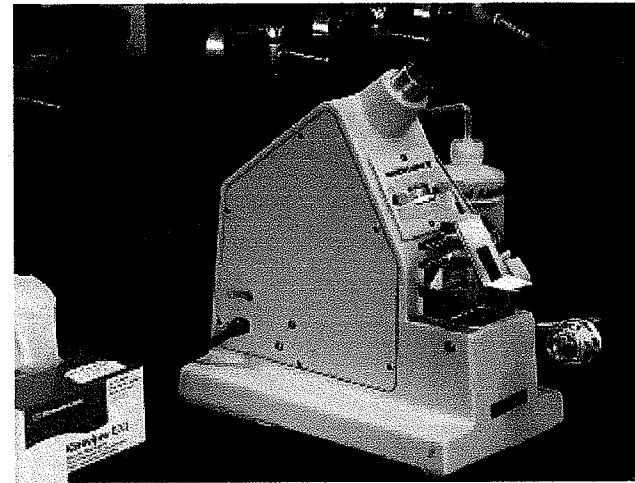
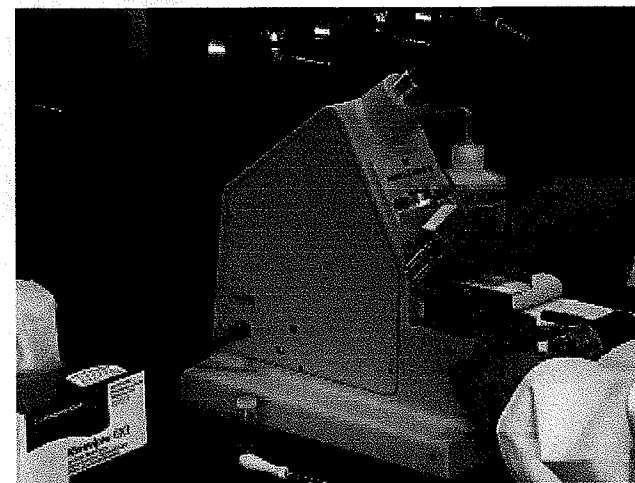


**Chemistry
Lab
Techniques**

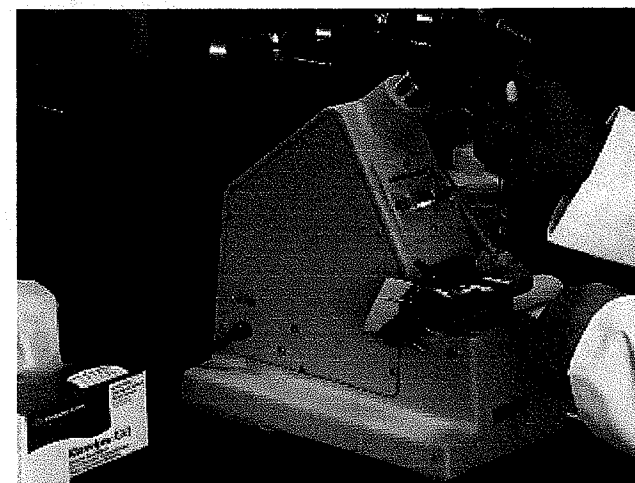
Operating the Bausch & Lomb Abbe-3L Refractometer



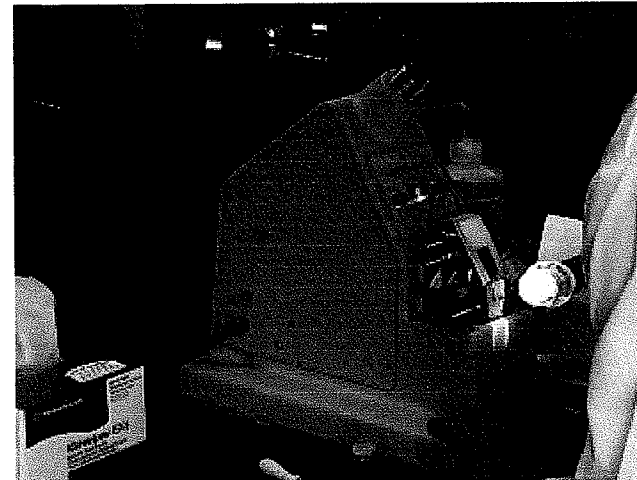
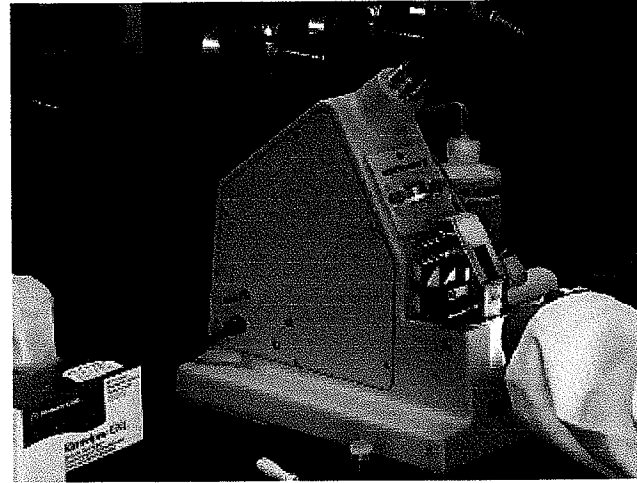
Some labs store the refractometer with a piece of tissue in the prism assembly to keep the prism glass from being scratched.



