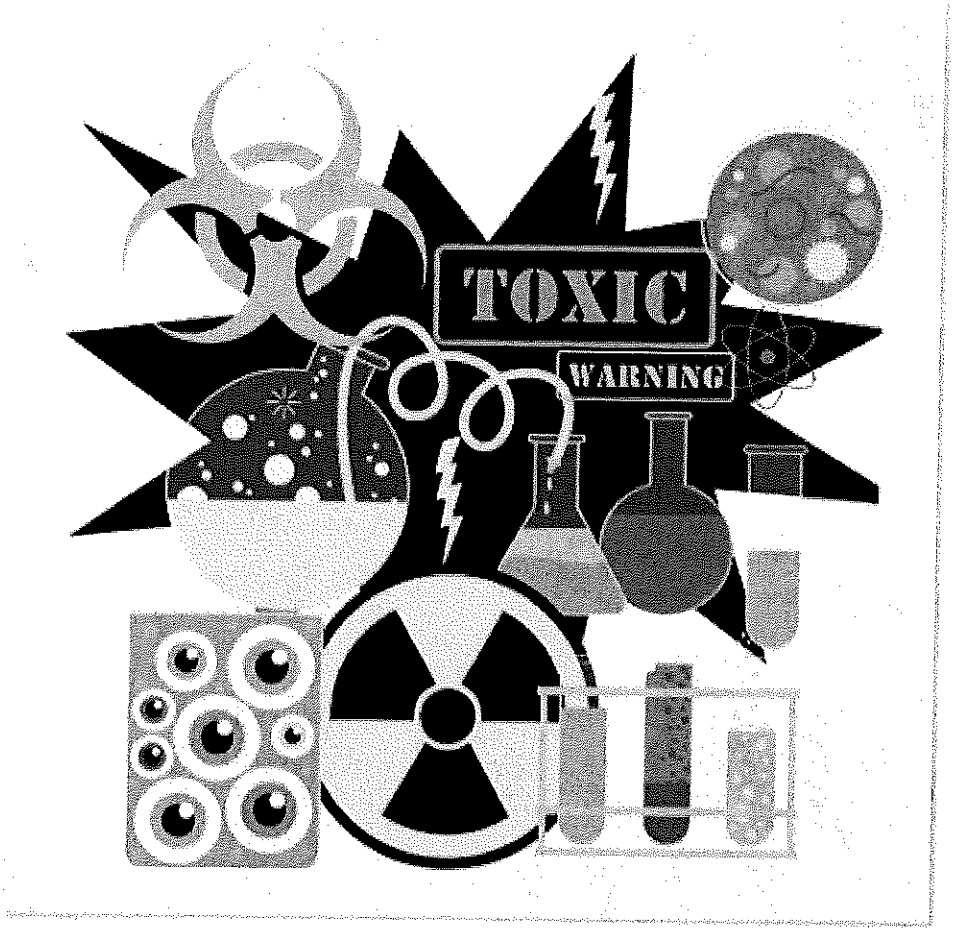


MAD SCIENTIST!

