

Simple and Fractional Distillation.

Reading Experiment 7 in Pavia (5th edition) and the Required Reading for this experiment - Techniques 14, 15 and 17.

Prelab

Make the usual entries in your notebook (Name, Title, Date, Purpose, and Outline), plus draw a picture of each apparatus that you will use (both simple and fractional distillation – see procedure below). Your diagram does not have to be a piece of artwork. It simply needs to show the assembled apparatus used in each type of distillation with labels for *all* of the parts (see example in the lab lecture). Prepare two tables in your notebook for recording the volume and temperature data for each part. An example of the correct apparatus will also be on display in the laboratory.

Work in pairs for this experiment. Note that you will first perform the simple distillation and then perform the fractional distillation. You will be using a 1:1 mixture of cyclohexane and toluene for both distillations (rather than any of the other combinations from the table in Pavia)

Prelab Exercise (5 points)

Draw and correctly label a vapor-liquid composition curve for cyclohexane-toluene mixtures. You should read through sections 14.2, 15.1, 15.2. Use Figures 14.4, 15.1 and 15.3 in Pavia as guides.

Procedure

Follow the procedure given in the text with the following modifications. You will be using a large-scale apparatus such as shown in Figures 14.11 and 15.11 in Pavia (5th edition). Use a 50-mL distilling flask, 28.0 mL of the distillation mixture and a 25-mL graduated cylinder for a receiving flask. Record the temperature of the distillation at every 1.0 mL of collected distillate (instead of at every 0.5 mL). You will save samples during your experiment that will be analyzed by Gas Chromatography (GC) during the following week. Your instructor will demonstrate how to obtain the GC samples and how to store them for analysis.

To Complete the Experiment - Partial

Prepare a graph of the simple and the fractional distillation – plot the temperature of the distillate (y-axis) as a function of the total volume of collected distillate (x-axis) as described in the Analysis section of the experiment (p. 61). Your graph should be prepared using a computer spreadsheet program (like Excel) and must contain all of the features of a good graph (axis labels, title, appropriate axis ranges, etc.). See the included example. Connect the data points for each type of distillation (don't try to find a straight line). In your conclusion be sure to comment on the observed differences between simple and fractional distillation.