Techniques in the Organic Chemistry Laboratory

Introduction
In the first few weeks of the quarter you will be learning a variety of techniques that are routinely used by organic chemists. The techniques you will learn include the determination of melting points, boiling points, and index of refraction for the identification of substances. You will also learn isolation and purification techniques, such as extraction, crystallization and distillation. Finally you will become familiar with the Gas Chromatograph and the FT Infrared Spectrometer.

After you have mastered the laboratory techniques, you will perform two preparatory experiments.

You are not required to purchase an expensive laboratory book for the Organic Chemistry course, however, you are expected to obtain additional information for the laboratory experiments from other sources, the library or the internet. Many important websites will be provided, but you encouraged to obtain additional sources of information.

Glassware
Most of the reactions you will be carrying out in our labs are run at the microscale level to minimize waste and exposure to chemicals. The special equipment in we use in order to carry out the various standard organic laboratory operations are shown below.

A = Connecting Adapter
B = Filter Adapter
C = Thermometer Adapter
D = Centrifuge Tube, 15 mL
E = Chromatography Column, Glass 150 mm
F = One Way Stopcock
G = Connector w/Support
H = Connector Only, Viton
I = Distillation Column
J = Distillation Head, 60 mm
K = Short Neck Flask, 5 mL
N = Filter Flask, 25 mL
O = Hirsch Funnel, with Disc
P = Reaction Tube, 10 x 100 mm
S = Syringe, Polyethylene
T = Tubing, PTFE, 1/16" fits 20 gauge needle

In addition to the specialized microscale equipment, we will use some regular glassware. During the first laboratory meeting you will become familiar with the glassware and other equipment in your lab drawer and in the laboratory room. You will check in a lab drawer during this first meeting.

Items Located in the Lab
In addition to the equipment in your drawer, you will find equipment and chemicals in the lab for general use. The lab contains enough sand bath for each student, 5 melting point apparatus, 4 milligram top loading balances (always report masses with 3
significant figures past the decimal point), 1 Gas Chromatograph, 1 FTIR, 12 water aspirators, lab jacks, and centrifuges.

Each table has a box of solvents and drying agents, included are:
- tert-butyl methyl ether
- dichloromethane
- ethanol
- petroleum ether (a mixture of hydrocarbons, also referred to as ligroin)
- methanol
- toluene
- saturated sodium chloride
- solid anhydrous calcium chloride
- solid anhydrous sodium sulfate

A supply cart contains all the necessary chemicals and additional equipment for each experiment. In addition, the cart contains general supplies, such as: clamps, cotton, aluminum foil, weighing boats, glycerol in dropping bottles, boiling sticks, boiling stones, melting point capillaries, open ended capillaries, Pasteur pipettes and bulbs, sample bottles with lids, gloves, and stainless steel sponge packing for distilling column.

Waste Disposal

Proper waste disposal is essential in the organic chemistry lab. Never discard organic solvents down the drain. In the hood you will find labeled containers for waste disposal. Be sure to discard waste chemicals in the proper container: 1. organic solid waste, 2. flammable organic solvents, 3. halogenated organic solvents, 4. acetone waste, 5. aqueous liquids. In addition, the hood contains a large jar for all disposable glassware.

Safety in the Lab

An organic chemistry lab is a potentially dangerous place. For that reason, even though accidents are very rare, they sometimes do occur and are typically the result of carelessness and inattention to detail. Being aware of simple safety precautions and using common sense in the laboratory is the best way to protect yourself and your peers from a potentially dangerous accident.

During the first laboratory section, your instructor will show you where the safety equipment is located and explain to you how to use it. You will see a safety film and the instructor will discuss safety rules, teach you about proper waste disposal, and tell you about location of chemicals used for each lab. You will be asked to sign a safety agreement with PCC to follow and obey safety rules in our labs. Non-compliance with our safety rules will result in expulsion from the lab and no make-up will be allowed.

If you are not sure about something, please ask your instructor. Remember that if an accident does occur, it must be immediately reported to the lab instructor.

Questions (Record the answers to all questions in your laboratory notebook)

You may need to look up some information to answer all questions.

1. Are there any safety devices located in the area near the laboratory that you can use? If so what are they and where are they located?
2. Why is it not advisable to wear contact lenses in the lab?
3. What should you do in the following circumstances? Briefly explain your answer.
   a. You spill a bottle of acid on the floor.
b. A small beaker of flammable liquids has caught on fire.
c. Your skin has come into contact with toluene.

4. What does MSDS stand for? What is it used for and why is it important to you?
5. You need to find information on the physical and chemical properties of a chemical. How do you proceed? List all sources you would consider for finding this information.

You’ll find more information of safety in the Organic Chemistry lab at the following website:
http://www.chem.ufl.edu/~barbaro/2211L/safety.html