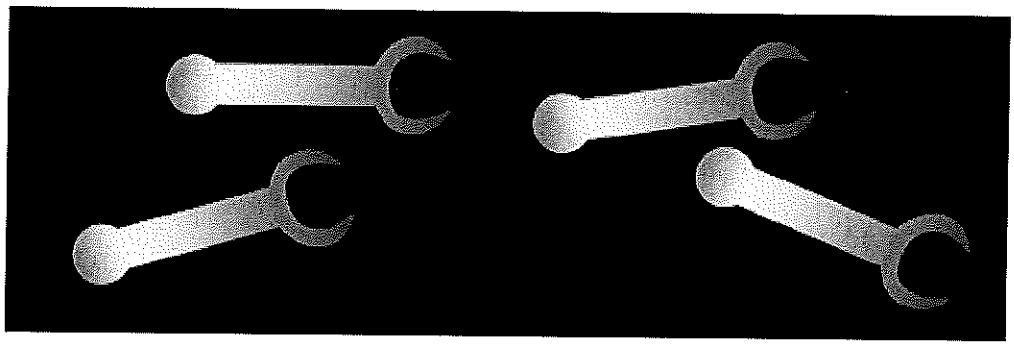
PRE AND POST OUTREACH ACTIVITIES

Mad Scientist

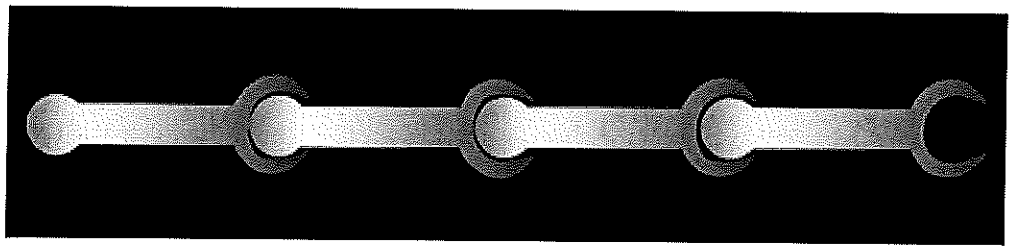
Pre Activity #1: Matter Song Materials: Copy of lyrics for teacher or all students.	**Instructions:** 1. Have students learn and sing the song.
Pre Activity #2: States of Matter Booklet Materials: Copy of each page of the booklet for each child, pencils, scissors, stapler.	**Instructions:** 1. Have students cut out the pages and put in order to create book. Staple together when complete. 2. Students should read through the book and answer the question.
Post Activity #1. States of Matter Search Materials: A copy of "States of Matter" page for each child, pencils, magazines, scissors, glue.	**Instructions:** 1. Have students cut pictures out of magazine that fall under the three categories.
Post Activity #2: Make Your Own Polymer Materials: Water, glue, talcum powder, food coloring, saturated borax-and-water, cups, stirrers, baggies. OR Glue, food coloring, Sta-Flo concentrated liquid starch, cups, stirrers, comic strips.	**Instructions:** 1. See attached instructions.
Post Activity #3: Ivory Soap Experiment Materials: Copy of "Ivory Soap Experiment" page for each child, pencils, ivory soap, water, container, knife.	**Instructions:** 1. Have students predict what will happen to the soap. 2. Do the experiment and have students fill in responses. 3. Cut the soap apart to observe.

Polymer Fact Sheet

"Poly" means "many" and "mer" means "parts." So "polymer" means "many parts." The parts are usually the same part used repeatedly in a chain-like manner. Polymers are also referred to as plastics because they are easily molded.



It's often easy to see if something could become a polymer. From the shape of these parts, you can probably guess how they might stick together.



That's right. The rounded end will connect to the open end. This approach is used by many toys that let you build things. It is also used in chemistry to build things.

Matter Song

(to the tune of "Farmer in the Dell")

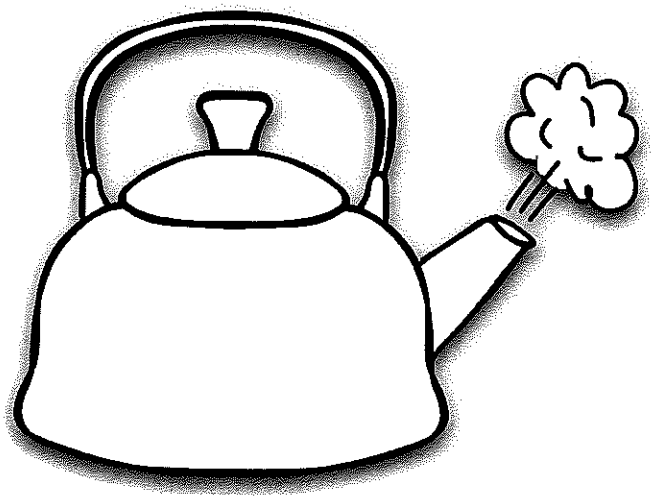
There's matter over here
There's matter over there
Liquid, solid, or a gas,
There's matter everywhere.

A solid keeps its shape
It doesn't separate
What you see is what you get
A solid keeps its shape.

Gas is in the air
You can't see, but it's there
It flows and blows right through your nose
And fits in anywhere.

