

# SPIN CHROMATOGRAPHY

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## PROCEDURE

### 1. Materials needed:

#### A. Felt-tip pens

filter paper or chromatography paper. Circles up to 20 cm diameter (7.8 in) or rectangles 12.7 x 17.8 cm (5 x 7 in). Flat coffee filters can be used. (Note: 11 cm or 12.5 cm filter paper has been most commonly used)

felt-tip markers, water color or permanent

water

alcohol: methanol (wood alcohol) - available at hardware or paint stores

ethanol (available as ethyl rubbing alcohol, 70% by volume, at drug stores)

2-propanol (available as isopropyl rubbing alcohol, 70% by volume, at drug stores)

25% alcohol solution. Prepared by diluting 35 mL of 70% ethyl rubbing alcohol to 100 mL with water.

droppers

pencil

tape (either Scotch tape or masking tape – masking tape is preferred)

Spin art machine, battery powered. (This investigation used an Ohio Art Company Twirl O Paint model 509 and a Natural Science Industries Paint-n-Swirl™ no. 7811)



#### B. Food Colors

food colors (use food colors as available in grocery stores, or obtain powdered food colors from chemical supply companies or manufacturers) Food color solution concentrations are 0.1% by mass.

cotton swabs (Q-tips or equivalent)

1% sodium chloride solution

### 2. Safety Precautions:

Wear safety goggles or glasses at all times in the laboratory.

When working with youngsters, it is highly recommended that only water soluble markers be used with water as the solvent.

Alcohol is flammable. Keep alcohol in small containers. Avoid sparks or flames.

Work in a well ventilated area to minimize alcohol fumes.

Do not attempt to stop the spin art turntable with your hand. Always allow it to stop by itself.

### 3. Disposal:

Alcohol solutions can be stored in air-tight bottles. If necessary, dispose of any alcohol or alcohol solutions in the drain with running water.

Excess food color solutions can be disposed of in the drain with running water.

### 4. Experimental Procedure:

Tape a piece of filter or chromatography paper to the turntable of the spin art machine. Using a pencil, mark the approximate center of the paper. (Note: Roll four pieces of masking tape into cylinders, sticky side out, and place on the turntable of the spin art machine. The filter papers will stick to the tape. The tape will last for many experiments.)



Start the machine. While it is spinning, gently place the pencil on the paper approximately .5 to 1.0 cm from the paper center. This will result in a pencil circle on the paper that can be used as the origin for a semi-quantitative chromatographic separation.

#### A. Felt-tip pens

The spinning paper can be marked with felt-tip pens.

Several methods may be used:

1. Touch a felt-tip pen to the pencil circle on the paper.
2. Touch several different felt-tip pens to the pencil circle on the paper.
3. Stop the turntable and draw several short lines on the pencil circle using different colored felt-tip pens
4. Touch felt-tip pens to the paper at several locations producing as series of concentric circles. If the felt-tip pen is moved toward the



outer edge of the paper, spiral lines can be made. (This method is best for making designs rather than just separating colored inks into their components.)

5. Draw a design or picture on the paper before placing it on the spin art machine.

With the turntable spinning, using a dropper, slowly drop liquid onto the center of the filter or chromatography paper. A total of 1 to 2 mL of liquid will be needed. Try water only (this works best with water soluble markers), a 25% alcohol-water solution, methanol, or 70% rubbing alcohol (either ethyl or isopropyl). - Depending on the type of markers used, each liquid may produce different results.

The liquid should not wet the entire paper. After the liquid has been added to the paper, allow it to spin for about 30 seconds, then stop the machine. The final pattern, on the paper, will tend to be elliptical or amoeba-like in shape rather than circular.

Remove the paper, note the color separation that has occurred. Label the paper on a dry area with a pencil and allow it to dry.



### **B. Food Colors**

The spinning paper can be marked with food colors. Several methods may be used:

1. Dip a cotton swab into some food color solution (pure colors or mixtures). Touch the cotton swab to the pencil circle on the paper.
2. Stop the turntable and use cotton swabs to draw several short lines on the pencil circle using different food color solutions.
3. Touch the cotton swabs to the paper at several locations producing a series of concentric circles. (This method is best for making designs rather than just separating food color mixtures into their components.)



With the turntable spinning, using a dropper, slowly drop 1% sodium chloride solution onto the center of the filter or chromatography paper. A total of 1 to 2 mL of liquid will be needed. The liquid should not wet the entire paper.

After the liquid has been added to the paper, allow it to spin for about 30 seconds, then stop the machine. Remove the paper, note the color separation that has occurred. Label the paper on a dry area with a pencil and allow it to dry.