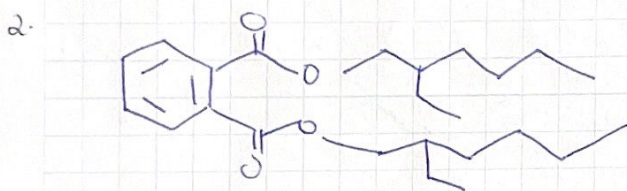


Exp. No. <u>4</u>	Experiment/Subject <u>CHEM 438 (DPT)</u>	Date <u>10/4/21</u>
Name <u>Abdul Fayed</u>	Lab Partner <u>Vincent Z</u>	Locker/Desk No. <u>021</u>

### PRE-LAB Questions

1. Quantitative data is data that can be measured  $\rightarrow$  refers to numerical data. Qualitative is descriptive data (observed results). In this experiment, quantitative data will be the change in mass of the Tygon tubing. Qualitative includes the change in IR spectra after removing the plasticizers.

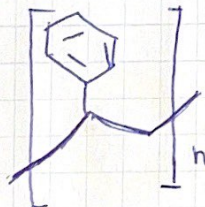


Bis(2-ethylhexyl) phthalate.

Label of peaks on NMR is attached in the PDF file.

3.  $\text{H}-\text{C}-\text{H}$ , wavelength  $\sim 2843-2863 \text{ cm}^{-1}$  or  $2916-2936 \text{ cm}^{-1}$ . The peaks should disappear after extraction of plasticizers.

4. Polystyrene :



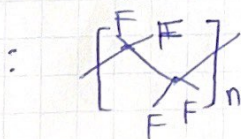
$\Rightarrow$  big stretch @ wave number  $< 1000 \text{ cm}^{-1}$  and some stretch @ wave  $> 3000 \text{ cm}^{-1}$  for benzene ring

Polyethylene :



$\Rightarrow$  methylene <sup>big</sup> stretch @  $2500-3000 \text{ cm}^{-1}$

Teflon  
(polytetrafluoroethylene)



$\Rightarrow$  C-F big stretch @  $1000-1300 \text{ cm}^{-1}$

Signature	Date <u>10/4/21</u>	Witness/TA	Date
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Exp. No. 4	Experiment/Subject CHEM 438 (DPT)	Date 10/4/21
Name Abdul Fajeed	Lab Partner Vincent Z	Locker/Desk No. Course & Section No. 021

Objective

The purpose of the experiment is to extract the plasticizer out of a Tygon tubing and learn the mechanical properties of the polymer through FT-IR spectrum.

Introduction

Fourier-transform infrared spectrometer can be used to detect at higher absorbances than the UV-visible spectrometer. FTIR reached the absorbance limit of around 6. Polymers will result in high absorbance where only FT-IR can be used to analyze the structure. FT-IR helps to distinguish from one another, and it is more powerful than NMR.

Procedure

1. Weigh the Tygon tubing before extraction and analyze in FT-IR.
2. Use reflux setup for the extraction.
3. Place 2 grams of sample into 50 mL round-bottom flask.
4. Place 30 mL of MeCl<sub>2</sub> to extract the plasticizer.
5. Reflux the sample for 1 hour inside the hood.
6. Cool the MeCl<sub>2</sub> to room temperature.
7. Collect the extract into scintillation vial and analyze in FT-IR.
8. Dry the tubing after extraction then weigh it.

Results

Mass before reflux :

mass after reflux and cooling :  
and drying.

Texture of tygon tubing before and after :

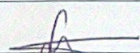
9. Note changes in the tubing based on the physical attributes.

10. Analyze unknown A, B, & C sample in FT-IR spectrum.

11. Clean up and dispose appropriately.

Conclusion

FT-IR is used to determine the structure of polymer and differentiate from one another.

