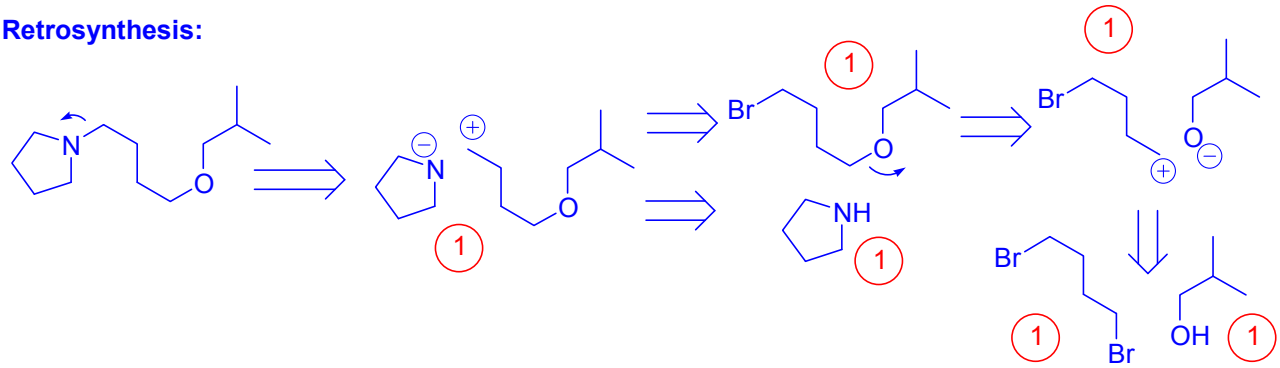




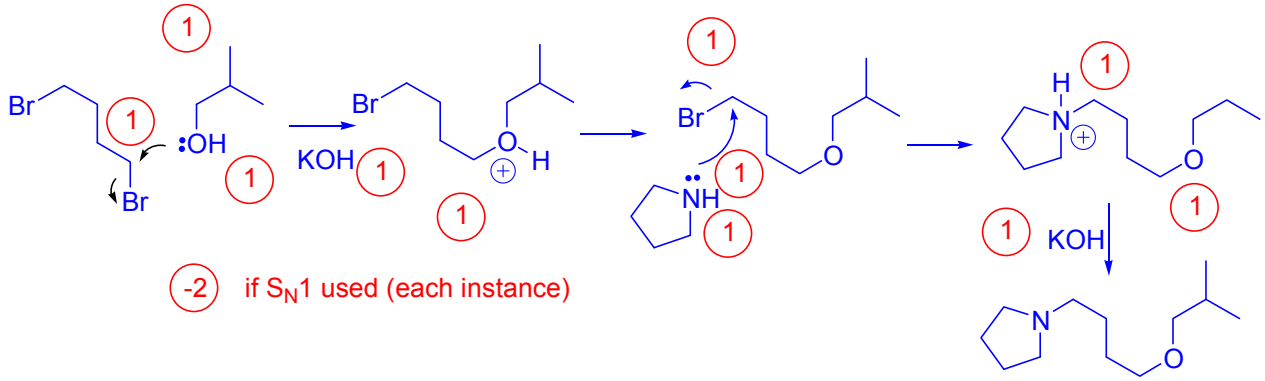
-2 if S_N1 used (each instance)

Alternative solution:

Retrosynthesis:



Synthesis:



-2 if S_N1 used (each instance)

It is also possible to open the ring. This requires an extra step, but is acceptable

Bonus: Give a mechanism to explain the following reaction: (**3 points**)