LAB REPORT:
BROMINE ADDITION TO TRANS-CINNAMIC ACID

A. Overall Reaction:

B. Mechanism:

C. Yield Data:

Limiting Reagent ________________ Moles used ________________
Product ____________________________________________
Formula _________ Mole Wt _______
Theoretical Yield (moles) __________ Actual Yield (grams) ____________
Actual Yield (moles) __________ % Yield ____________

D. Stereochemical Assignment

Melting Point of Product __________
Stereoisomer Obtained ___________________________

Complete the Newman projection below to represent a view down the C2-C3 bond of the 2,3-dibromo-3-phenylpropanoic acid isomer which you obtained.

CO₂H
Ph
E. Infrared Spectra (nujol or thin film): Attach the spectra to your report.

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<thead>
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<th>Frequency (cm(^{-1}))</th>
<th>Appearance</th>
<th>Assignment</th>
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F. Questions

1. The infrared spectrum of cinnamic acid has a strong absorption at about 1630 cm\(^{-1}\) that is not seen in the spectrum of 2,3-dibromo-3-phenylpropanoic acid. What is the absorption due to?

2. Cinnamic acid contains a carboxyl group (-CO\(_2\)H) in which the carbon oxygen double bond is “conjugated” with the carbon –carbon double bond (C=C–C=O). The C=O stretching absorption appears at about 1685 cm\(^{-1}\) in cinnamic acid.
   a. What is the frequency of the C=O stretching absorption in your product?
   b. What effect does the conjugation have on the frequency of the C=O stretching absorption?

3. The reaction of alkenes with osmium tetroxide (OsO\(_4\)) results in the formation of vicinal diols.

\[
\begin{align*}
\text{C=C} & \quad \xrightarrow{\text{OsO}_4} \quad \text{Me}_3\text{CCO}_2\text{H} \\
& \quad \text{HO} \quad \text{OH}
\end{align*}
\]

The mode of addition in this case is “syn,” that is the two hydroxyl groups become attached to the same face of the double bond. Consider the reaction of trans-cinnamic acid with osmium tetroxide to give PhCHOH–CHOH–CO\(_2\)H (2,3-dihydroxy-3-phenylpropanoic acid). Complete the Newman Projection below to show clearly the stereochemistry of the product produced in this reaction.