**Coffee Filter Thin Layer Chromatography**

AIChE at the University of California, Los Angeles

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1. **Overview**

“Chromatography” is used to separate a mixture into its components. Each component is separated based on their affinity for either a stationary or a mobile phase. Different affinities pull apart components so that we can identify substances like a fingerprint.

1. **Objective**
   1. Describe the chemical background behind TLC based on affinities to each phase
   2. Demonstrate how scientists could utilize chromatography for different applications
2. **Materials**
   1. Water
   2. Isopropyl Alcohol (optional)
   3. Coffee filter paper, cut into tall strips and folded to stand up
   4. Container
   5. Scissors
   6. Markers
      1. Traditional Crayola markers separate well
3. **Procedure**
4. Ask students if they are familiar with mixing colors. How do they get black ink? Is there a way they can think to separate the ink’s components?
5. Describe that chromatography is a technique used to separate and analyze mixtures
6. Pour about ¼ in. of mobile phase (water or alcohol) into the container.
7. Using the marker, put a dot about ½ in. above the bottom of the filter paper.
   * 1. Feel free to mix colored dots for additional effect.
8. Place the filter paper in the container so that the marker dot is above the liquid surface. Observe and allow for separation for several minutes.
9. Have students describe the different separation that is occurring.
10. Dispose of the mobile (liquid) phase down the drain and the stationary phase in the trash can.
11. **Theory**
    1. Polarity:
       1. Chemicals are *polar* if their constituent atoms have an uneven distribution of electrons. This can lead to *partial charges*.
       2. Typically, polar molecules are *soluble* in other polar liquids, and nonpolar molecules are *insoluble* in polar liquids.
       3. Polarity is a spectrum, so more polar molecules will move quicker than less polar molecules.
    2. Phases:
       1. In chromatography, the *stationary phase* is what absorbs the mixture.
       2. The *mobile phase* is what pulls the mixture along. In this form of chromatography, *capillary action* of the liquid leads to movement.
    3. Physical mixture
       1. A mixture where the components are not chemically combined and can be separated by their *physical properties*
    4. Real world examples:
       1. Can be used to identify different chemical compounds, such as separating metal compounds from soil samples
       2. Other forms of chromatography can separate proteins or DNA from biological extracts, or purify/detect small amounts of chemicals in a mixture