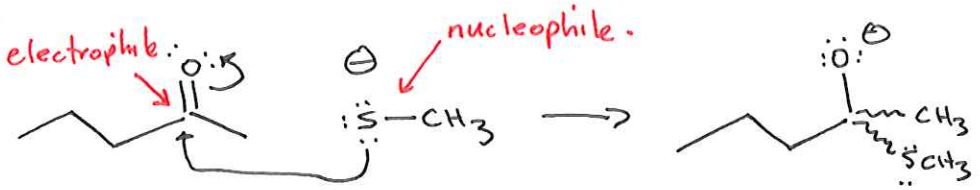
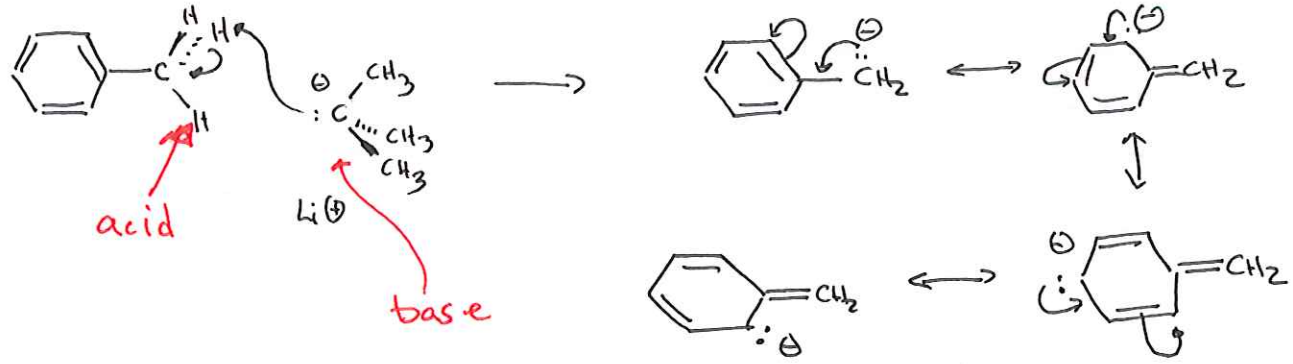
Chem 2500

Assignment #14 – Mechanisms – Answer Key

1. a)



b)



→ while not usually considered a reaction of a nucleophile and electrophile, acid/base reactions can be considered to be a ~~more~~ very specific example. In this case ^tBuLi (→ base) provides a pair of e^- to form a new bond to H^+ (acid).

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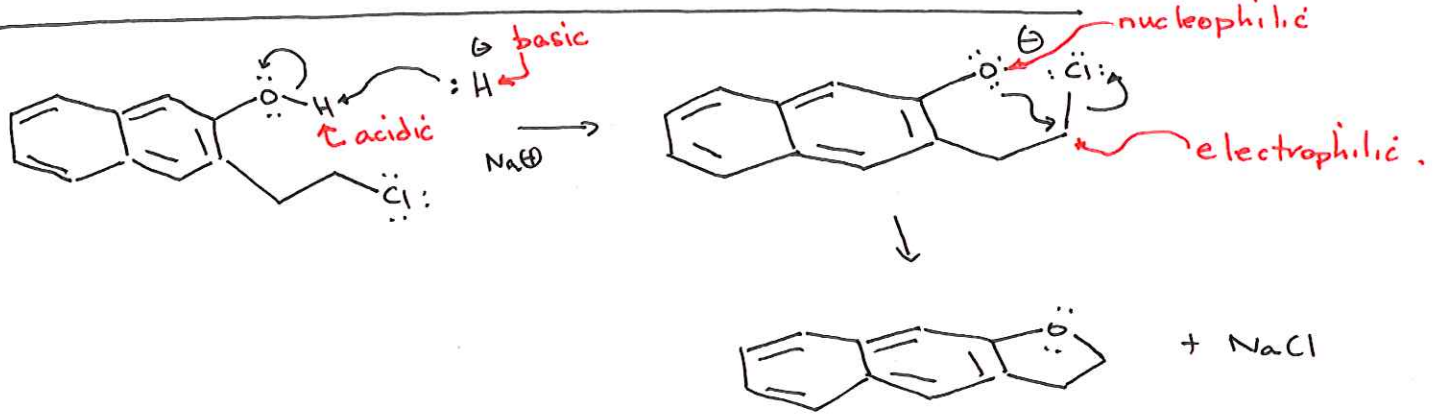
2)



