

Experiment 3. Vapor Pressure of a Pure Liquid

Adapted from Shoemaker *et al.* Experiment 13 (page 199)

1 Introduction

In this experiment you will be examining the relationship between vapor pressure and temperature. The vapor pressure is the pressure exerted by molecules leaving the liquid surface in an evacuated bulb. This will reach some equilibrium value dependent on the liquid and temperature (the pressure raises with increasing temperature). This pressure is however independent of the amount of liquid or gas present. From the dependence between pressure and temperature the molar heat of vaporization can be defined.

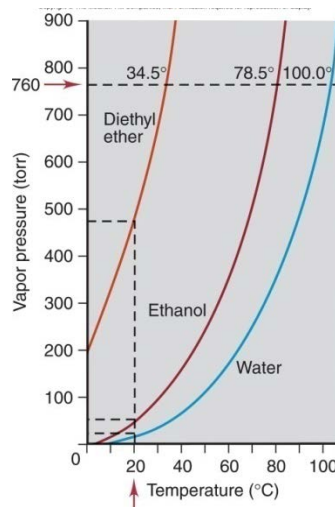
2 Theory

See the book (Experiment 13) for a detailed discussion of the theory behind this experiment. You will need to read this section in order to understand how to determine the vapor pressure.

3 Experimental procedure

Follow the directions outlined in the experimental section in Experiment 13 of text. You will be using the *boiling point method* (Method 1). Examine the vapor pressure dependence of H_2O only.

The apparatus you will be using is already set up for you, and differs slightly from that in Figure 2 on page 203 of the book. The main difference concerns the layout of valves, i.e. a three-way valve and one-way valve are used. This layout negates the possibility of having both the stopcock to the manometer and the vacuum open at the same time. The three-way valve can remain closed, open to vacuum, or open to the ma-



nometer. The one-way valve opens to atmosphere. A digital manometer is used to read the pressure.

See your TA on directions on how to use the apparatus before proceeding. Avoid excessive evacuation rates (this causes extreme bumping).

4 Calculations and Discussion

Carry out the calculations outlined in the *Calculations* section of the book on p. 205 for water only.

Discuss the pertinent thermodynamics properties of H_2O obtained in this experiment as discussed in *Discussion* section of the book on p. 205.