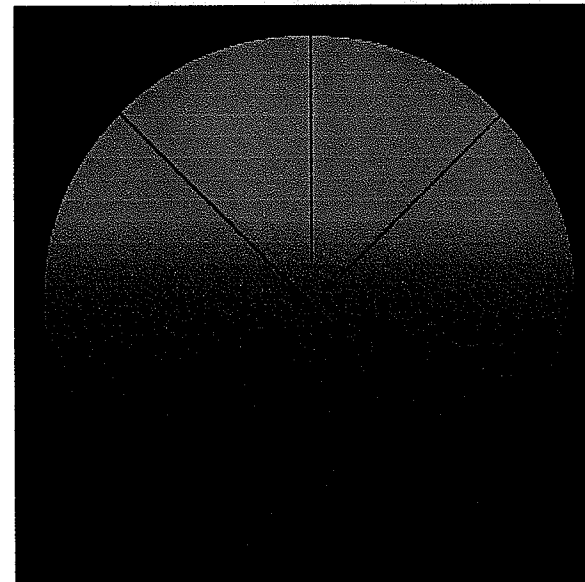
Open the prism assembly and remove the tissue.



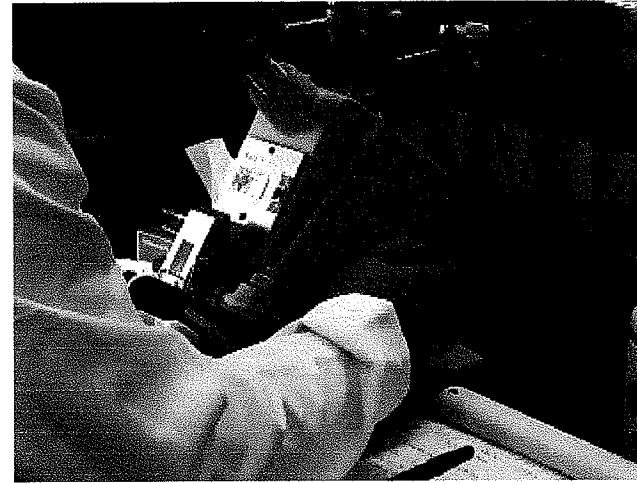
Use a pipet to apply your liquid sample to the prism.



Look through the eyepiece.



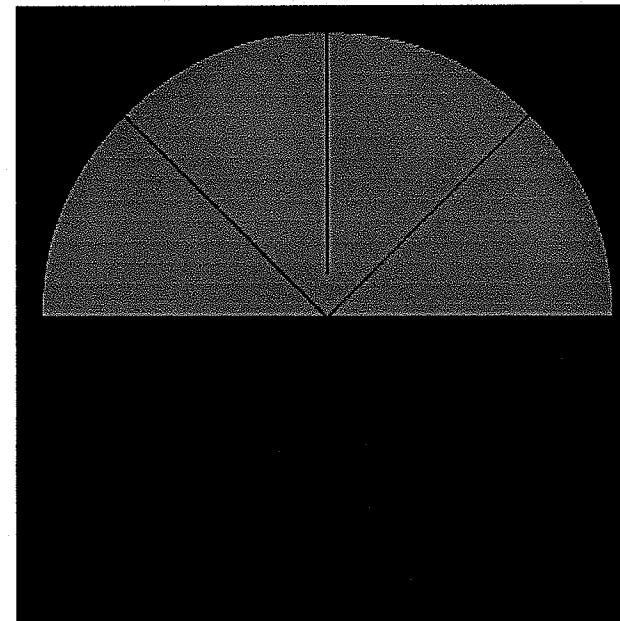
If you are close to the index of refraction of your sample you should see that the view in the eyepiece shows a dark region on the bottom and a lighter region on the top.



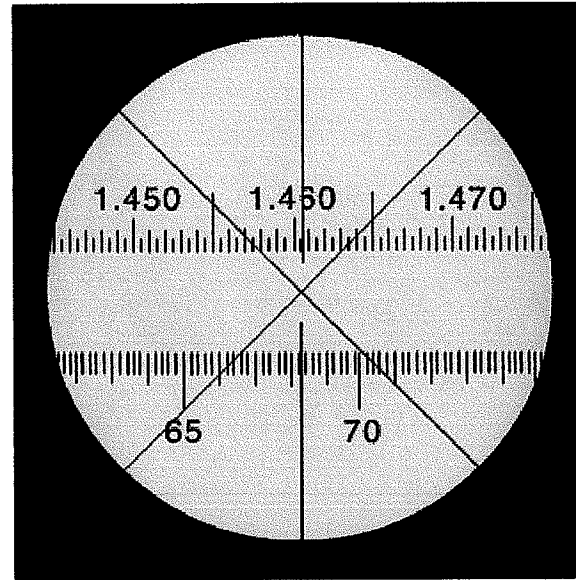
If you do not see a light and a dark region, turn the handwheel on the right side of the instrument until you do.