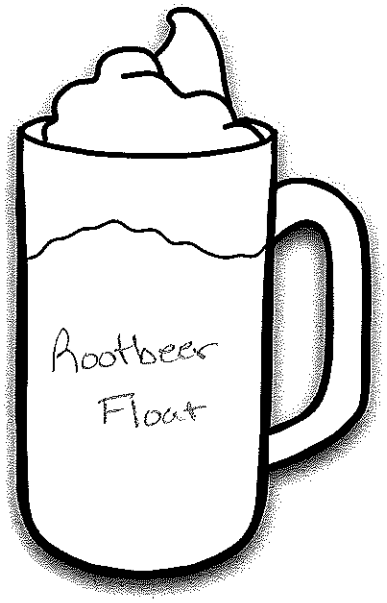
When you melt a solid down
A liquid can be found
It's wet and moves wherever there's room
And spills and splashes, too.

Evaporation



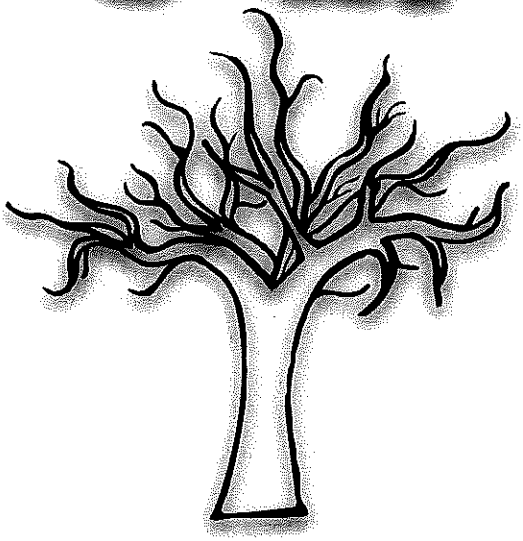
Evaporation is when water changes from a liquid to a gas (vapor). Heat causes water to turn into vapor or steam. The water vapor or steam leaves the water and goes into the air.

STATES OF MATTER



There are three states of matter - **liquid, solid** and **gas**. All matter on earth is either a liquid, solid or gas.

Solid



Solids have a certain shape and size. Let's think about a tree. A tree is a solid and has its own shape. If you wanted to change the shape and size of the solid tree, you would have to cut it down.

Condensation

Condensation is when liquid drops of water form from **water vapor**. Water vapor in the air gets cold and changes back into a liquid.

If you poured a glass of cold water on a hot day, water will form on the outside of the glass. The water did not leak through the glass! It came from the air. Water vapor in the warm air turns into a liquid when it touches the cold glass.

STATES OF MATTER SORT

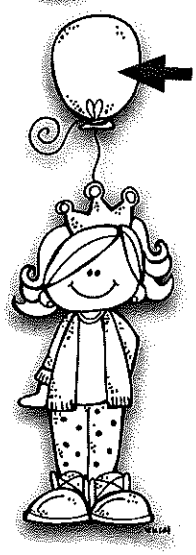
Liquid	Solid	Gas

Sort the matter pictures into the correct group.

Liquid

Liquids do not have their own shape. They take the shape of the container they are in. Liquids have a size or **volume**. Volume means it takes up space. Liquids can flow, be poured or spilled.

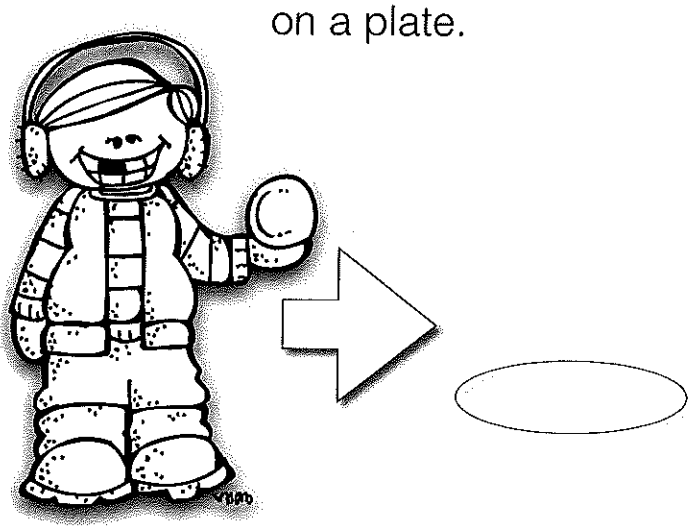
Gas



Gases have no shape, size or color. Gases are all around us. The air you breathe is a gas. You can feel gas when the wind blows. Air is many gases mixed together.

