Science at Home

Stained Glass Milk

What You Need

Pie pan
Whole milk
Food coloring (set of 4 colors
Liquid dish soap
Cotton swabs

What You Do

1. Pour the milk into the pie pan, approximately ¼ inch deep. Allow the milk to settle before continuing.
2. Add one drop of each of the four food colors to the milk. Keep the drops close together in the center of the pan of milk.
3. Using a clean cotton swab, touch the tip of the swab to the center of the milk. Be careful not to stir the milk—you do not want to disturb the food coloring. Make observations about what has happened.
4. Now dip the end of the cotton swab into the liquid dish soap.
5. Touch the soapy end of the cotton swab to the center of the milk, and hold it there for 10-15 seconds. Make observations about what has happened.
6. Add another drop of soap to the cotton swab, and touch the milk in other areas around the pie pan.

Questions to ask

- *What did you observe?*
- *How did the reaction of the food colorings change between the first time and the second time you dipped your cotton swab?*

What's The Science?

Milk is mostly water, but it also contains vitamins, minerals, proteins and tiny molecules of fat. The proteins and fats are sensitive to changes in their surrounding solution—this helps create the bursts of color. The secret is the chemistry of the tiny drop of dish soap. The soap has bipolar characteristics that weaken the chemical bonds that hold the proteins and fats in the milk. The soap's polar end that is hydrophilic, or water loving, dissolves in water. Its polar end that is hydrophobic, or water fearing, attaches to the fat in the milk. The molecules of fat bend, roll, twist and contort in all directions as the soap molecules race around to meet up with the fat molecules. While all this is happening, the food coloring is bumped around and allows you to see what is happening.

Try This

Use science vocabulary: Use related science words such as proteins, fats, chemistry, and molecules as you talk and play together. Children learn new vocabulary words when they hear grown-ups use them in context.

Extend your activity: Try this experiment again, replacing the whole milk with 2%, 1%, and/or skim milk. Do your results change with different types of milk? If so, can you detect a pattern?

Keep In Mind

- Children are natural scientists; let them lead the way in their experimentation! Encourage them to ask questions and make suggestions only when they are stuck/discouraged.
- The order suggested is not the only right or perfect way. Make adjustments based on the age, ability, and interests of the children.

Additional Resources

Clarabelle: Making Milk and So Much More by Cris Peterson
The Milk Makers by Gail Gibbons

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AN URBAN SIGHT PROJECT
Bridging The Arts & Education

imagination STATION
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