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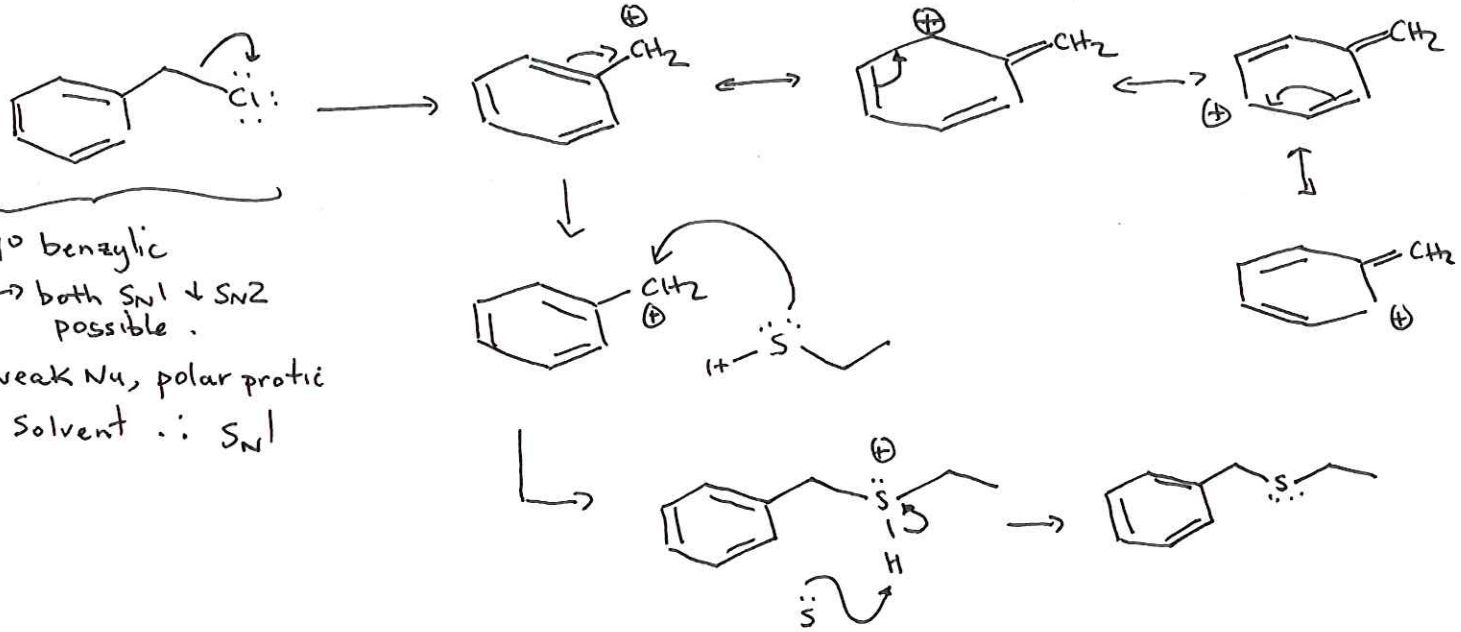
3)



→ 1° benzylic
→ both S_N1 & S_N2 possible.
→ weak Nu, polar protic solvent ∴ S_N1

