Stereochemistry of Bromine Additions

Name_____

SID_____

Technique____/5 Report_____/50 Total_____/55

Section : Introduction

Statement of Purpose. Write a succinct statement describing why the experiment was performed. (5 pts)

Reaction Equation. Write a balanced reaction equation. Make sure to indicate stereochemistry in both starting materials and product(s). (5pts)

Section II: Reaction Methods

Experimental Procedure: (9 pts)

To a 25 mL round-bottom flask equipped with a reflux condenser and charged with *trans*-cinnamic acid (____ g, ____mmol) was added _____mL of CH_2Cl_2, ____mL of a 10% bromine solution, and a boiling stone. The mixture was heated to a gentle reflux for ____min. The reaction mixture was allowed to cool to room temperature, then was placed in an ice-water bath for ____ min. The resultant precipitate was collected by vacuum filtration. The solid was washed with ____mL of cold CH_2Cl_2. The solid was recrystallized from _____ (solvent) to give ____ g of crystals.

Observations. (5 pts) In addition to general observation made while running the reaction, describe any changes you made from the above procedure. Also describe the crystals (color, shape, etc).

Section III: Analysis

Melting point: (3 pts)

Calculate your percent yield. (2 pts):

Based upon the observed melting point, is the product the *(R*,S*)* diastereomer, the *(R*,R*)* diastereomer, or a mixture? (The * means racemic mixture. Don't just assume a low melting point means "impurity." What would the impurity be?)(3 pts)

Does this correspond to a *cis*, *trans* or mixed addition of bromine across the double bond? (3 pts)

Questions:

1) Think about the results of your experiment. Do they support the theory we developed in class that bromination of alkenes gives *trans* products? If not, is the theory just plain wrong, or can it be modified? What modification to the theory would you make to explain your observations? (6 pts)

2) Using curved arrow notation, provide a mechanism for the addition of bromine to *trans*-cinnamic acid (*i.e.* the reaction you ran in lab) that accounts for your observations (3 pts).

4) How do you know if you have an excess of bromine present in the reaction? (3 pts)

5) Given the results of your experiment with *trans*-cinnamic acid, draw the organic product(s) that you expect from the reaction of *cis*-cinnamic acid. Which one is major?