1. Under certain conditions propene will undergo an acid catalyzed polymerization reaction.

\[ \text{n} \begin{array}{c} \text{H}^+ \end{array} \rightarrow \text{CH}_3\left(\text{CH}_2\right)_{2n}\text{CH}_3 \]

A related reaction is the acid catalyzed dimerization of propene.

\[ 2 \begin{array}{c} \text{H}^+ \end{array} \rightarrow \text{CH}_3\left(\text{CH}_2\right)_{2n}\text{CH}_3 \]

Draw a curved arrow mechanism for the dimerization reaction. Once you have a completed mechanism show how you would modify it to explain the polymerization.

2. Identify each compound in the following reaction sequence.

\[ \text{Br} \xrightarrow{\text{K}^+\text{OtBu}} \text{A} \xrightarrow{\text{HBr}} \text{B} \xrightarrow{\text{K}^+\text{OtBu}} \text{C} \xrightarrow{1. \text{BH}_3, 2. \text{H}_2\text{O}_2/\text{OH}^-} \text{D} \]

3. Give a reaction sequence that would allow you to convert cis-2-pentene to trans-2-pentene.

\[ \text{cis-2-pentene} \rightarrow \rightarrow \rightarrow \text{trans-2-pentene} \]
4. Give a synthesis of each of the following compounds starting with molecules that contain four carbons or less.

a. 

b. 

c. 

d. 