Introduction

Most substances around you, whether you realize it or not, are mixtures. In this activity, you’ll start to learn about how chemists can analyze (literally, “take apart”) materials by conducting two simple activities in which you separate mixtures. These two methods represent many, many methods that have been developed to understand the materials in our world, some of which you may use later in this course.

Part A – Separating a Mixture Using Paper Chromatography

Chromatography comes from Greek words that mean “color picture.” The basis for this separation process is that some phases (parts) of a mixture will move faster than others as they travel through a suitable material. In this case, the filter paper acts as the stationary phase. The pigments in the marking pens dissolve in the alcohol to become the moving phase.

You will need: marking pens, filter paper strips, tape, wood stick (or pencil), 250-mL beaker, rubbing alcohol, plastic wrap, and a tray.

Procedure:
1. Working in a well-ventilated room, pour rubbing alcohol into the beaker to a depth of 1 cm. Keep the beaker in the tray at all times.
2. Use one of the marking pens to draw a line across a strip of filter paper about 2 cm from one end. (Be sure it will be above the level of the alcohol.)
3. Tape the unmarked end of the filter paper to the center of a wooden stick or pencil. Place the stick/pencil across the top of the beaker so that the bottom of the strip is in the alcohol and the line is above the liquid. Cover the beaker top with the plastic wrap.

NOTE: Your group can use different color pens and put more than one strip into the alcohol at the same time, but be sure to keep the strips from touching each other.
4. Observe the set-up for 15 minutes and answer the questions on the next page.
5. You should throw all solids into the waste paper and flush liquids down the sink.
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Analyze and Conclude:

1. What changes in the appearance of the filter paper do you observe during the procedure?

2. How does this provide evidence that the pigment (ink) is a mixture and not an element or compound?

3. If your group (or other groups) used different colors, how did your results compare?

Part B – Separating a Mixture of Solids

Many objects in the world around you are mixtures. In this part, you will be given a mixture of three solids. Your challenge is to design and carry out an experiment to separate them. Think about some of their physical properties that could be different, such as size, color, and magnetism.

On a separate piece of paper that you attach to this one, answer the following questions:

1) What materials will you need for your procedure?
2) What steps will you take in your procedure?
3) What observations do you make as you separate the materials?
4) How did you dispose of wastes and clean up your area?
5) How successful do you think you were in separating your mixture?
6) What other comments about separation can you make?
Applicable Standard(s): NJCCCS 5.1A, B, and C; 5.6B

Materials needed per group:

Part A -- chromatography
- marking pen,
- filter paper strips
- tape
- wood stick (or pencil)
- 250-mL beaker
- rubbing alcohol
- plastic wrap
- tray

Part B – separating solids
- small paper plate
- magnifying glass
- magnet
- screen sieves
- tweezers or similar device
- iron filings
- beach sand
- zinc filings
- aluminum filings

and/or other materials requested by students in design of their experiments