Homeschooler's Soap Science Session

Wood Buffalo Regional Library

This is a 1 hour program for the WBRL scheduled for November 2nd, 2015 at 2:30pm.

This program is designed for students aged 3-12

Program designed by:

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Activity 1: Magic Milk

In this activity students will use food coloring to show the movement of molecules in milk when they are reacted with soap.

Materials

Item	Quantity
Milk	3 litre bottle
Liquid dish soap	1 bottle
Q-tips	40
Paper plates/Bowls	20
Food Coloring	2 4-packs
Small plastic cups	20

Method

1. Give each student a paper plate
2. Pour some milk into the plate, just enough so it doesn't spill over the shallow edges
3. Allow the student to add a 2-3 drops of food coloring around the plate
4. Pour a small amount of liquid soap into a plastic cup
5. Give each student a Q-tip and allow them to dip it into the soap
6. Allow the student to dip the soapy Q-tip into the centre of the milk on the plate. The milk should move and cause the food coloring to mix around

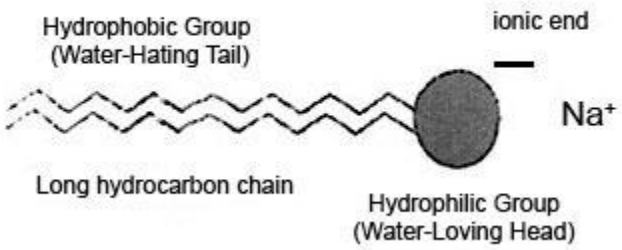
What's Happening?

Soap is a unique molecule because it is both **Hydrophobic** and **Hydrophilic**.

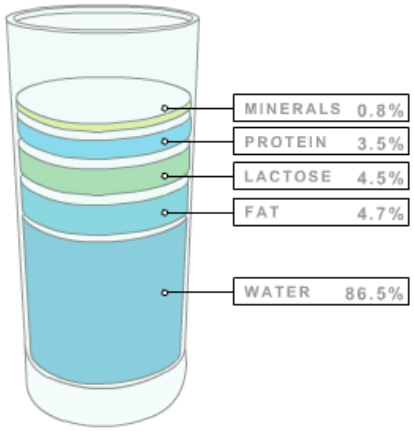
What does this mean?

- **Hydrophilic** means that a substance will dissolve in water. Oil, fat and grease do no usually dissolve in water which makes them hard to clean.
- **Hydrophobic** means that a substance does NOT dissolve in water. Oil, fat and grease are hydrophobic.

Soap's chemical structure contains a hydrophobic end and a hydrophilic end.



Milk is a complex mixture of hydrophobic particles (fats) and hydrophilic particles (water).



When the milk comes into contact with the soap the particles move around. The fat in the milk try to get as close as possible to the Hydrophobic side of the soap and the water in the milk tries to get to the Hydrophillic side. We see this movement by using the food coloring.

Activity 2: Soap Making

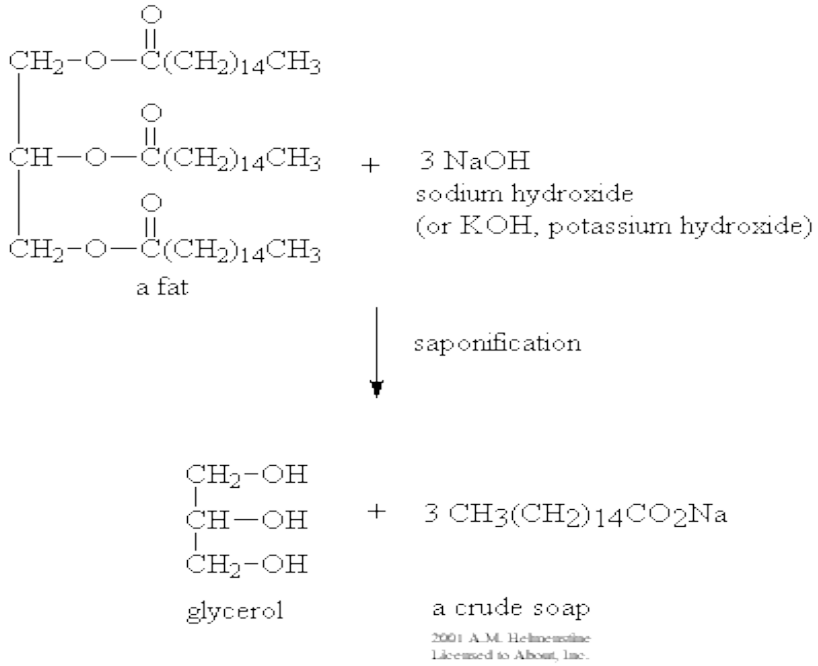
This activity will allow students to create their own soap and learn about the chemical reaction of saponification.