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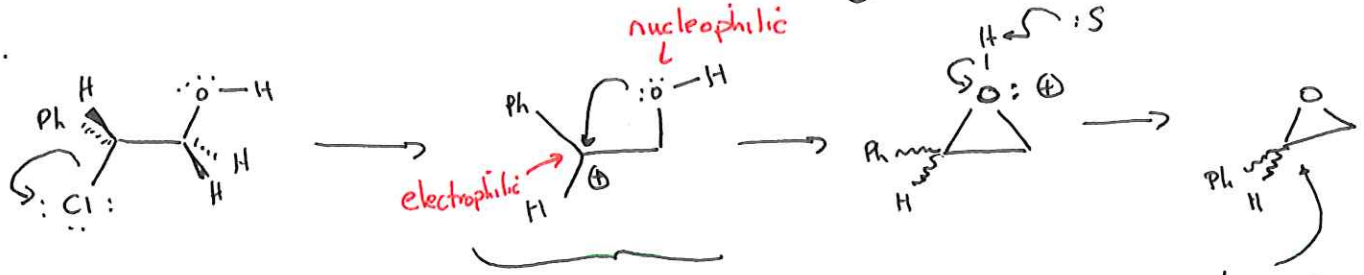
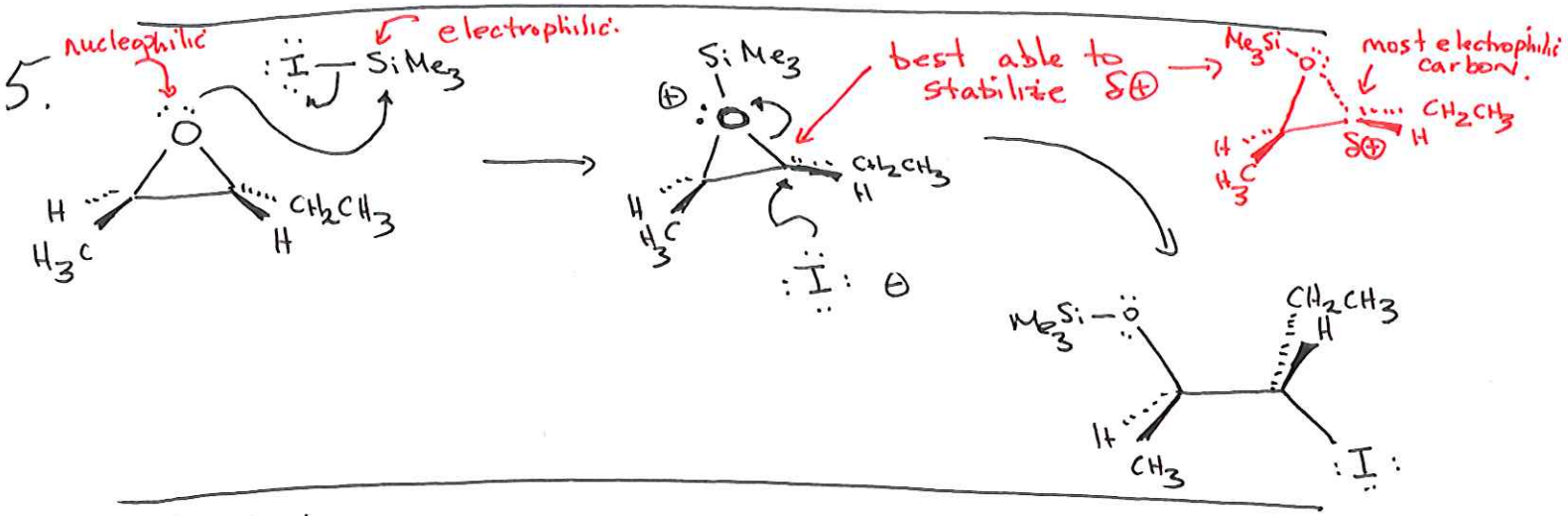
4.



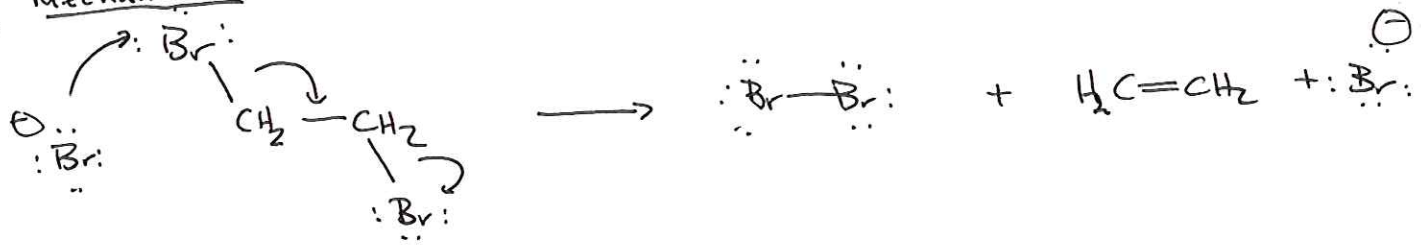
2° benzylic cation ∴ resonance stabilized.

stereochemistry is arbitrary, as S_N1 processes will give a racemic mixture.

