Sources:

-https://buggyandbuddy.com/science-activities-for-kids-baggie-and-pencil-magic-science-invitation-saturday/

-https://www.stevespanglerscience.com/lab/experiments/leak-proof-bag/

Lesson Outline:

1. Molecules
2. Polymers
3. Activity
4. Review Questions

Materials:

1. Long, thin, flexible objects (i.e. pool noodles, pipe cleaners, cooked spaghetti noodles, etc.)
2. Plastic ziploc bags
3. Round, sharpened pencils
4. Pencil sharpener
5. Glue
6. Borax
7. Cornstarch
8. Food Dye

MS-PS1-1 Matter and its Interactions

Develop models to describe the atomic composition of simple molecules and extended structures.

Molecules

1. Ask if they know what a molecule is, and explain that that's what we're going to be learning about today
2. Ask if they've ever built anything with legos before, what specific things they've made with legos
    a. Explain how we can make all sorts of things just using lego bricks
        i. Explain how everything is made out of molecules, and how we can think of molecules like legos: you can combine them to make almost anything
3. Explain that when you string certain molecules together and connect them, you get what is called a *polymer*
        i. Polymers are flexible strands of molecules
    b. Ask them what things they use everyday that are plastic: these are all polymers!
        i. Just like how the plastics we described were all very different, polymers can be very different from one another too, but a lot of the times they're very flexible and they don't break easily
4. *Ask if anyone has any questions*
5. We're going to show you guys an example of a polymer right now, in the form of a really cool magic trick

Plastic Bag/Pencil Magic

1. Pass out the plastic bags filled with water, and two round pencils to everybody
2. Ask the kids what they think is going to happen if we poked the plastic bag with the pencil
    a. Take several answers
3. Tell the kids that we're about to try and push the pencils all the way through the plastic bags
4. Afterwards, ask the kids what happened
    a. Ask them if they know why it happened, keeping in mind what we've learned before
        i. The reason the pencil didn't pop the plastic bag is because the bag is made out of a really flexible polymer, and it bent out of the way when we poked it instead of breaking
            1. Hold up the flexible material (pool noodles, pipe cleaners, etc)
                a. Just like these (___), the polymers in our plastic bag moved out of the way when we poked the pencil through

Bouncy Balls

1. Now, we're going to make another example of a polymer, and this one is going to be a really fun one- bouncy balls!
2. Pass out the pre-measured cups
3. Instruct the kids to pour the cup of cornstarch/glue into the cup of borax, and let it sit for about 15 seconds

4. Stir until it becomes very difficult to do so, then scoop out the mixture and roll it into a ball
5. After they've had time to play with they're bouncy balls, quiet them down for review
    a. Ask them what we made when we mixed our ingredients
        i. Explain that we made a polymer!
            1. When we mixed our ingredients, all of the molecules inside linked together and created a polymer
                a. This is why our bouncy balls bounce, because the string of molecules wants it to bounce, and not break