

**Distillation and Gas Chromatography (GC) Guidelines**  
**Pre-lab report MUST be written inside your lab notebook.**

***There is only ONE PRE-LAB REPORT FOR THIS EXPERIMENT***

1. Introduction for the ENTIRE experiment (i.e., both the distillation and gas chromatography)
2. Provide a procedure in flowchart format (for the entire experiment). Make sure you reference the procedures. Please note the following changes.

**CHANGE IN PROCEDURE:**

1. Instead of a toluene/ethyl acetate mixture, you will be provided with an **UNKNOWN** mixture.
2. You will also collect the fractions at the following temperatures instead of the ones listed in the manual.
  - a. You will collect fraction #1 between 55 – 65 °C.
  - b. You will collect fraction #2 between 65 – 75 °C.
  - c. You will collect fraction #3 between 75 – 85 °C.
  - d. You will collect fraction #4 between 85 – 115 °C.

You will also adjust the Power Mite setting to 45 during the experiment. Power Mite is the knob that controls the heating rate of the heating mantle.

3. MSDS information (*refer to the SDS handout for details*)

The following chemicals will require you to use the MSDS database on the Web:

**Ethyl Acetate, 2-Butanone, *n*-Propyl Acetate, 2-Pentanone**

**Record the following SDS information in your notebook for the chemical listed on the previous page.** Printouts directly from Web pages will NOT be accepted for grading.

***Important: Reference the site (i.e., write down the URL address) that you used for each of the chemical.***

- (a) Product Name
  - (b) Chemical Formula
  - (c) CAS Number
  - (d) Formula Weight
  - (e) Melting Point; Boiling Point and Density
  - (f) Health Hazard Data (**summarize in your own words**)
  - (g) Spill and Disposal procedures (**summarize in your own words**)
4. Complete **ALL** the pre-lab questions (refer to page 105 in your manual).

*Use the link below for the theory on gas chromatography (GC).*

<http://www.wfu.edu/chem/courses/organic/GC/index.html>

***Go through the tutorial BEFORE you attempt to complete the study questions.***

**For question #2, you MUST explain the ranking of the boiling points in terms of the various types of intermolecular forces that exist between different functional groups on a compound.**

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**Post-lab (This is a GROUP Report)**

*Write the names of the group members on the report. Write down the responsibilities of each group member in writing this report as well as in performing the experiment. Write down the UNKNOWN NUMBER. Review the theory on Gas Chromatography (GC) before you complete the post-lab report. Refer to the previous page for a link to the GC tutorial.*

**(I) Abstract** – outline the goals of the experiment as well as the technique that you used in achieving such goal(s). Also, summarize all experimental results.

**(II)** Record the temperature at which the first drop of condensate forms and the temperature ranges over which each of your fractions distilled.

**(III)** Label each of your gas chromatograms (fraction# and components – see below). Calculate the percentage composition for EACH of your fraction from the gas chromatogram. *Show ALL your work.*

*Make sure your group attaches the ORIGINAL GC chromatograms for the various fractions that you obtained in the lab to this post-lab report.*

**(IV)** Compare the retention times for the various standards given below

Can you identify each of the individual components in the unknown mixture based *only* on the retention time analysis? Why or why not? **Explain.**

If you can identify the component based on the retention time, label the component on your GC chromatogram.

If you cannot identify the compounds based on retention time alone, explain what causes the retention time not to be useful in unknown identification in this case. What needs to be changed in the GC in order to separate those components?

**(V) Conclusion**

- Summarize your results (again)
- Justify the percentage composition results from the gas chromatograms. In other words, are they what you expected based on the theory of simple distillation?
- Discuss how you could have achieved a better separation in the distillation.

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(VI) Sketch the GC chromatogram inside your lab notebook for your *first distillate fraction* based on the following conditions:

- (1) There had been **twice** as much **LOW** boiling point component in the distillate fraction
- (2) A shorter GC column was used instead
- (3) The temperature of the GC column had been set at a higher temperature

**DO NOT DRAW ANY SKETCHES ON YOUR ORIGINAL GC CHROMATOGRAMS**

**Reference section**

<b>Chemical</b>	<b>Average Retention Time (min)</b>
Ethyl Acetate	1.309
2-Butanone	1.211
n-Propyl acetate	2.506
2-Pentanone	2.094