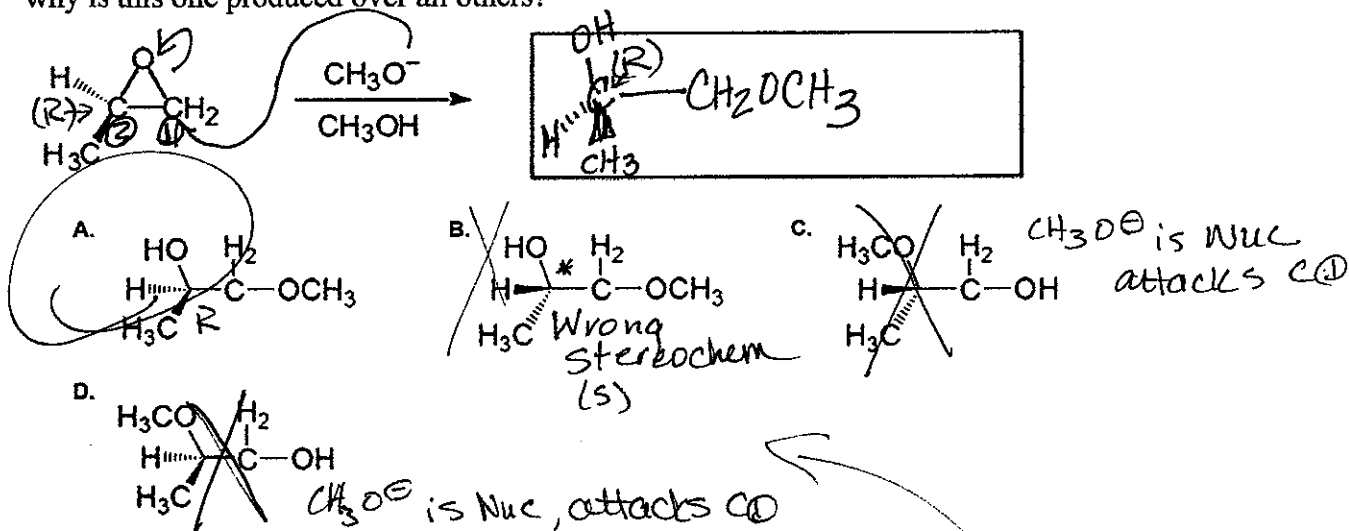


Key

Student: _____

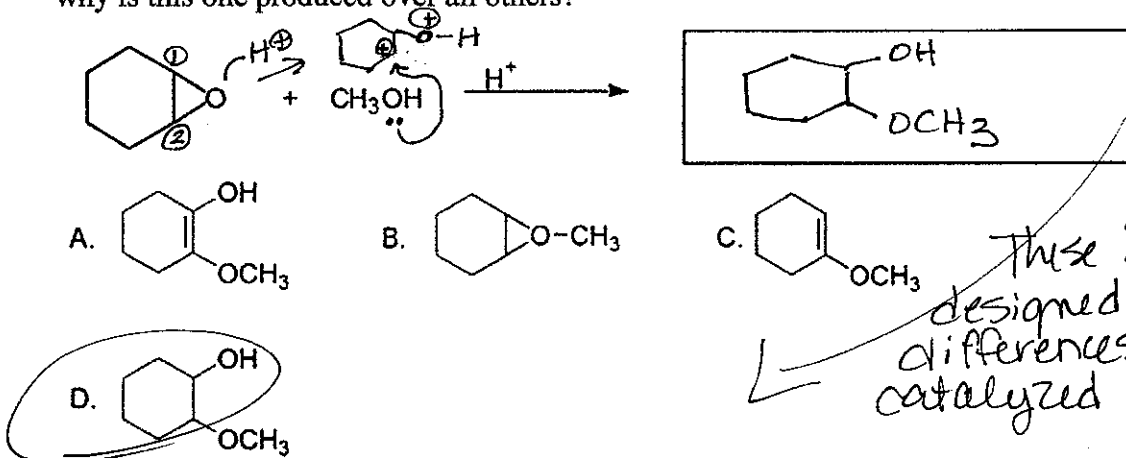
1. Circle the product in the reaction below? Write an explanation for the formation of your chosen product, i.e. why is this one produced over all others?



Provide detailed explanation:

Based catalyzed ring opening of an epoxide, follows S_N2 chemistry. Sterics are most important in the first step, nucleophilic attack by strong base nucleophile $\text{CH}_3\text{O}^\ominus$. Carbon ① of epoxide ring is less sterically hindered, stereochem at ② is retained.

2. Circle the product in the reaction below. Write an explanation for the formation of your chosen product, i.e. why is this one produced over all others?



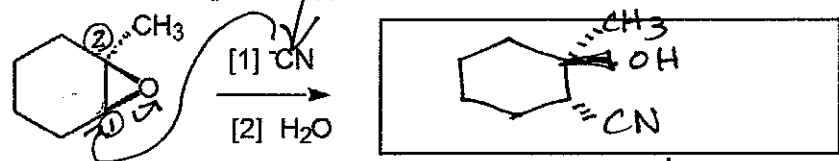
These 2 questions are designed to probe the differences in acid vs base catalyzed epoxide rxns.

