

Name _____ Partner Name _____

TA Name _____ Section Day _____ Time _____

Experiment 2 Lab Notebook Template
Citrus Distillation and GC Analysis

Use as reference for notebook preparation – every student uploads to GradeScope after lab

Pre-Lab Requirements – must be complete *before* arriving to lab

1. **Lab Notebook:** copy templates below into designated notebook
 - **Purpose, scheme, and reagent table**
 - **Procedure Diagrams**
 - **Cleaning and Safety** – copy table from the procedure
 - **Data entries**
2. **Dress for lab** – see safety rules – arrive a few minutes early

A. Purpose, sketch of citrus, and structures of terpenes:

B. Reagent Table – properties must be filled in before lab

Sample Name	Amount Fill in during lab	Molecular Mass	mmoles Fill in during lab	Boiling or melting point	Density	Hazards Refer to clean-up & safety table
Citrus Peels		n/a	n/a	n/a	n/a	n/a
Water						
Citrus Oil Enter properties for limonene						

List terpene hazards:

C. Procedure – hand-drawn using procedure in lab PDF, class notes, & Slugs@home

- Instructions, diagrams, & labels for all **equipment, chemical names** with **amounts, & transfers**
- Leave space to record additional notes and observations within the procedure diagrams

Step 1. Preparation of peels from home

Step 2. Distillation Apparatus – copy **Figure 2** from Exp 2 PDF

- Include diagram of complete distillation setup with labeled components
- Step-wise procedure to assemble the distillation apparatus

Step 3. Separation and Collection of Citrus Oil

- Separation of citrus oil from distillate in a buret and collection in a vial

Step 4. Sample Preparation

- Representative diagram for any 1 sample: steps for drawing liquid & air into syringe

Step 5. Injection of Standards, Citrus Oil, & Data Collection

- Identity and volume of each standard
- Transfer from needle to GC (one representative sample)
- GC diagram: injection port, oven, chart recorder & rough sketch of chromatograms

Cleaning & Safety – copy table from procedure

Cleaning and Safety – copy the tables from the end of the procedure

- Includes instructions for safely taking apart the distillation apparatus and returning shared equipment

D. Data

Description of your peels *and* those of a neighboring pair (3 characteristics, ex. size, color, fragrance, texture)

Mass of citrus peels _____ g

Volume of water _____ mL

Distillation temperature: first drop _____ °C

Final temperature _____ °C

- Estimate one decimal place, ex. 97.0 °C

Mass of citrus oil _____ g

Percent Recovery _____ %

Calculation: % Recovery = (mass citrus oil) / (mass of peels) x 100%

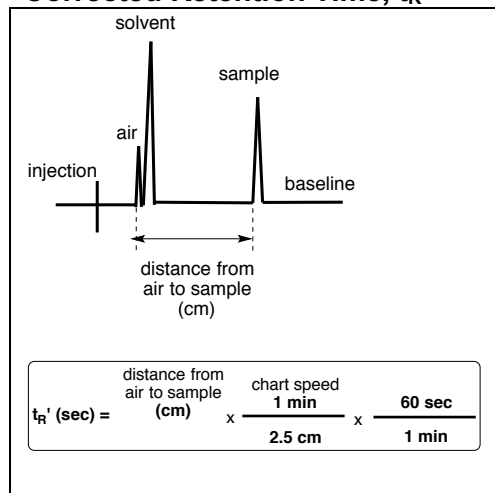
Record the **Observations** and **% recovery** of a neighboring group in your lab: _____ %

* you'll need this and comparison of your peels to their for the lab report (bigger or smaller pieces of peel?)

E. Data & Calculations: Gas Chromatography (GC)

- See Experiment 2 for background on GC; equations below.
- GC charts will be obtained in lab, time permitting, or sample charts provided.
- Copy the sample calculations and tables below into your notebook.

Corrected Retention Time, t_R'



Integration and Percent (%) Composition

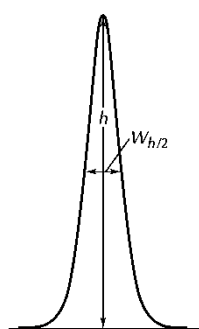


FIGURE 20.13
Determining peak area: h = height; $W_{h/2}$ = width at half-height.

Integration:

$$\text{Peak Area} = h \times W_{h/2}$$

$$\% \text{ Composition, A} = \frac{\text{Area of component A}}{\text{Sum of all peak areas}} \times 100\%$$

Table 1. Standard Terpene GC Retention times

Sample	Corrected t_R (s)
alpha-pinene	
beta-pinene	
Limonene	

Retention Time Calculations:

Table 2. GC Analysis of Citrus Oil

* Not all standards may be present in the oil, some peaks overlap, and other unknown peaks may be present. Add or remove rows as needed.

Peak #	Compound Name	Corrected t_{Rt} (s)	Integration (cm^2)	% Composition

Calculations (retention time, integration, % composition):