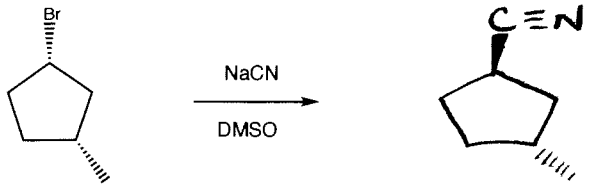
Directions (1-9): Predict the product(s) for the following reactions based on the appropriate mechanism. Indicate their relative quantities if more than one organic product is formed – major / minor / numerical order (if needed). Assume a single dominant mechanism except as noted.

1.



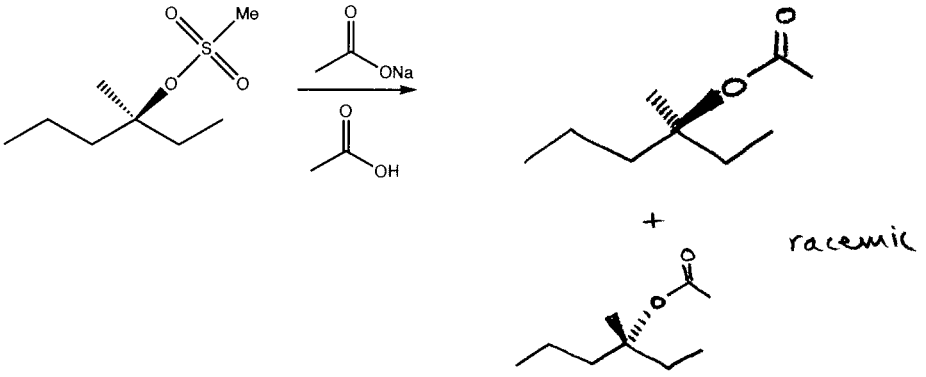
S_N2 Mechanism dominates
Weak base (minimal E2)
polar aprotic solvent facilitates S_N2 (poor nucleophile solvation)

2.

50/50 mix (structural isomers)

E2 dominates
2° subst
strong base
polar protic solvent – minimizes S_N2 competition

3.

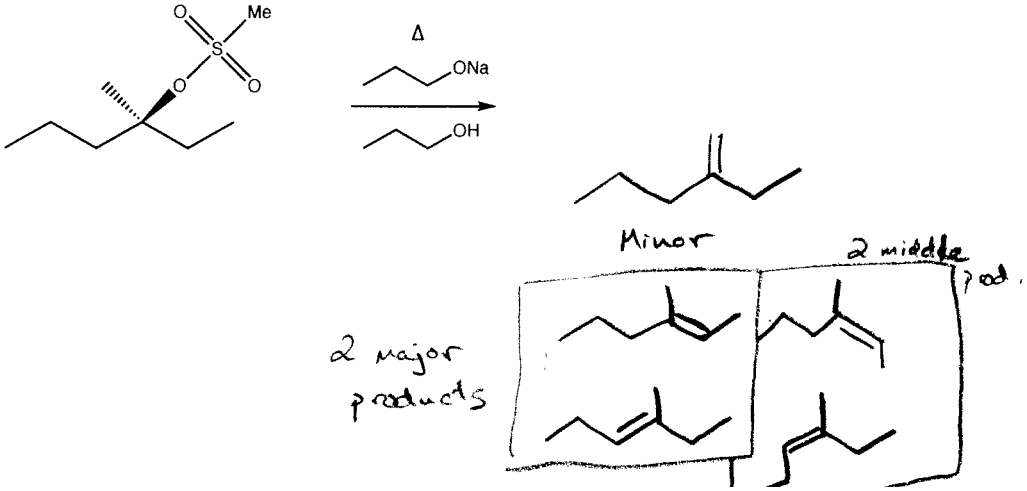


racemic

S_N1 dominates

polar protic solvent (stabilized C+)
3° species (NO S_N2)
weak base nucleophile (min. Elim.)