Background

Soap Making is done through a process called **Saponification**.

This is a chemical reaction where **a** Fat (triglyceride) is reacted with **Lye (sodium hydroxide)** to produce **Glycerol** and a **Fatty Acid Salt (Soap)**.

The chemical reaction for soap is:



Soaps are a unique chemical because they are both ***Hydrophobic*** and ***Hydrophilic.***

Soaps work by attaching their *hydrophobic ends* to oil and grease. They then dissolve in water using their *hydrophilic ends*. This allows the oil and grease to be washed away leaving you nice and clean ☺

Chemical Formula of Soap

Hydrophobic Side $CH_3(CH_2)_{14}CO_2^-Na^+$ Hydrophillic Side

Materials:

Note these materials are for the melt and pour soap making method which is an easier and safer method for children. Soap making from scratch required the use of a string alkali (lye) and is recommended for older students.

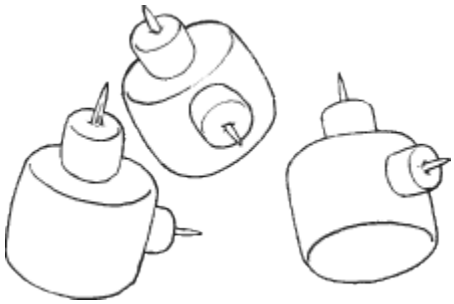
Item	Quantity
Glycerin Amazon Link	1
Colorants Amazon Link	1
Fragrance Amazon Link	1
Soap Molds Amazon Link	2
Microwave safe bowls	4
Styrofoam cups	20
Popsicle sticks	20
Knife	1-2
Microwave	1-2
Oven mitts	2pairs
Plastic wrap or Wax Paper	1 roll

Method

1. Cut glycerine and place pieces into the microwave safe bowls
2. Microwave for 40 seconds on high, then continue to heat at 10 second intervals until completely melted.
3. Remove from microwave using oven mitts
4. Give each student a Styrofoam cup and popsicle stick
5. Pour melted glycerine into each cup
6. Allow students to add desired color and fragrance
7. Students will stir with popsicle stick
8. Pour mixture into soap mold and allow to dry for 30-40 minutes
9. Remove soap from mold and wrap in plastic wrap or wax paper

Activity 3: Marshmallow molecules

Students will create diagrams of soap molecules using marshmallows showing their hydrophilic heads and hydrophobic tails.

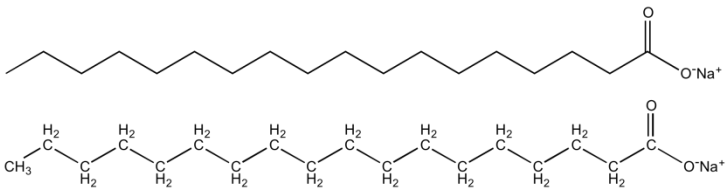


Materials

Item	Quantity
Marshmallows	5 20-oz bags
Mini Marshmallows (white)	3 16-oz bags
Mini Marshmallow (colored)	1 16-oz bags
Jumbo Marshmallows	2 12-oz bags
Toothpicks	3 500-packs