Provide detailed explanation:

Acid catalyzed ring opening of an epoxide, follows S_N1 chemistry and the stability of the carbocation intermediate is the most important consideration. In this case, we have a symmetrical epoxide, so either C① or C② will give a 2° carbocation followed by Nuc attack of the weak base nucleophile CH_3OH and loss of a proton.

base catalyzed, so SN2. Carbon ① is less sterically hindered than carbon ②, since SN2, Nuc attack occurs from backside of C-O epoxide bond, CN⁻ group is facing back, not front. Stereochemistry at carbon ② is Retained.

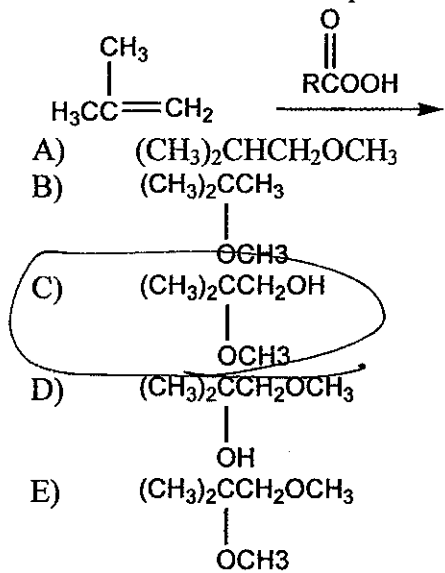
3. Determine the product(s) in the reaction below, and circle the correct answer.



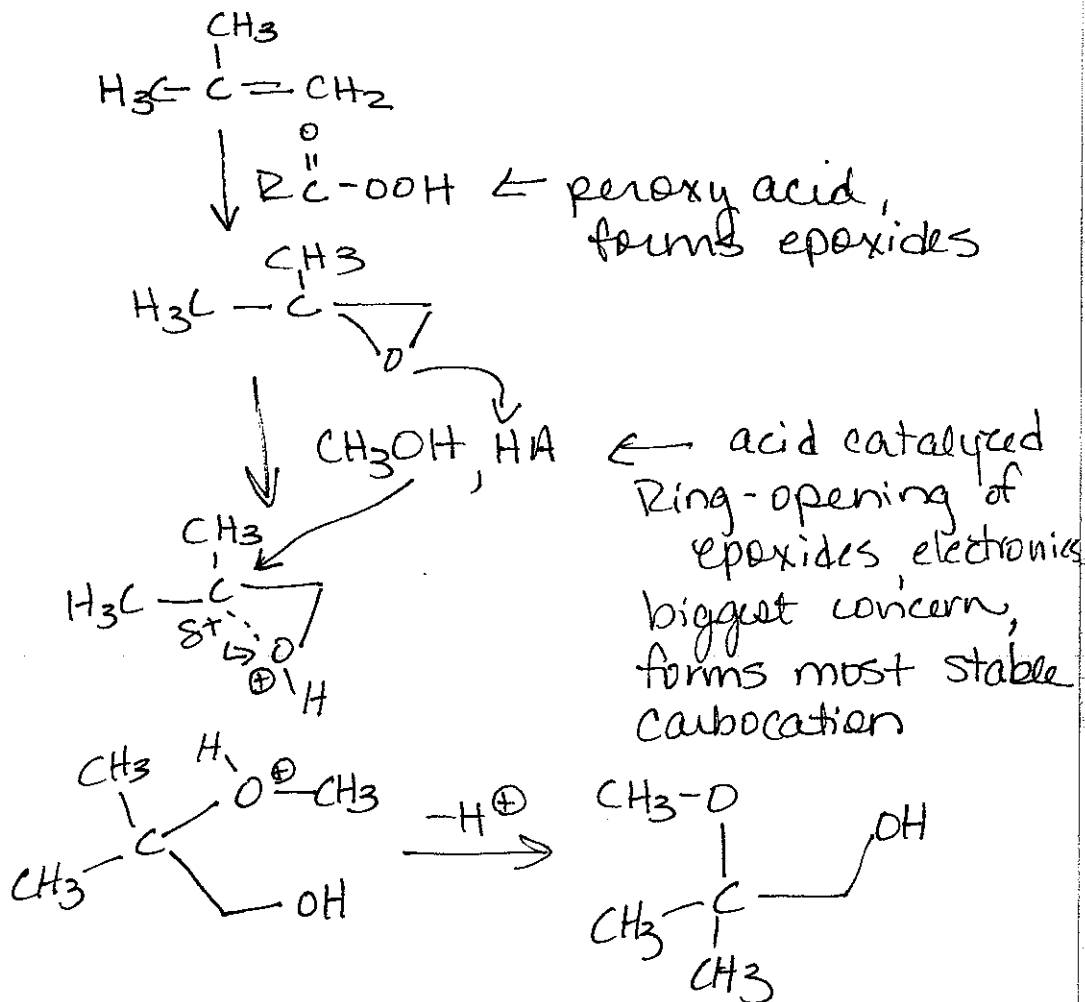
- A. 1-cyano-2-methylcyclohexanol (methyl at C2 on dash, cyano at C1 on dash)
- B. 1-cyano-2-methylcyclohexanol (methyl at C2 on wedge, cyano at C1 on dash) - **Correct stereochem and regiochem**
- C. 1-cyano-2-methylcyclohexanol (methyl at C2 on wedge, cyano at C1 on wedge)
- D. 1-cyano-2-methylcyclohexanol (methyl at C2 on wedge, cyano at C1 on dash)
- E. A and C

