

The organic teaching labs employ distillation routinely, both for the identification and the purification of organic compounds. The boiling point of a compound, determined by distillation, is well-defined and thus is one of the physical properties of a compound by which it can be identified. Distillation is used to purify a compound by separating it from a non-volatile or less-volatile material. Because different compounds often have different boiling points, the components often separate from a mixture when the mixture is distilled. The boiling point is the temperature at which the vapor pressure of the liquid phase of a compound equals the external pressure acting on the surface of the liquid. The external pressure is usually the atmospheric pressure. For instance, consider a liquid heated in an open flask. The vapor pressure of the liquid will increase as the temperature of the liquid increases, and when the vapor pressure equals the atmospheric pressure, the liquid will boil. Different compounds boil at different temperatures because each has a different, characteristic vapor pressure: compounds with higher vapor pressures will boil at lower temperatures. Boiling points are usually measured by recording the boiling point (or boiling range) on a thermometer while performing a distillation. This method is used whenever there is enough of the compound to perform a distillation. The distillation method of boiling point determination measures the temperature of the vapors above the liquid. Since these vapors are in equilibrium with the boiling liquid, they are the same temperature as the boiling liquid. The vapor temperature rather than the pot temperature is measured because if you put a thermometer actually in the boiling liquid mixture, the temperature reading would likely be higher than that of the vapors. This is because the liquid can be superheated or contaminated with other substances, and therefore its temperature is not an accurate measurement of the boiling temperature. If you are using the boiling point to identify a solid compound which you have isolated in the lab, you will need to compare its boiling point with that of the true compound. Boiling points are listed in various sources of scientific data, as referenced on the Chemical Information page on this website. If you look up the boiling point of a compound in more than one source, you may find that the values reported differ slightly. The literature boiling point depends on the method and ability of the technician taking the boiling point, and also on the purity of the compound. While theoretically all boiling points should be constant from source to source, in reality the reported boiling points sometimes vary. Therefore, always reference the source of the physical data which you write in your lab report.