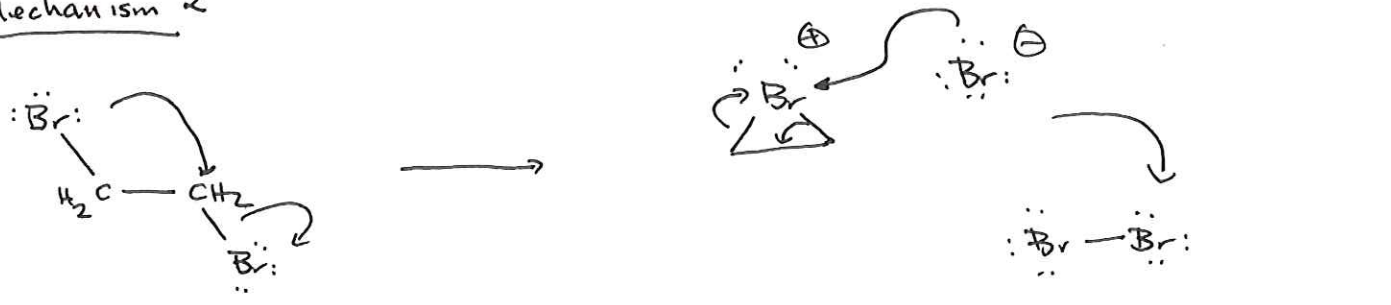
5.



6. Mechanism 1



Mechanism 2



a) Elimination

b) see above

c) rate = k [dibromoethane]

d) Mechanism 2 is operative. Mechanism 1 is bimolecular and would be first order in both [Br^-] and [dibromoethane].

