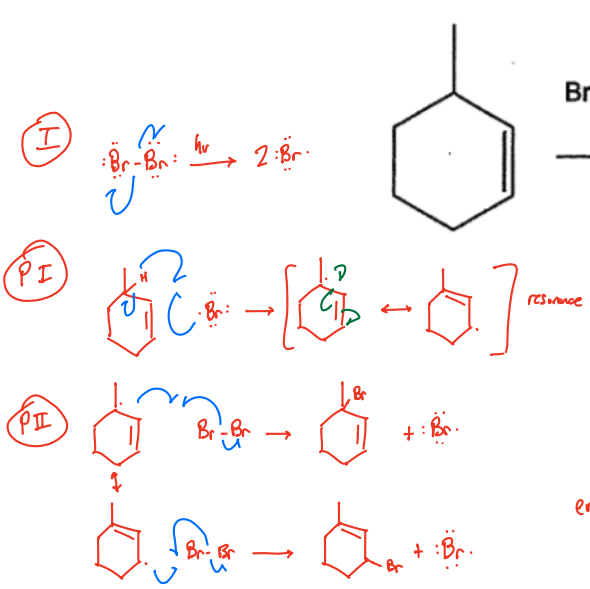
CHEM 223 (2024) SI Session #12

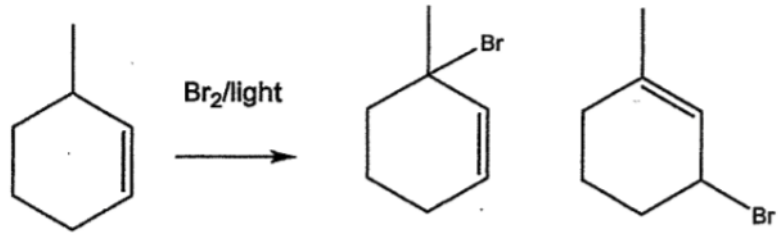
Learning Objectives: By the end of this session, students should be able to:

- Apply concepts from Chapters 4-6 to answer exam questions

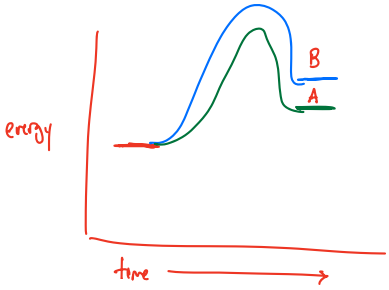
Section 1: Free Response

1. (2021 & 2022) Draw a mechanism for the production of the two products. Which one will be more abundant? Explain your answer using Hammond's Postulate.

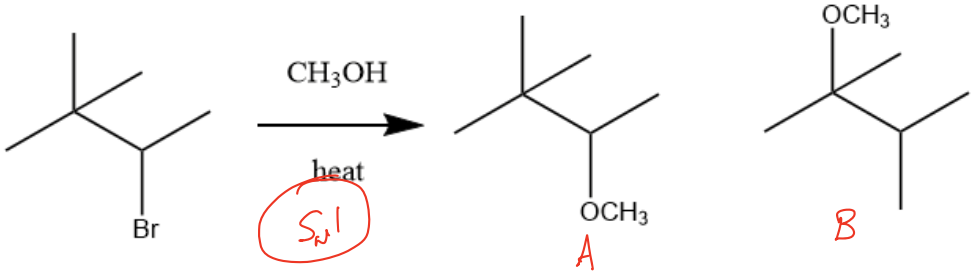


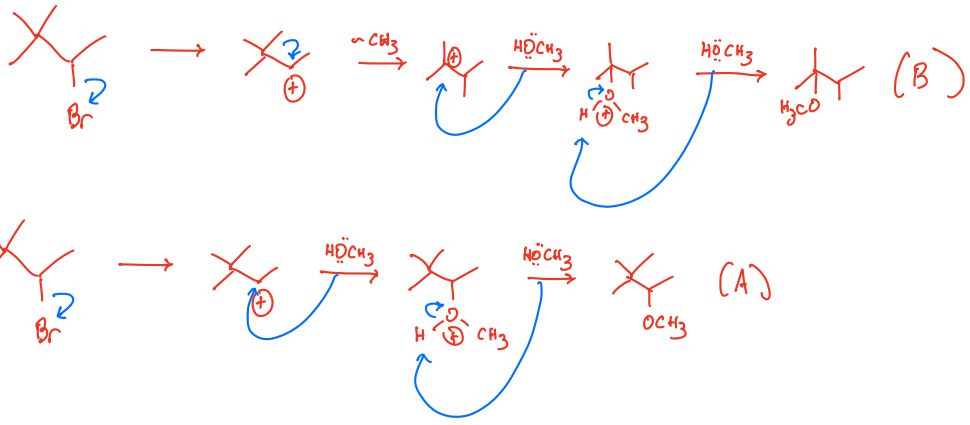


Product A is the major product, as it arises from a 3° radical. Since Bromination is endothermic, Hammond's postulate states that the transition state will be product-like, favoring the 3° radical.

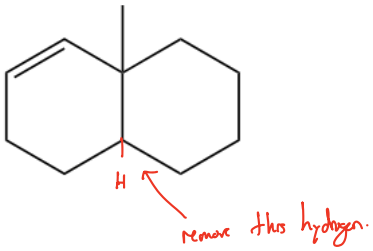


2. (2023) Draw a mechanism that explains the production of both products below.