CHANGING STATES OF MATTER

Some matter can change. Draw what you think would happen if you brought a snowball into your house and left it on a plate.



I think the snowball will _____

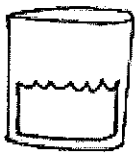
_____

Name: _____

STATES OF MATTER SEARCH

Directions: Draw or cut pictures out of magazines that represent each state of matter.

SOLID 

LIQUID 

GAS 

Introduction

1. Share the definition of polymers, and how they are long chains of molecules, just like spaghetti noodles.
2. Share that plastics are polymers and ask for examples of them in daily life. What are some characteristics of polymers? Use their polymer examples to see that they are usually strong, flexible, durable, sometimes strechable and bendable.
3. Ask for examples of things that are NOT polymers (such as bricks, glass, metals) to see whether they have the idea.
4. Why use polymers in things like car bumpers, garbage bags, plastic dishes and utensils, countertops, etc.? Reinforce their characteristics.

Activity

Today, we are going to make polymers.

- Pass out cup, stirrer, and Baggie to each student.
- Have polymer recipe on blackboard or countertop chart.

    1. Measure 20 ml water into cup.
    2. Add 25 ml Elmer's-type glue. Mix with stirrer.
    3. Add 1 level teaspoon talcum powder. Stir 2 minutes until compound is made—or ingredients are thoroughly mixed together.
    4. May add up to 5 drops of food coloring—AND NO MORE! Decisions about mixing colors should be made *before* the five-drop limit is reached. More coloring makes too big a mess on hands, clothing, and surroundings.
    5. Add 5-8 ml or 1 teaspoon of saturated borax-and-water [***Be careful!*** Students should be warned that the borax solution can burn their eyes a little, so they should take care not to splash it. They should also not rub their eyes until they have washed their hands. Younger children should have the borax solution measured out for them.] Stir 2 minutes.
    6. Remove polymer from cup. Pull off extra material from stirrer. Form a glob.
    7. Dispose of cup. When done playing with polymer, store in plastic bag. If you plan to keep it awhile, store in the refrigerator.

- Have students play with the material—see if it has the "polymer" characteristics discussed earlier: flows, stretches; is flexible, durable. Try pulling apart chunk quickly. See clean break of molecules. See flowing when pulled apart slowly. Don't forget the old Silly Putty favorites of imprinting a design, from a coin or a sealing wax impresser, and picking up print from the color comics pages of the Sunday newspaper.

  Note that we are using scientific skills such as precise measuring and following directions, experimenting, observing, making hunches or forming a hypothesis, and testing a hypothesis.

- Brainstorm how we could use our material and why it would be a good material for our applications (examples: plug up holes in walls, use as a shock-absorbing material within sole of shoe, glob to hold pins or paper clips, etc.)

Homemade Silly Putty on Newspaper Comics

Silly Putty is a type of popular polymer. Make your own and have the children experiment with bouncing it, kneading it and copying newspaper images onto its surface.

Materials:

- Elmer's Glue-All multipurpose glue
- food coloring
- Sta-Flo concentrated liquid starch
- Comic sections of newspapers

Instruction

1. **Mix the glue with the food coloring** until the color is even throughout.
2. **Pour the liquid starch** into the colored glue mixture.
3. **Stir** and let it sit for five minutes.
4. **Pull the putty out of the mixing bowl** and set it on a paper towel. Knead the putty in your hands for five to ten minutes.
5. **Place the putty on a comic strip section of a newspaper.**
6. **Gently push down and then peel off.**
7. **Observe.**

The final product is great! It can copy newspaper print and bounces when you roll it up into a ball, just like the original store-bought Silly Putty.

Ivory Soap Experiment

1. What do you predict will happen when we put ivory soap in water?

2. What did happen? _____

3. What do you think causes the soap to _____?

4. Cut the soap apart and look at how it is made. What do you notice? Write and draw what it looks like inside.