

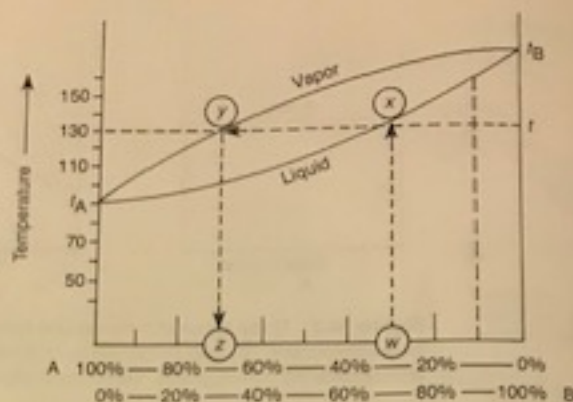


Figure 14.4 Phase diagram for a typical liquid mixture of two components.

When two components that have a large boiling-point difference are distilled, the temperature remains constant while the first component distills. If the temperature remains constant, a relatively pure substance is being distilled. After the first substance distills, the temperature of the vapors rises, and the second component distills, again at a constant temperature. This is shown in Figure 14.3C. A typical application of this type of distillation might be an instance of a reaction mixture containing the desired component A (bp 140°C) contaminated with a small amount of undesired component B (bp 250°C) and mixed with a solvent such as diethyl ether (bp 36°C). The ether is removed easily at low temperature. Pure A is removed at a higher temperature and collected in a separate receiver. Component B can then be distilled, but it is usually left as a residue and not distilled. The separation is not difficult and represents a case where simple distillation might be used to advantage.

14.3 Simple Distillation—Standard Apparatus

For a simple distillation, the apparatus shown in Figure 14.1 is used. Six pieces of specialized glassware are used:

1. Distilling flask
2. Distillation head
3. Thermometer adapter
4. Water condenser
5. Vacuum adapter
6. Receiving flask

The apparatus is usually heated electrically, using a heating mantle. The distilling flask, condenser, and vacuum adapter should be clamped. Two different methods of clamping this apparatus were shown in Technique 7 (Figure 7.2 and Figure 7.4). The receiving flask should be supported by removable wooden blocks or a wire gauze on an iron ring attached to a ring stand. The various components are each discussed in the following sections, along with some other important points.

Distilling Flask. The distilling flask should be a round-bottom flask. This type of flask is designed to withstand the required input of heat and to accommodate the boiling action. It gives a maximized heating surface. The size of the distilling