

Simple and Fractional Distillation.

Reading Experiment 7A 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 during the first lab period, and then the fractional distillation during the second lab period. You will only 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) so only physical properties information about these are required in in your notebook.

Procedure

Follow the procedures given in the text for simple and fractional distillations – see the figures in the text for the apparatus for each. Follow the procedure given in the text for 7A with the following modifications. You will save samples during your experiment that will be analyzed by Gas Chromatography (GC). Before starting each distillation (the simple and fractional), prepare two gas chromatography sample vials by adding about 1.5 mL of methylene chloride to each vial and sealing with the cap. Label one vial in each set as “1 mL” and the second vial as “5 mL.” Do not use tape to mark the vials, use a Sharpie marker or grease pencil. During each distillation, you will collect 3 drops of the distillate in the vials after collecting 1 mL of distillate and 5 mL of distillate.

Place your sample in the GC auto-sampler for analysis (see instructor for details).

To Complete the Experiment – Partial (will be combined with GC experiment)

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). Show both sets of data on the same graph. Complete the report template found at the class website. In your conclusion, be sure to comment on the observed differences between simple and fractional distillation, i.e., your conclusion should address how the distillation temperature data that you collected indicate which distillation was more efficient at separating the original mixture of cyclohexane and toluene. Which one separated the mixture more efficiently? Explain. You will also add a conclusion from the GC data, which will answer the same question but in a different way. Ultimately, your conclusion should compare the results from both sets of data – temperature and GC.