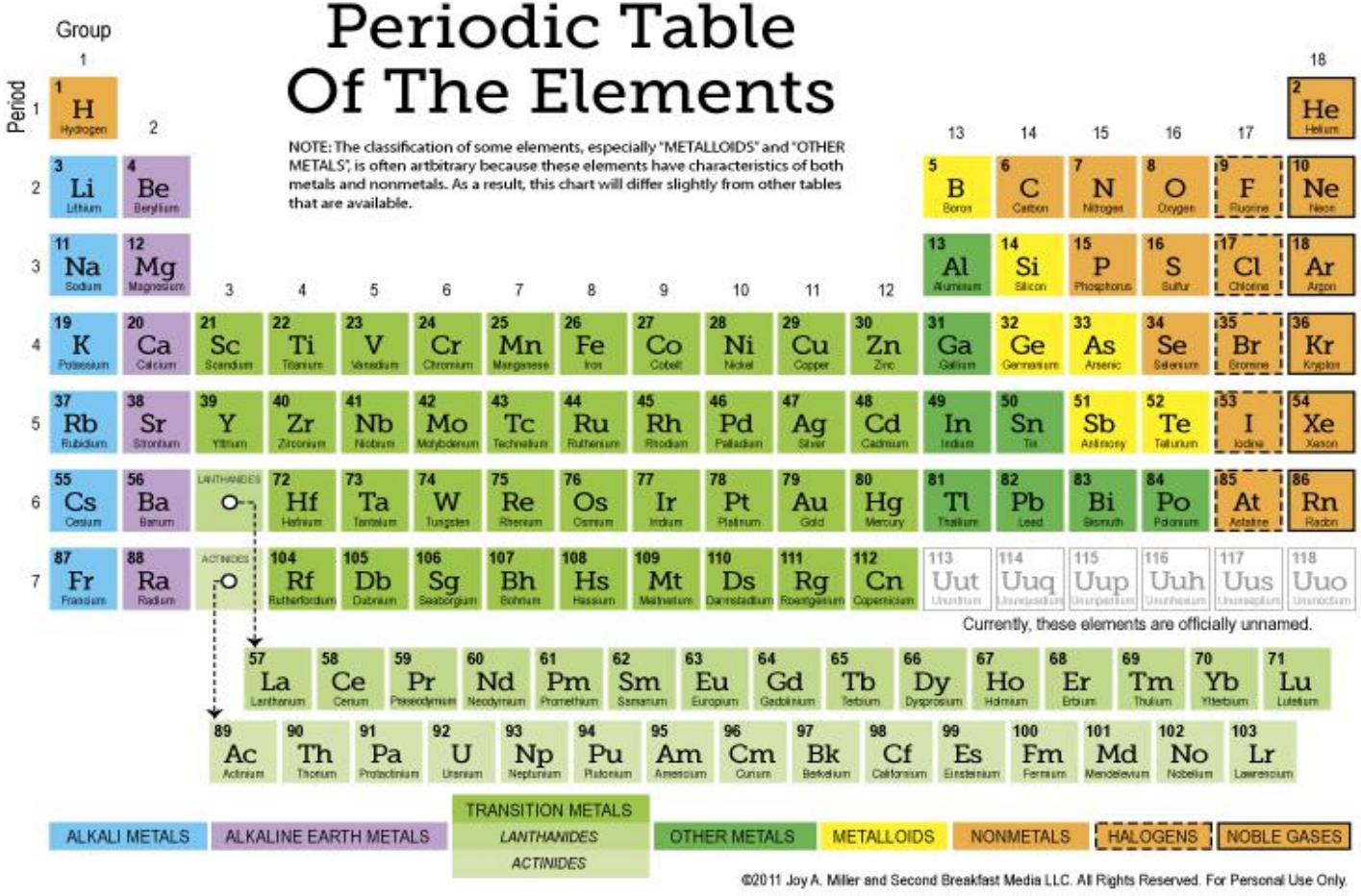
Method:

1. Each student will be given an assortment of marshmallows and toothpicks
2. Students will be shown an example of a soap molecule or it will be drawn on the board



3. Student will then create a diagram of a soap molecule using the following sizes

Marshmallow	Atom	Symbol	Quantity Needed
Jumbo	Oxygen	O	2
Regular	Carbon	C	18
Mini (white)	Hydrogen	H	35
Mini (colored)	Sodium	Na	1


Periodic Table
Of The Elements
NOTE: The classification of some elements, especially "METALLOIDS" and "OTHER METALS", is often artbitrary because these elements have characteristics of both metals and nonmetals. As a result, this chart will differ slightly from other tables that are available.
Group
Period
Currently, these elements are officially unnamed.
ALKALI METALS
ALKALINE EARTH METALS
TRANSITION METALS
LANTHANIDES
ACTINIDES
OTHER METALS
METALLOIDS
NONMETALS
HALOGENS
NOBLE GASES
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