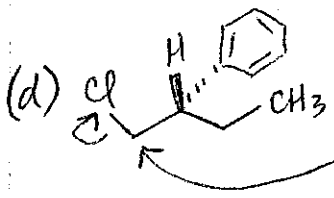
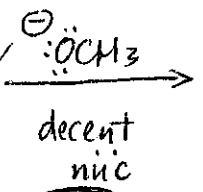
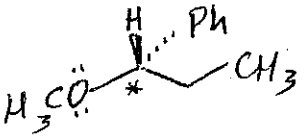
(d) 

1° alkyl halide

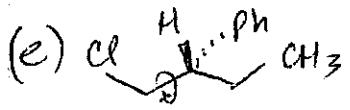


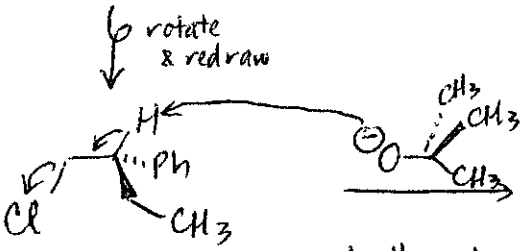
decent nuc

SN2



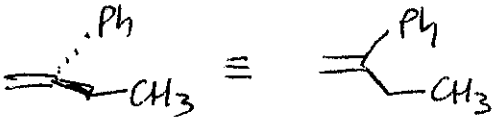
NOTE: no inversion at chiral center (*)

(e) 

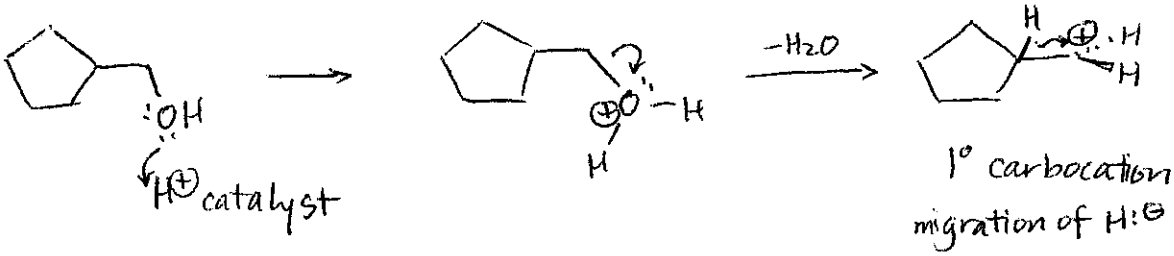


bulky, strong base

E2

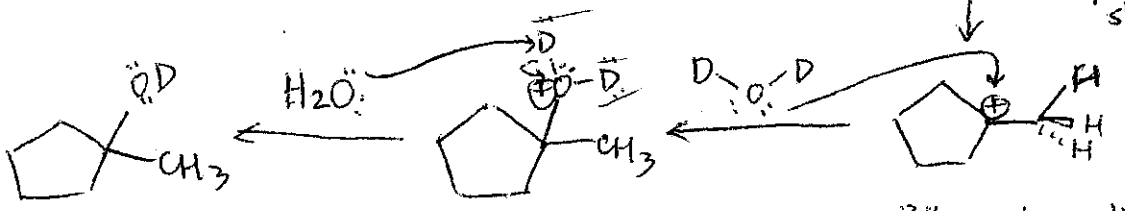


3.



1° carbocation migration of H:⊖ gives 3° carbocat.

1,2-hydride shift



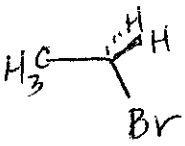
3° carbocation (more stable)

(+, $^{H}_{3}O^{+}$)

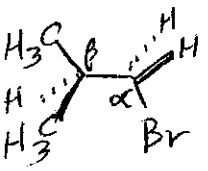
regenerate catalyst

In drawing mechanisms, you should be VERY CLEAR about where you want to push your electrons. The details shown here are what I would expect for, say, an exam answer. ☺

4.