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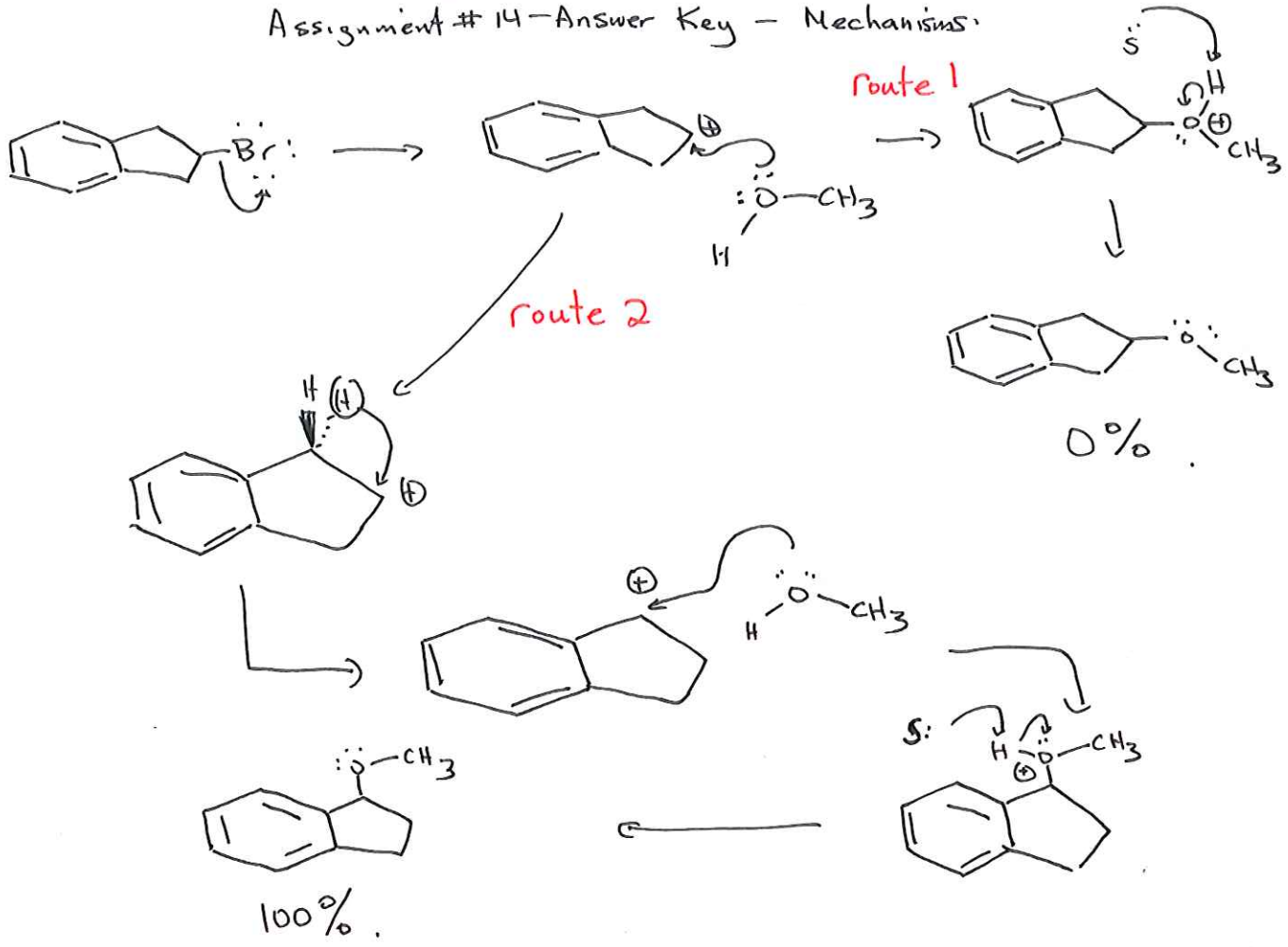
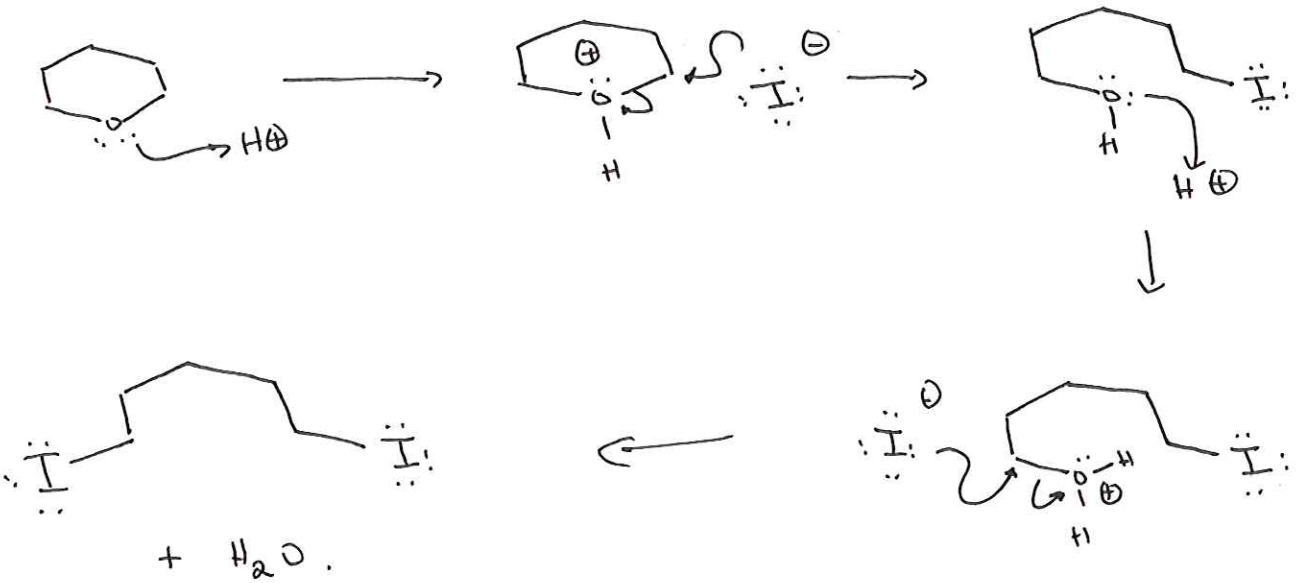
7.



