**CHEMISTRY 3514 ORGANIC CHEMISTRY 10 October 2013**

**LABORATORY #6: IDENTIFICATION OF AN ORGANIC MIXTURE VIA ~~GAS CHROMATOGRAPHY~~**

**~~AND~~ INFRARED SPECTROSCOPY**

**6.1. Introduction**

In the several labs you have performed thus far, the emphasis has been on separating and then characterizing substantially pure compounds. Because you’ve ultimately obtained `pure’ compounds, melting point or boiling point as well as qualitative features like color ( bone white, snazzy red, snot green) sufficed to positively identify the compound.

Often, however, a mixture of compounds is obtained for which it would be inconvenient or unnecessary to perform a separation. In such case, organic chemists resort to several basic instrumental methods.

In this lab you will gain a working knowledge about ~~two~~ one of them~~: gas chromatography (GC) and~~ Infrared Spectroscopy (IR) and use it to determine the identity of components in a liquid mixture.

**6.2. Purpose of the Lab**

Instrumental identification of the components in an unknown mixture of organic compounds prepared from the following list:

**methanol acetone isopropanol n-hexane n-heptane n-octane**

**CH3OH (CH3)2CO (CH3)2CHOH CH3(CH2)4CH3 CH3(CH2 )5CH3 CH3(CH2)6 CH3**

**6.3. Procedure**

***6.3.1. Characterization of Unknown Mixture by IR ~~and GC~~***

After the instructor demonstrates how to set up and use the IR ~~and GC instruments~~ (a PE Spectrum 1 FTIR) ~~and the Carle 6000 student GC with TCD detector)~~ run your selected unknown mixture and compare your spectrum with the several reference mixtures provided. Once you have selected 1-3 possible matches, prepare a 1:1 mixture of each and re-run the IR for your `knowns’ as you did your unknown. Based on comparisons of knowns and unknown, decide what your mixture is.

**6.3.2. *Tabulation of Measurements***

In your lab book, following the **Introduction**, prepare a table similar to that shown below, in **Observations**

**Table 1: Characterizing Mid-IR Bands for Unknown # \_\_\_\_\_ vs. 1:1 Mixture of \_\_\_\_\_\_\_ and \_\_\_\_\_\_**

Unknown band, cm-1 strength/shape Matching known band, cm-1 strength

2850 s, sharp doublet 2851 s, sharp doublet

2760 ms, multiplet 2760 ms, multiplet

**Etc.**

It is common to list about 6-8 of the most prominent bands that match. There should be little if any difference in the positions and shapes, while you can expect the band heights to vary since that is determined by details connected with the drop size and sample handling.

Attach also: **the annotated, original IR of both the best matching synthetic mix and the unknown.**

6.3.3. Results

Report your unknown # and what you think the mixture components are.

*Due Monday 14 October 2013*

REQUIRED SOLVENTS FOR IR/GC LAB

**methanol acetone isopropanol n-hexane n-heptane n-octane**

**CH3OH (CH3)2CO (CH3)2CHOH CH3(CH2)4CH3 CH3(CH2 )5CH3 CH3(CH2)6 CH3**

**UNKNOWN PREPARATIONS**

**SAMPLE COMPONENT A (5 ml) COMPONENT B (5 ml) TEAM**

#1 METHANOL ACETONE Dara/Christy

#2 ISOPROPANOL METHANOL Vicky/Ellen

#3 HEXANE OCTANE Becky/Nancy

#4 ACETONE OCTANE Wayne/Brandon

#5 METHANOL HEPTANE Julie/Michal

#6 ACETONE ISOPROPANOL Thien/Phuong

#7 OCTANE METHANOL Chris/April/Crystal

**1:1:1 REFERENCE MIX PREPARATIONS (5 mL:5mL:5mL)**

Reference mix #1 hexane:heptane:octane

Reference mix #2 methanol:isopropanol: aceton