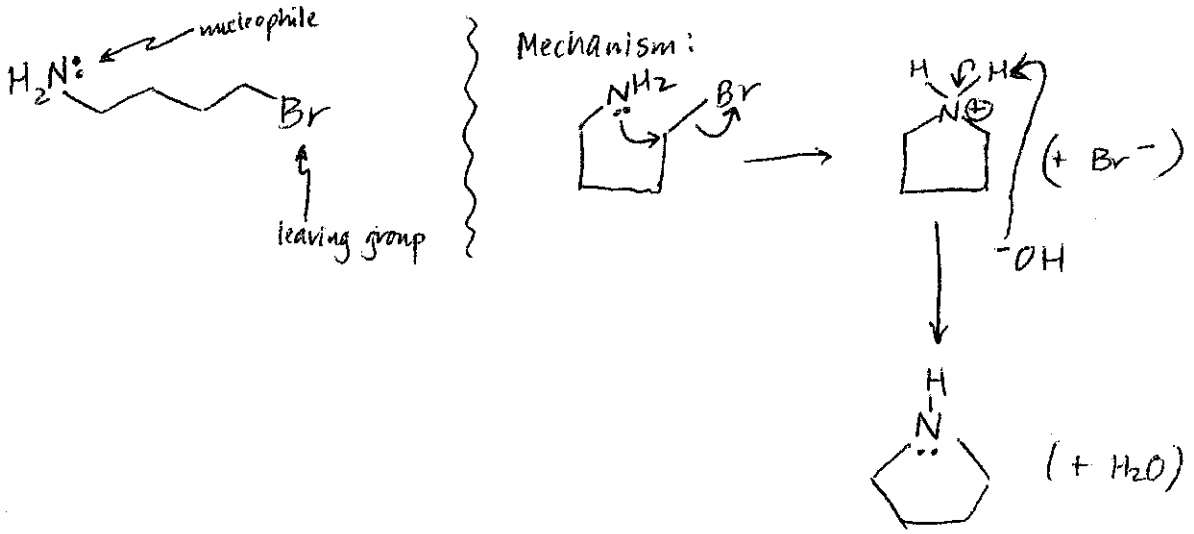
ethyl bromide
1°



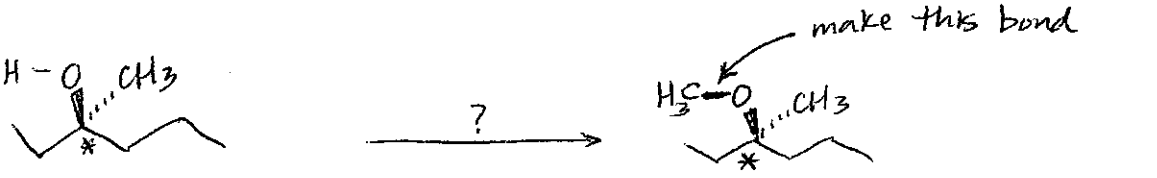
isobutyl bromide
1°, but more sterically hindered

Isobutyl bromide is more sterically hindered than ethyl bromide due to the methyl groups on the β-carbon. The steric hindrance results in reduced reactivity for isobutyl bromide in S_N2 reactions ... and, consequently, more elimination product (via E2) when a strong base is used.

5. What we have here is an intramolecular S_N2 reaction:



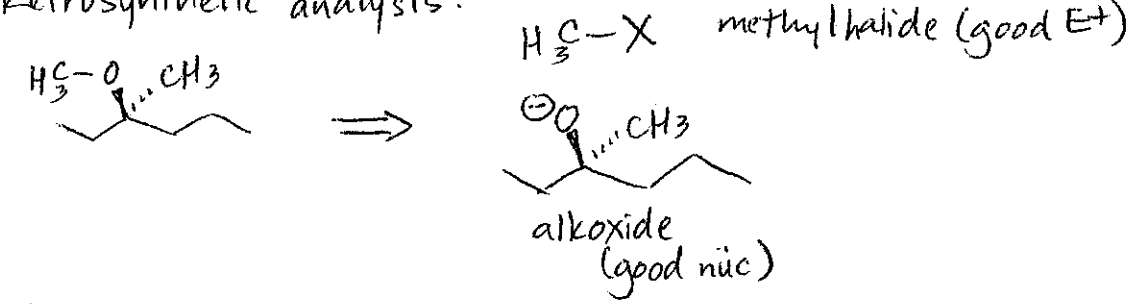
6. (a)



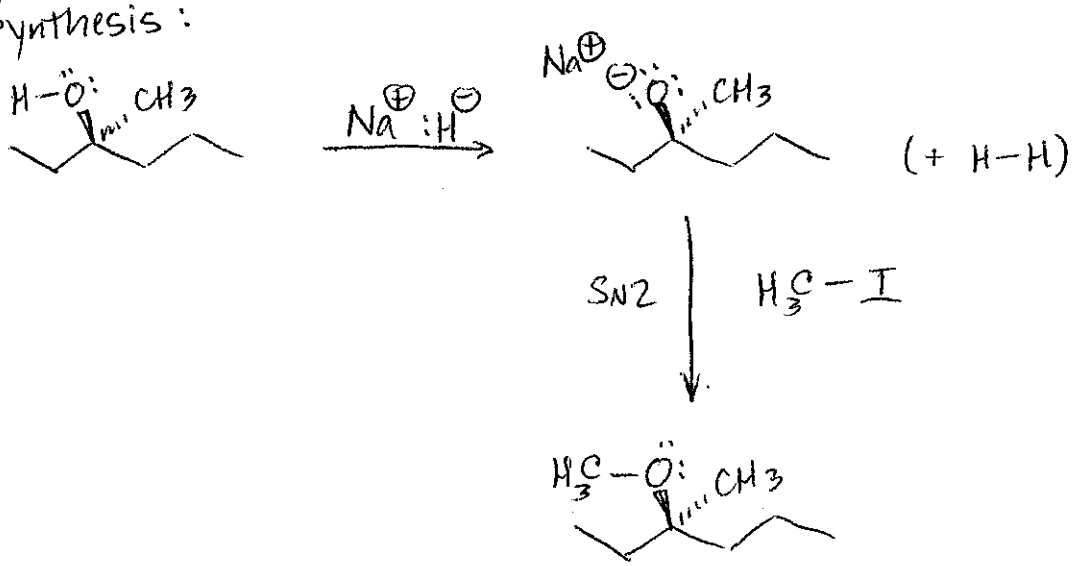
(3R)-3-methyl-3-hexanol → (3R)-3-methyl-3-methoxyhexane

