Study Guides : Separating Mixtures Part 2

Chromatography, in this case paper chromatography, is able to separate mixtures of different solutes that are placed on strips of chromatography paper. Differences in how the solutes adsorb (stick to) to the carrier solvent is what separates them. The end of the paper is dipped into a solvent and as the solvent moves into and up the paper, it carries with it the different solutes that were mixed together. The ratio of how far the solute traveled over how far the solvent traveled is known as the Rf value.

$$Rf = \frac{\text{distance solute travels}}{\text{distance solvent travels}}$$

Since each solute has a unique Rf value for a particular solvent, this can be used to help identify the solute. Those solutes that are attracted more strongly to the solvent, get carried along further and have high Rf values. Those solutes that are attracted more strongly to the paper, don't move much at all and have low Rf values.

Skimming is a technique that works on a difference in density between fractions. This would normally be done with fractions that do not dissolve in a particular solvent and yet have significant differences in their densities. Specifically, one of the fractions would need to float in a solvent while the other sinks. The fraction that floats could be picked off or skimmed with a net or strainer.

Screening is a technique that works on a difference in particle size. You may have had as a child, a plastic strainer for a sand box that allowed you to separate larger size objects from the sand in the box. For example gravel, sand, and flour could be poured into a set of trays each with different size holes in the bottom. The tray with the largest size holes would be on top, followed by a tray with smaller openings, and at the very bottom a tray with no openings. The gravel would be trapped in the top tray, the sand in the middle tray, and the flour would be in the very bottom tray.

One other property that mixtures have in common versus pure substances, is that mixtures can be separated into fractions. When these fractions are put back together again, you get back the mixture, with all of the same properties as before. Try doing this with a pure substance, like water, which can be broken down into hydrogen and oxygen gases. When you combine the hydrogen and oxygen, all you get is a mixture of hydrogen and oxygen and not water.

So in conclusion, remember that all separation techniques depend on differences in characteristic properties between the various fractions that make up the mixture. Once you have identified which characteristic property shows the biggest differences among the fractions, use the separating technique based on that characteristic property.