Correct stereochem and regiochem
Stereochemistry at carbon ② is Retained.

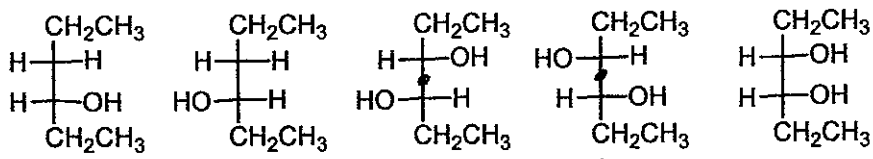
4. What would be the final product?



product $\xrightarrow{\text{CH}_3\text{OH, HA}}$ final product

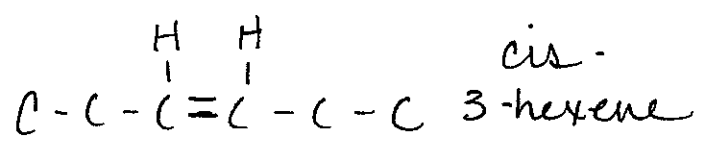


5. cis-3-Hexene is treated with magnesium monoperoxyphthalate and the product is then subjected to acid-catalyzed hydrolysis. What is the final product?

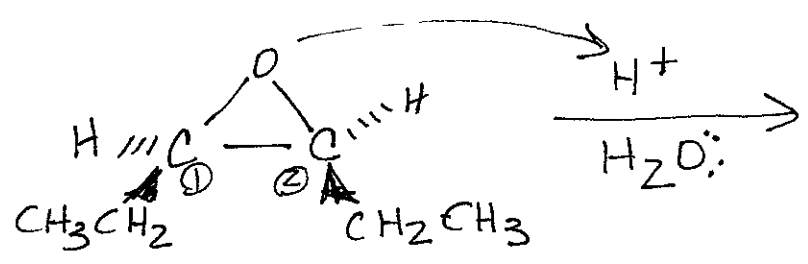


- I II III IV V
- A) equal amounts I and II
 B) equal amounts I, II and V
 C) equal amounts III, IV and V
D) equal amounts, III and IV
 E) Only V

Same compound just rotate 180°, center

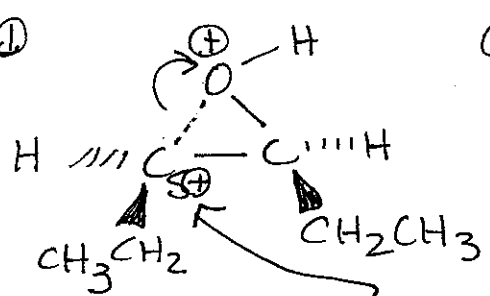


↓ monoperoxyphthalate

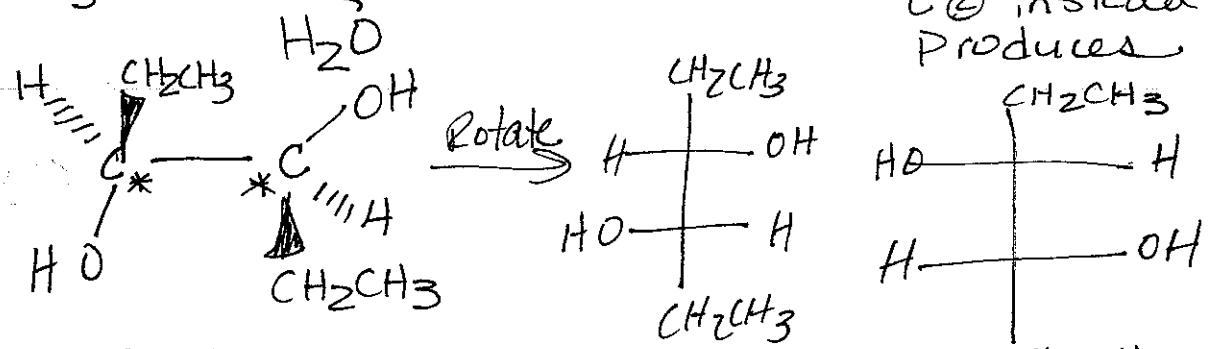


symmetrical epoxide
 C1 & C2 same

attack at C1



H₂O could have easily reacted at C2 instead of C1 Produces



vicinal diol

same