

Playing with Polymers 2.1

Introduction to polymers using silly putty, slime, gravity goo, orbs and other gooey, slippery, sticky and really slimy stuff.

*Materials can be classified as solids, liquid or gas based on their observable properties.

Introduction:

What are polymers?

While *polymer* in popular usage suggests plastic, the term actually refers to a large class of natural and synthetic materials with a wide variety of properties, including properties typically associated with plastics.

NOTE: Before class cover tables with plastic and tape down- leave on until end of class.

Activity 1: Polymer Bead Demo

Materials: Polymer Strand with Mug

- 1- Hold the cup with the bead chain up for the students to see. (A polymer is a large molecule composed of repeating structural units typically connected by chemical bonds).
- 2- Ask for a volunteer to come up and take the tip of the chain and hold it over the rim of the beaker and release.
- 3- The chains of polymer become tangled and act as a single strand. Gravity exerts a force on the falling strand and the top beaker slowly empties. (This is the lead in to PolyOX).

Activity 2: Silly Putty

As a bouncing putty, Silly Putty is noted for its unusual characteristics: it bounces, but breaks when given a sharp blow; it can also flow like a liquid and will form a puddle given enough time. Silly Putty and most other retail putty products have thixotropic agents added to reduce the flow and enable the putty to hold its shape.

Activity 3: Jelly Marbles

Materials:

Jelly Marbles

Water

Large plastic bowls

Gloves

Petri Dish (for every 2 to 3 kids)

Show the students the large plastic bowl with water in it – do they notice anything about the bowl- there is water inside. Could something else be in the bowl?

Put on a pair of gloves and place your hands inside the bowl- WOW- look there is something in the bowl- show them a jelly marble before it was hydrated and then the hydrated ones.

The marbles grow 11X their original size!

-Pass out gloves to all students- these polymers are safe – but even safer with gloves.

-Pass out bowl with polymers to each group.

-Pass out petri dishes to every 2-3 students.

- Have students put 2 or 3 jelly marbles in their petri dish to observe.

1. Are they cold or warm.

2. How do they feel?

3. Can you pick the marbles up easily?

4. What happens when you apply a little pressure with your finger?

5. What happens when you place the jelly marbles- in the petri dish- over words or the CT Science Center logo?

Explanation: The jelly marble works like a magnifying glass over the words. Because of the spherical shape, it creates a convex “lens” over the words, just like the lens in a magnifying glass.

NOTE: Tell the kids they cannot break the jelly marbles.

You can also pass out some colored marbles in a cup for them to compare.

NOTE: Keep gloves on for remainder of class.

Activity 4: Sodium Polyacrylate

Materials:

2 Opaque Cups

Water

¼ Teaspoon Sodium Polyacrylate

1. Place sodium Polyacrylate in one cup before class begins.
2. In front of class pour water in cup.
3. Move cups around- guess which one has water- oh you guys are too smart for me. Pour water in another cup- the one with the S.P. and move around again. Can you guess which one has the water? Take the first cup and “throw” water out into audience- no water there. Take second cup and “pour” over someone’s head- no water. Third cup I hope you are wrong since I already had a shower today- no water.
4. Conclusion: show diaper and explain that S.P. can absorb form 500 to 1000 times its mass in water.
5. Show the gel in the cup.
6. Predict how many cups of water would it take to fill the diaper?
7. Call up a volunteer and have them pour a cup at a time to see how much water the diaper can hold.

Activity 5: Insta – Grow Snow

Materials:

Petri Dish (for every 2 to 3 kids)

Pipette

Goggles

Water in flask

Do a demonstration of how Insta- Grow snow works. Place some in a petri dish, add a little bit of water with a pipette and watch it expand.

1. Pass out goggles and flasks with water and pipettes.
2. Pass out petri dishes that have the snow powder in them already.
3. Remove the lid to the petri dish and have the students start by adding 2 to 3 drops of water at a time so they don’t saturate the snow powder.
4. Watch what happens.

Activity 6: Slime

Polyvinyl Alcohol
Sodium Borate
Popsicle stick
Bowl to make it in
Pipe cleaner (1 per person)
Slime for each group

Watch as I mix 2 liquids together to create a polymer, by cross linking the molecules!

Have the kids observe the properties of slime.

-Is it the same or different than the other polymers they experimented with in class?
How?

-Is the slime warm or cold?

-Can you pick it up with your hands? With the popsicle stick?

When you are done experimenting the kids put their gloves on the table and you or helper roll up the plastic sheets (with gloves & Slime) and throw away!

Conclusion:

Today we investigated 4 different types of polymers: Jelly Marbles, Sodium Polyacrylate, Insta Snow and Slime (PVA & Sodium Borate). Do you have any questions about polymers?

Take 2 questions and wrap up.