GSK Science in the Summer™

Be a Chemist!

This summer, your child is invited to play the role of a scientist—a materials chemist—to explore basic concepts of chemistry and solve a real-world problem.

Welcome to *GSK Science in the Summer*, brought to you at home this year in partnership between GSK and The Franklin Institute!

This free summer science program aims to inspire the next generation of scientists and engineers by inviting children to experience real science careers by practicing science skills and using real science tools—all while having fun!

This at-home science activity is supported by a series of online resources, including videos and a live, interactive virtual experience with a Franklin Institute science educator.

Here is the recommended sequence for your *GSK Science in the Summer Be a Chemist* experience:

1. Start by watching **short introductory videos** to help your child set up their lab and learn about their research project. Find these videos at scienceinthesummer.fi.edu by clicking on the "Materials Chemist" image.
2. Do your **at-home experiments**, using the guide in this booklet and the provided science materials. Remember to follow the safety guidelines during all activities.
3. Join a live **Materials Chemist Team Meeting** to share the results of your research with a Franklin Institute educator and other *GSK Science in the Summer* participants. Information for how to register will be sent via email. For more information, visit scienceinthesummer.fi.edu/phila.

Are you ready to be a chemist? It's time to set up your lab and get started on your research!

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THE FRANKLIN INSTITUTE

Materials Chemist

You are a **materials chemist** working for a toy company that is developing new kinds of slime toys. Your job is to research slimy, stretchy materials and recommend a formula for creating a new slime toy.

MATERIALS

Materials Chemist Science Materials:

- Lab notebook
- Small paper cups
- Wooden craft sticks
- Plastic spoons
- Pipettes
- Borax
- Cornstarch
- