Adventures in Surface Tension and Cohesion

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Molecules liquid state experience strong intermolecular attractive forces. When those forces are between like molecules, they are referred to as cohesive forces. For example, the molecules of a water droplet are held together by cohesive forces, and the especially strong cohesive forces at the surface constitute surface tension. When the attractive forces are between unlike molecules, they are said to be adhesive forces. The cohesive forces between molecules down into a liquid are shared with all neighboring atoms. Those on the surface have no neighboring atoms above and exhibit stronger attractive forces upon their nearest neighbors on the surface. This enhancement of the intermolecular attractive forces at the surface is called surface tension. Soaps and detergents further lower the surface tension. Soaps and detergents help the cleaning of clothes by lowering the surface tension of the water so that it more readily soaks into pores and soiled areas.

Magic Milk

**Grade Level:** 6th-college

**Time:** 30 minutes for setup, experiment, and written observations. 1 hour to write lab report.

**Learning Objectives and Expected Outcome:**

Students shall demonstrate an understanding of the role of surface tension and cohesion in chemistry.

**Materials:**

- Dixie Paper Plate
- Milk
- Food Coloring (4 colors)
- Q-tips
- Liquid dish soap (Joy)
Computer Technology:

Microsoft Office: Word and PowerPoint

Methods:

1. Formulate a hypothesis.
2. Set plate on table.
4. Put four drops of red food coloring near center of plate.
5. Repeat for yellow and green. Make sure colors are close together, but not touching.
6. Put 2 drops of blue food coloring in milk close to other colors.
7. Place clean Q-tip in center of colors, press to bottom of plate, move hand in circles without moving bottom of Q-tip.
8. Record observations.
9. Then apply soap to the other end of Q-tip.
11. Record observations.

Assessment:

1. Describe in your own words the process that took place during the experiment?
2. What reactions occurred? What caused these reactions?
References and Acknowledgements:

Pictures taken by Charles D’Reego

Video of Experiment http://www.youtube.com/watch?v=Y.Qdv8xC_f0

Information site http://hyperphysics.phy-astr.gsu.edu/Hbase/surten.html

Puzzle Maker http://puzzlemaker.discoveryeducation.com/

Demo Video: http://www.ilpi.com/genchem/demo/tension/