Signature 	Date 10/4/21	Witness/TA	Date
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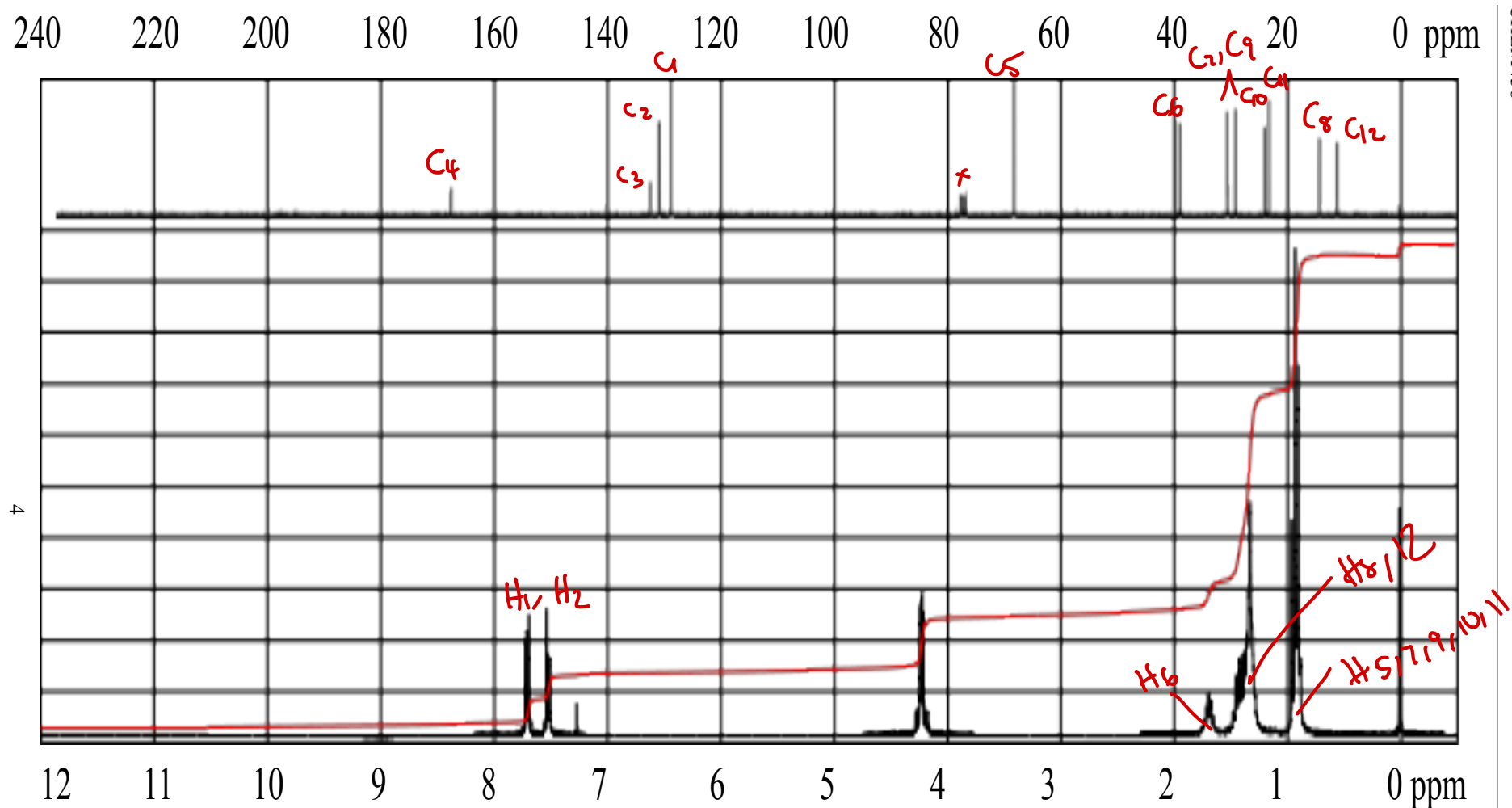
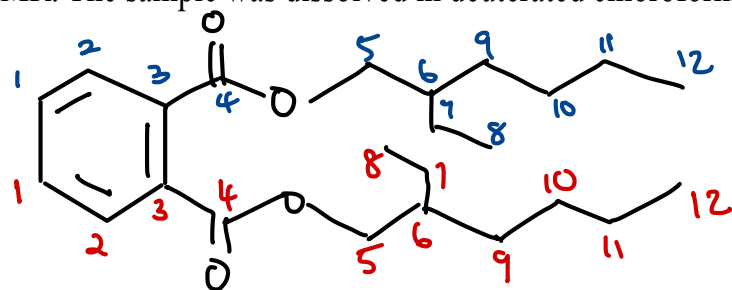


Figure 2. NMR spectra for the plasticizer. Top spectra is  $^{13}\text{C}$  NMR and the bottom spectra is  $^1\text{H}$  NMR. Data was taken using an QE310 NMR. The sample was dissolved in deuterated chloroform and TMS.



symmetrical...

Bis(2-ethylhexyl) phthalate