Name: Lab Day:

Isolation of Limonene From Orange Peels (6.2M)

Results *Show calculations for the following, where appropriate, in your notebook and indicate the page number where it can be found.* _____

Mass of orange peels used: Mass of limonene isolated:

% Recovery of limonene from peels: Temperature (range?) during distillation:

Concentration of limonene in polarimetry solution (with units):

Observed rotation, α: Specific rotation, $[\alpha]$:

% Enantiomeric excess of limonene: % *R*:

Describe the isolated limonene.

General Questions

1. Limonene and water co-distill at atmospheric pressure (assume 760 mmHg) at a temperature of 97.4°C. **a-**Look up the vapor pressure of water at this temperature and use this information to calculate the following: **b-**the vapor pressure of limonene at this temperature, **c-**the mole fraction of limonene in the limonene/water mixture that co-distills, and **d**-the corresponding mass percent of limonene. Report the values for a, b, c and d below and put the calculations in your notebook (give the page number).

   a. _____ b. _____ c. _____ d. _____

   Page number for calculation: _____

2. Why was NaCl used in the extraction?

3. Describe how each of the following would affect the indicated result(s)—high, low, no effect—and **briefly** explain.

   a. The oranges were peeled on Tuesday and the peels were used in lab on Thursday.
      i. Mass of "limonene" isolated

   b. The 50-mL receiving flask for the distillation had traces of water in it, as compared to being perfectly dry.
      i. Mass of "limonene" isolated

      ii. Specific rotation of limonene and calculated % *R*

c. Not all of the limonene was rinsed from the distillation column before the extraction.
    i. Mass of "limonene" isolated

    ii. Specific rotation of limonene and calculated % *R*

d. Not all of the methylene chloride was evaporated.
    i. Mass of "limonene" isolated

    ii. Specific rotation of limonene and calculated % *R*

e. There was some *S*-limonene present.
    i. Specific rotation of limonene and calculated % *R*

    - Would a given amount of S-limonene affect these more or less than the same amount of a non-optically active substance? Why?

f. When solvent was added to the volumetric flask to make the solution for the polarimetry, too much was added and it went past the mark on the flask.
    i. Specific rotation of limonene and calculated % *R*

Conclusion Question

4. Make a list of the evidence that *R*-limonene was isolated, as opposed to *S*-limonene, a mixture of enantiomers, or some completely different compound.