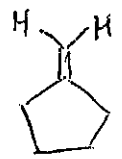
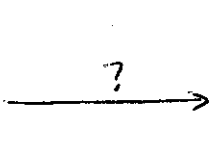
Since the stereochemistry of the chiral carbon (*) is set in the starting material, we don't want to touch it. Instead, focus on indicated (→) bond.

Retrosynthetic analysis:



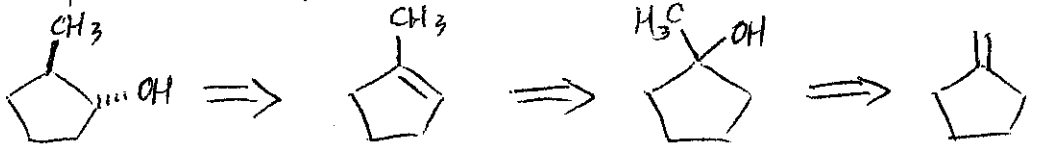
Synthesis:



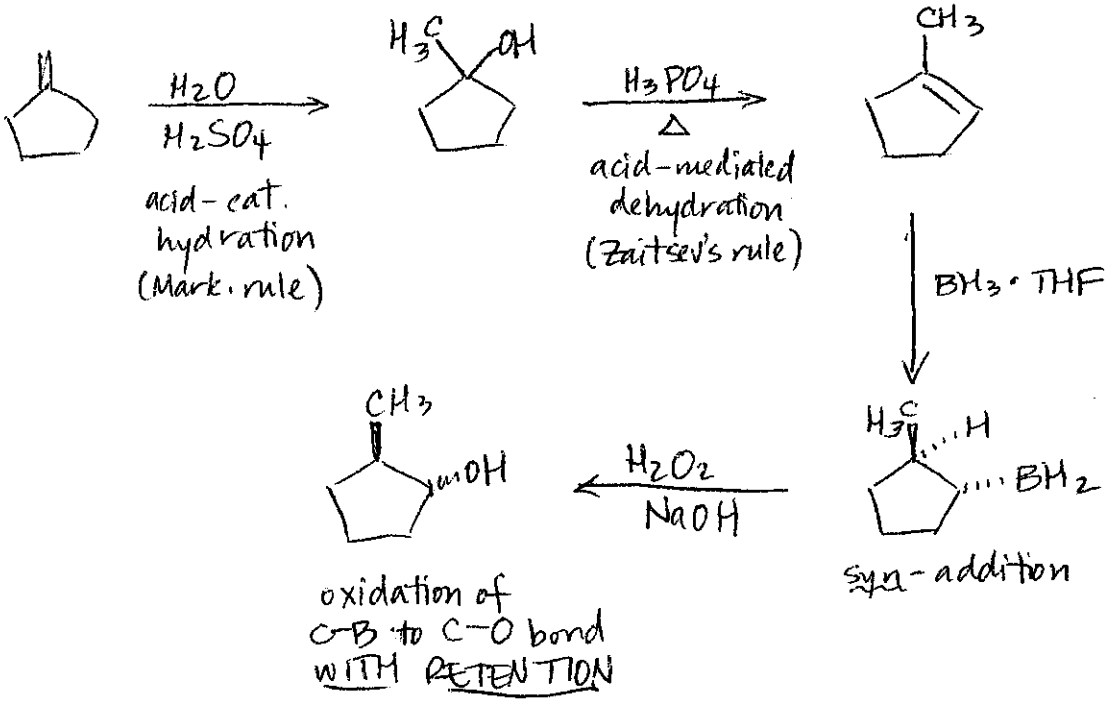
(b)  

methylene cyclopentane — *trans* - 2- methylcyclopentanol

Retrosynthetic analysis:



Synthesis:



This problem provides a good opportunity to review both Markovnikov's and Zaitsev's rules...