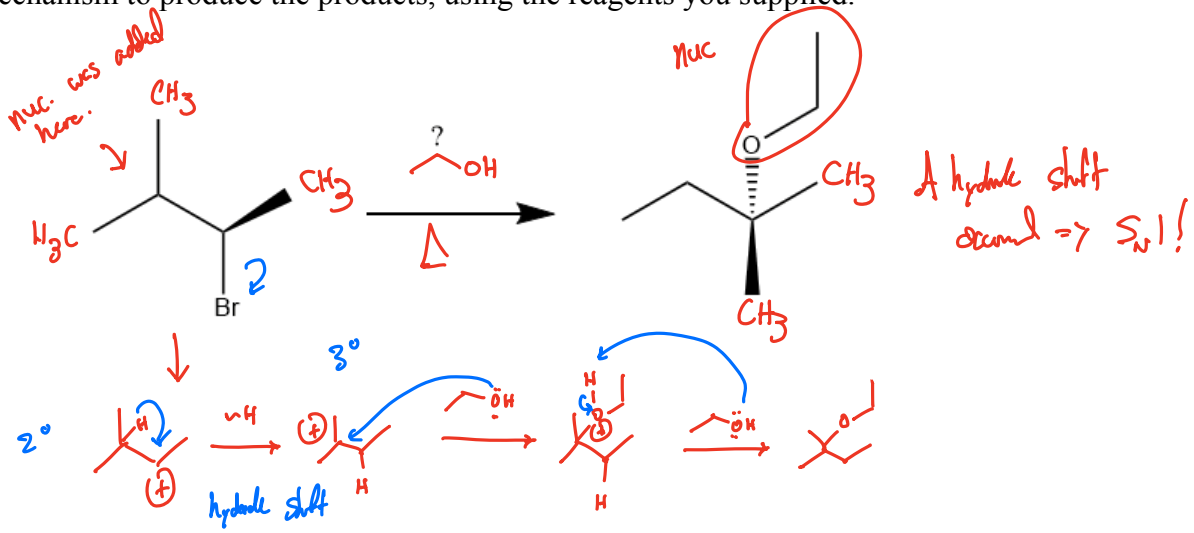


3. (2021 & 2023) In the following structure, remove a hydrogen to create the LEAST stable carbanion. Explain your reasoning.



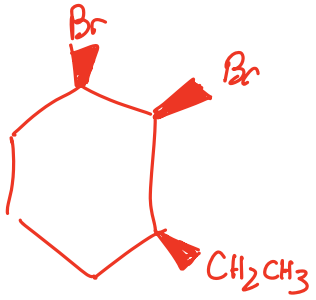
The inductive effect and hyperconjugation will donate e⁻ density to the already ⊖ charged carbon, destabilizing it.

4. (2018 & 2023) Provide reagents required for the following transformation. Then, provide a mechanism to produce the products, using the reagents you supplied.

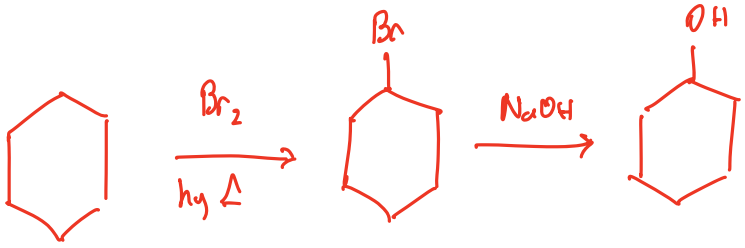


5. (2021) Draw the Fischer projection as well as the perspective formula of (1R, 2S, 3S)-1,2-dibromo-3-ethylcyclohexane. Take particular care to indicate stereochemistry properly (4 pts).

no fischer



6. (2023) Starting with cyclohexane, synthesize cyclohexanol.

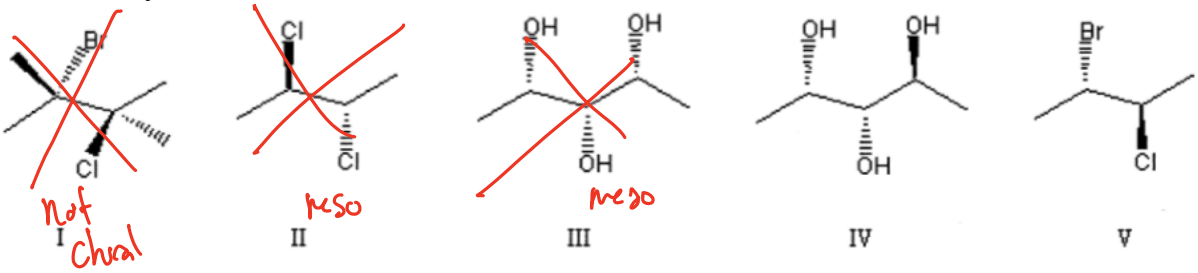


Section 2: MCQ

7. (2023) Which alkyl halide undergoes solvolysis with methanol most rapidly?
   a. $PhCH_2Br$ benzylic carbocation
   b. PhBr
   c. $(CH_3)_3CBr$
   d. CH_3CH_2Br

8. (2023) Which of the following is a secondary halide?
   a. $(CH_3)_2CHCH_2CHICH_3$
   b. $(CH_3)_3CCH_2CH_2I$
   c. $(CH_3)_2CICH_2CH_2CH_3$
   d. $ICH_2C(CH_3)_2CH_3$

9. (2023) Which of the following compounds, if isolated in its pure form, will show optical activity?



   a. I and IV
   b. IV and II
   c. V and III
   d. IV and V
   e. All 5 will show optical activity

10. Based on the table below, which bond is the weakest?

Structure	Bond Dissociation Energy (kcal/mol)
CH3-Br 70 (A)	70
CH3CH2-Br (B)	68
(CH3)3C-Br (C)	68
(CH3)2CH-Br (D)	65

Swap the Structures

(D)

11. Based on the table in #10, which bond is the strongest?

(A)