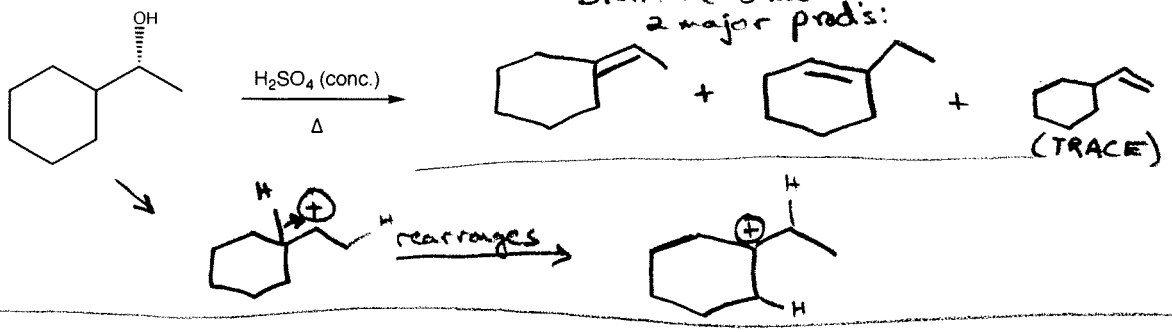
4.



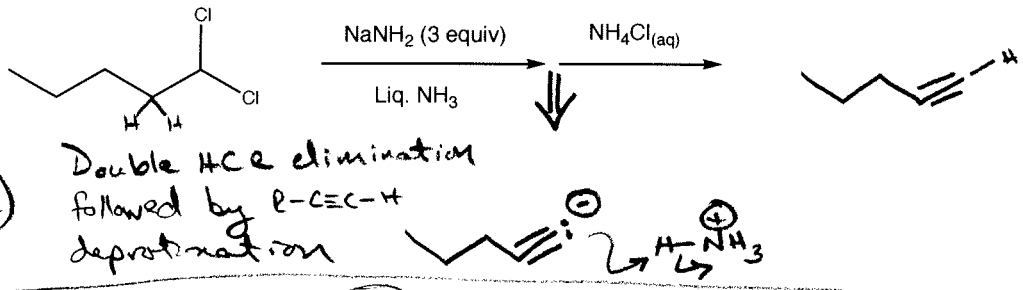
E2 favored (vs. # 3 above);
Heat + strong base – elimination

Some E1 (some product)
S_N1 also occurs to a small extent

5.



6.



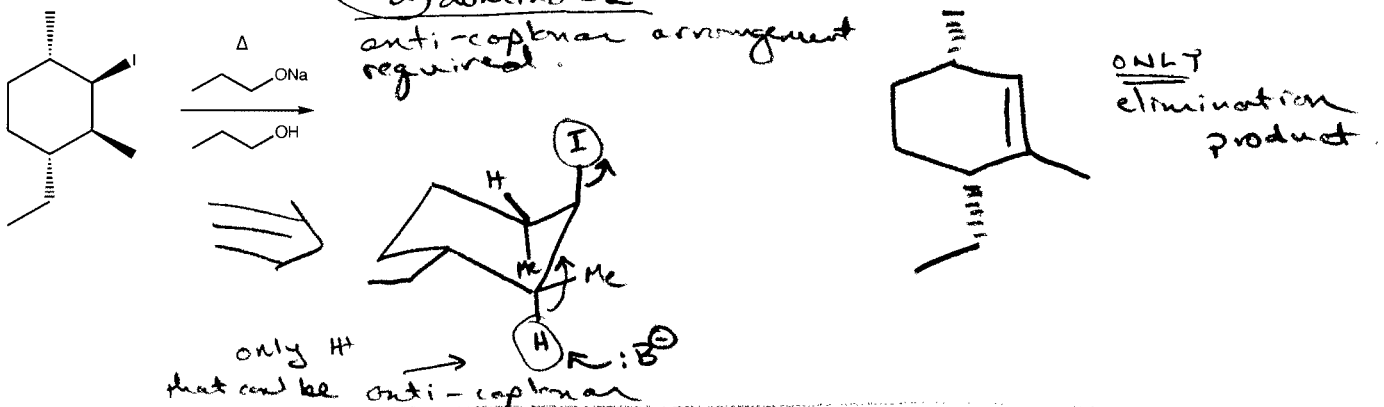
E2

Double HCR elimination followed by R-C≡C-H deprotonation

7.