Before making the final adjustment, it will usually be necessary to adjust the lamp position and to sharpen the borderline between the light and the dark regions using the compensator dial on the front of the refractometer.



Once you have a crisp demarcation between the light and dark regions, turn the handwheel on the right hand side to place the borderline exactly on the center of the crosshairs as shown.



To read the index of refraction, depress the switch on the left hand side of the refractometer until you see the scale through the eyepiece. The upper scale indicates the index of refraction. By carefully interpolating you can read the value to 4 decimal place accuracy. The example shown here has a refractive index of 1.4606.



Record the refractive index in your lab notebook. Then read the thermometer and record the temperature.



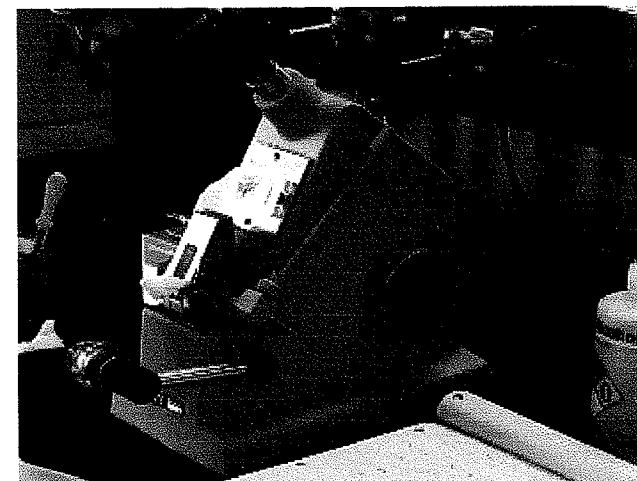
After you are finished, clean the refractometer. First use a tissue to dab away most of your sample.



Then wash the prism with a little solvent, we usually use a simple alcohol such as ethanol for cleaning organic samples.



A dabbing motion rather than a rubbing motion is preferred to minimize the chances of scratching the prism.



After you have finished cleaning the prism, place a clean tissue in the assembly. Before you leave make sure that the light has been turned off.

Refractive Index of a Liquid: Operating Procedure:

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1. Set the bath temperature to 20 degrees C.
2. Open the prism and place approximately two drops of the liquid sample on the bottom prism. Use care not to touch the prism surface with the dropper. Common samples are 2-propanol and ethylene glycol. Check with lab instructor to insure you have the correct sample.
3. Close the prism case and place the lamp close to the prism. Turn on the lamp.
4. Adjust the hand wheel on the right side of the instrument until the viewer appears light above and dark below the center horizontal line.
5. Adjust the compensator dial on the front until the image in the viewer shows a sharp line between light and dark.
6. Adjust the hand wheel on the right side until the horizontal line in the viewer passes between the crosshairs.
7. Depress and hold the switch on the left and read the R.I value.
8. Clean the prism with acetone and a Kimwipe.

Some representative refractive indices			
Material	λ (nm)	n	Ref.
Vacuum		1 (exactly)	
Air @ STP		1.0002926	
Gases @ 0 °C and 1 atm			
Air	589.29	1.000293	[1]
Helium	589.29	1.000036	[1]
Hydrogen	589.29	1.000132	[1]
Carbon dioxide	589.29	1.00045	[2] [3] [4]
Liquids @ 20 °C			
Benzene	589.29	1.501	[1]
Water	589.29	1.333	[1]
Ethyl alcohol (ethanol)	589.29	1.361	[1]
Carbon tetrachloride	589.29	1.461	[1]
Carbon disulfide	589.29	1.628	[1]
Solids at room temperature			
Diamond	589.29	2.419	[1]
Amber	589.29	1.55	[1]
Fused silica	589.29	1.458	[1]
Sodium chloride	589.29	1.50	[1]
Other materials			
Pyrex (a borosilicate glass)		1.470	[5]
Ruby		1.760	[5]
Water ice		1.31	
Cryolite		1.338	
Acetone		1.36	
Ethanol		1.36	
Teflon		1.35 - 1.38	
Glycerol		1.4729	
Acrylic glass		1.490 - 1.492	
Rock salt		1.516	
Crown glass (pure)		1.50 - 1.54	
Salt (NaCl)		1.544	
Polycarbonate		1.584 - 1.586	
PMMA		1.4893 - 1.4899	
PETg		1.57	