→ an $H:^{\ominus}$ migration generates a very stable benzyl cation, thus route 2 leads to the observed product.

8.



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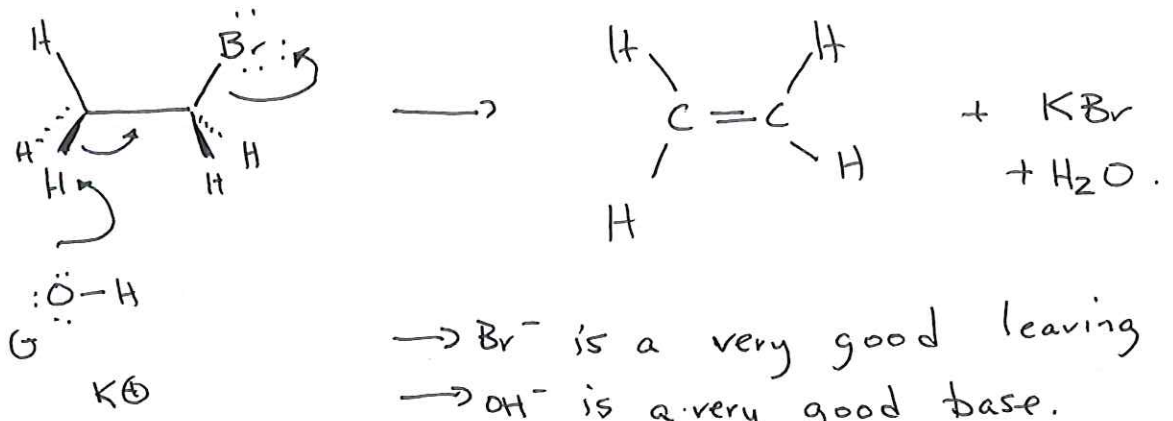
9.

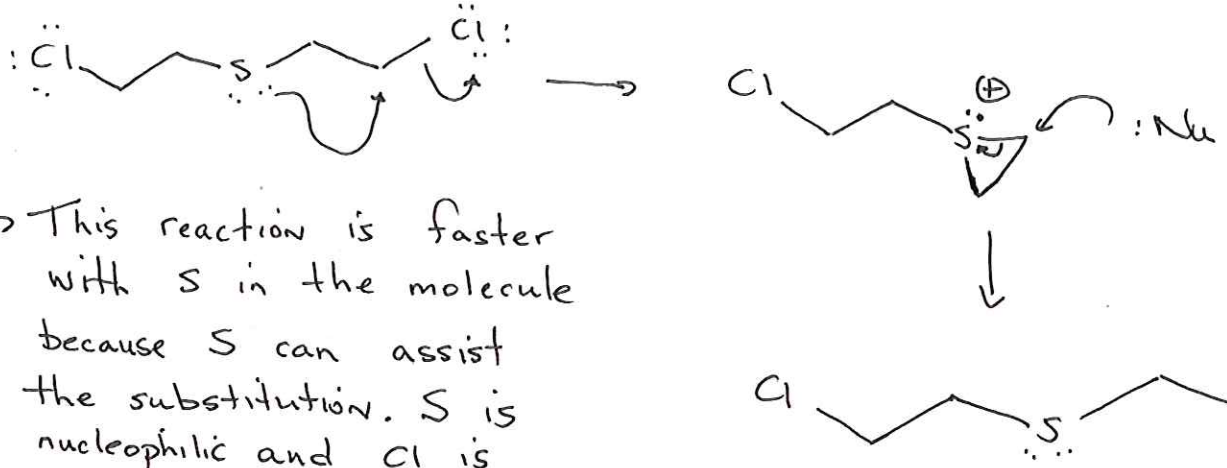


→ Br^- is a very good leaving group.

→ OH^- is a very good base.

→ ∴ E2 mechanism

10.



→ This reaction is faster with S in the molecule because S can assist the substitution. S is nucleophilic and Cl is a good leaving group. Hence, an intramolecular S_N2 reaction is facile. The resultant 3-membered ring is particularly electrophilic because of ring strain and R_2S is an excellent leaving group. While the net result is the same, the combination of these 2 facile steps is much faster than a simple S_N2 reaction whereby S does not assist the process.