E2 dominates

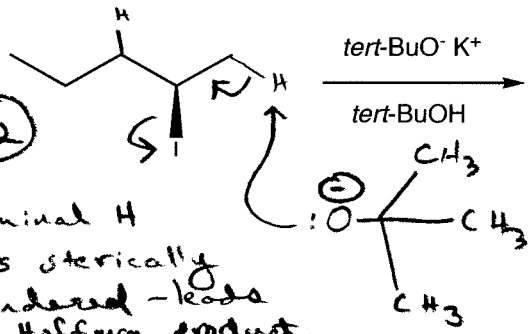
anti-coplanar arrangement required.



ONLY elimination product

only H that can be anti-coplanar

8.



E2

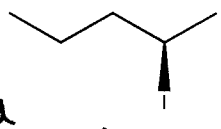
Terminal H less sterically hindered - leads to Hoffman product.

MAJOR (1)

MINOR (2)

MINOR (3)

9. Two mechanisms compete strongly for #9:



Small

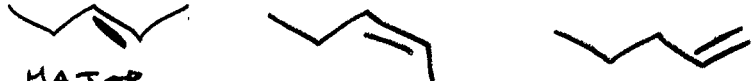
Strong base / strong nucleophile

→ S_N2 / E2 competition

→ However polar, protic solvent favors E2

→ Absence of heat allows for greater S_N2

E2:

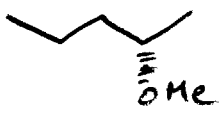


MAJOR (1)

MINOR (2)

MINOR (3)

S_N2:

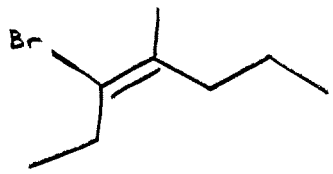


E2 vs S_N relative amount difficult to determine by expt.

10.

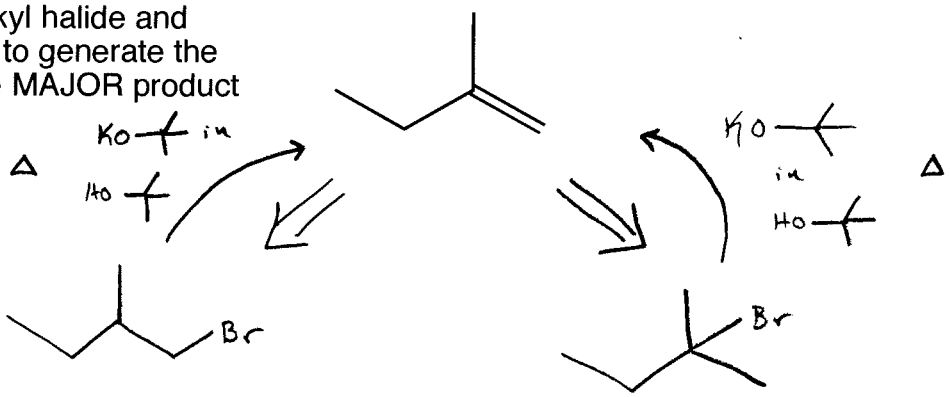
Draw the structure for the following compound:

(*E*)-3-bromo-4-methylhept-3-ene



11.

Suggest a 5-carbon alkyl halide and appropriate conditions to generate the following alkene as the MAJOR product of an elimination.



12. Suggest an alkyl halide and an alkyne - each of 6 carbons or less – that could be used to synthesize the following compounds. Provide other necessary conditions as well.