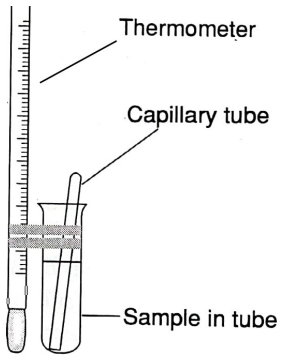
IB/AP Chem: Boiling Point Determination Name:

Procedure:



1. Using gloves, carefully break a closed-end capillary tube in half and place it in a microscale test tube with the closed-end up
2. Place about 0.5 mL (2 cm) of the liquid in the microscale test tube using a pipet.
3. Attach the first test tube to the thermometer so that the bottom of the test tube is even with the bottom of the thermometer (see Figure 7)
4. If the boiling point is known, heat the water bath to about 5 ^{o}C above the expected boiling point of the liquid. Stop heating the water bath and place the thermometer/test tube set up in the water bath so that the thermometer bulb is about an inch below the surface of the liquid. If the boiling point is not known, place the thermometer/test tube set up in the water bath and begin heating. When a rapid stream of bubbles begins to come out of the capillary tube, turn off the heat and allow the water bath to cool. If too much sample boils off, remove the thermometer/test tube setup from the bath and add more of the sample.
5. Gently stir the water bath with a glass stirring rod until the steady stream of bubbles coming from the open end of the capillary tube ceases. Record this temperature; this is the boiling point.
6. Refill the microscale test tube and repeat the boiling point procedure.

Hints:

1. Determine the boiling point as the sample is cooling rather than heating
2. Do not allow water to enter the microscale test tube. This may change the boiling point.
3. Do not rinse the test tubes or capillary tubes with acetone to dry them unless adequate time is provided for total evaporation.
4. Heat the sample slowly when determining the exact boiling point.

Unknowns/Boiling Points (^{o}C)

Acetone (56)	sec-butanol (98)	methanol (65)	n-propanol (97)
Ethanol (80)	tert-butanol (83)	ethyl acetate (77)	isopropanol (82)

Questions:

1. How does an increase in atmospheric pressure effect the boiling point of a sample?

2. If the atmospheric conditions on the surface of a planet are 0.01 atm and –5 ^{o}C, what is the most likely state of matter for water on this planet?

3. Why does a pressure cooker speed cooking?