



## ***Food color, Inks and Paper-Exploring their aesthetics and physical properties***

Playing around with colored materials is a very engaging activity for students of all ages. Depending on the materials and the way they are introduced there is an opportunity to carry out parallel investigations in art and science. The materials can be very simple. For instance, I have found that dropping food color on paper towels to make various designs readily engages students at the elementary and middle school level. They naturally will make designs and patterns with the food color. This type of exploration can be extended by placing a few drops of water on the spots of food color causing the colors to spread out in interesting ways. Observed closely the expanding mixtures of food color eventually results in a separation. The red color separates from the blue or yellow. This occurrence can be the start of an extended science investigation with the question of why colors separate. Going further with this approach water based markers and permanent markers can also be used to make designs and patterns. Water is dropped on the spots made by these markers. Interesting designs will appear. Liquids other than water can also be used to spread out the marks. In the science exploration the technique of chromatography can be used to see what happens with different kinds of markers doing this in a systematic manner. Concurrently, the colors from different kinds of markers and different liquids can be the basis for creating different kinds of aesthetic effects. These explorations and experiments can be the context for introducing physical and chemical properties of materials such as solubility, physical and chemical changes.

Students can be shown some of the paintings of Helen Frankenthaler and Morris Lewis who carried out an analogous type of exploration pouring oil paints on untreated canvas.

Possible materials: Food color, paper towels, water base and permanent markers, liquids such as alcohol, household cleaners, vinegar, baking soda solution, bleach.

The science activities outlined are developed in detail in the curriculum guide *Inks and Papers* from the curriculum project *Models in Technology and Science* available at Kelvin,bernie zubrowski

## ART

### Exploring Food colors

Students are given white paper towels or coffee filters and red, yellow and blue food color. They are shown a few examples of how the colors can be added to the paper and that water can be dropped on top of these spots to spread them out. What kinds of designs can they make?

### Exploring Water based markers

As they did with food colors they make marks on the towels or coffee filters and then add water to the marks. What kind of designs can they make?

### Mixing Food Colors

Using containers such as plastic egg cartons or special mixing trays students can be challenged to mix the red, blue and yellow colors to match the colors of the pens. What combinations give a dark green, or purple, or orange color? What proportions of these three can be used to make various shaded of colors? Can they match the colors of the markers they have used previously?

### Exploring with other liquids

Alcohol, cooking oil, vinegar and few other household liquids can be introduced.

What happens when these liquids are placed on spots of food colors? Can they be used to make designs that are different from water?

e.g. If cooking oil is first dropped on the paper and allowed to spread out, the food color will not spread into the oil. So, designs can be made something like batik.

## SCIENCE

### An inquiry into how colors separate

Following up the observations that colors separate out when water is added to a spots of food color, an inquiry can be started to investigate what is causing this to happen. Simple experiments can be set up to see how the colors move up a vertical strip of paper placed in container of water.

A similar set of experiments can be done with water based markers. The question to pursue is based on the observation that some inks seem to be mixtures of two or more colors. Chromatography experiments can be set up to systematically determine what happens with the different markers. Different brands of water based markers can be tested. Black markers with some brands are sometimes a mixture.

**Comparisons can be made between water based and permanent markers.** Will permanent markers spread out in the same way as water based markers.

A simple observation can be carried out. What happens if cups of water with food colors are put aside and allowed to evaporate. Will both the liquids and the food color disappear? These observations can be used to talk about the solubility of solids.

Having recorded and compared results of all of the experiments time should be taken to discuss what is happening. Do different colors have different solubilities in the liquids?

### **Erasing colors**

Bleach can be introduced. It can be carefully dropped on areas of food color with the result that the colors disappear. Designs can then be made by deciding where the bleach is placed.

Given all these explorations students can be challenged to do a final project. What kind of design or "painting" can they create that express their ideas and feelings about colors.

### **Studying an artists work**

Some painters in the 1950s explored placing paints on untreated canvas. The paints spread out similarly to the way food color spread out on paper towels. Helen. Frankenthaler and Morris Lewis paintings can be studied for this method.

Can a visual model be developed to help explain what is happening during chromatography?

### **Changeable Markers**

There are markers available that change colors when a special marker in the set is drawn over marks from the other markers. These can be explored.

Blueberry and cabbage solutions will act as chemical indicators changing colors when acids such as vinegar or bases such as baking soda are mixed with these solutions. This can be used to illustrate reversible chemical reactions.

Bleach acting on food color or inks wipe out the color and can be used as example of irreversible chemical reactions.

### **Mystery Spots**

Students are given a paper towel with spots made with different markers. Drawing on all their previous explorations and experiments, can they identify what brand the marker came from. This can be the basis for an embedded assessment.