Practice problems:
Stereochmical outcomes of organic reactions

For each of the following reaction conditions, draw the organic products, showing stereochemistry.
Indicate the stereochemical relationship of the products (enantiomers or diastereomers). Then indicate whether the two products would be formed in equal amounts or unequal amounts.

Keep in mind the following:

Optically inactive starting materials can only give optically inactive products, whether the product is a single achiral molecule or a racemic mixture of enantiomers.

Optical activity in either the starting material or a catalyst/agent will result in optical activity in the product, generally meaning an excess of one enantiomer or diastereomer over the other possible stereoisomeric products.

1. \( \text{H}_2 \text{Pd/C} \)
2. \( \text{Br}_2 \text{H}_2 \text{O} \)
3. \( 1. \text{BH}_3 \text{-THF} \)  
   \( 2. \text{H}_2 \text{O}_2, \text{NaOH}, \text{H}_2 \text{O} \)
4. \( \text{HBr} \)
5. \( \text{Br}_2 \)
6. \( \text{Cl}_2 \text{H}_2 \text{O} \)
7. \( 1. \text{BH}_3 \text{-THF} \)  
   \( 2. \text{H}_2 \text{O}_2, \text{NaOH}, \text{H}_2 \text{O} \)
8. \( \text{OH} \) \( \xrightarrow{\text{MCPBA}} \) \( \text{omitted} \)
9. \( \text{OH} \) \( \xrightarrow{\text{MCPBA}} \) \( \text{omitted} \)
10. \( 1. \text{Hg(OAc)}_2 \)  
    \( 2. \text{NaBH}_4, \text{OH}^- \)

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For each of the following reactions or reaction sequences, provide the missing starting material, major organic product, or reagents. For reactions where more than one stereoisomer can form, draw them all, indicate their relationships to each other, and state whether they are formed in equal or unequal amounts.

1. BH₃-THF
2. NaOH, H₂O₂

1. PBr₃
2. NaOEt, EtOH
3. Br₂, H₂O

1. O₃
2. DMS

1. Hg(OAc)₂, H₂O
2. NaBH₄

1. BH₃-THF
2. NaOH, H₂O₂

1. NaOEt, EtOH
2. Br₂, H₂O

Please answer

relationship = equal or unequal?

Please answer

Give the starting material

(racemic)

(racemic)
Chapter 6 Advanced Practice Key

Practice problems:
Stereochemical outcomes of organic reactions

For each of the following reaction conditions, draw the organic products, showing stereochemistry:

1. Draw the products of the reaction of H₂ with the given starting material in the presence of Pd/C.
2. Draw the products of the reaction of Br₂ with the given starting material in the presence of H₂O.
3. Draw the products of the reaction of BH₃·THF with the given starting material in the presence of H₂O, NaOH, and H₂O.
4. Draw the products of the reaction of Zn with the given starting material in the presence of H₂O, NaOH, and H₂O.
5. Draw the products of the reaction of Br₂ with the given starting material.
6. Draw the products of the reaction of CH₃Cl with the given starting material.
7. Draw the products of the reaction of OH⁻ with the given starting material.
8. Draw the products of the reaction of MCPBA with the given starting material.
9. Draw the products of the reaction of MCPBA with the given starting material.
10. Draw the products of the reaction of Hg(OAc)₂ with the given starting material.

Optically inactive starting materials can only give optically inactive products, whether the product is a single achiral molecule or a racemic mixture of enantiomers.

Optical activity in either the starting material or the catalyst/reagent will result in optical activity in the product, generally meaning an excess of one enantiomer or diastereomer over the other possible stereoisomers/products.
For each of the following reactions or reaction sequences, provide the missing starting material, major organic product, or reagents. For reactions where more than one stereoisomer can form, draw them all, indicate their relationships to each other, and state whether they are formed in equal or unequal amounts.

1. BH$_3$-THF
2. NaOH, H$_2$O$_2$

1. PBr$_3$
2. NaOEt, EtOH
3. Br$_2$, H$_2$O

1. ozone
2. DMS

1. Hg(OAc)$_2$, H$_2$O
2. NaBH$_4$

1. BH$_3$-THF
2. NaOH, H$_2$O$_2$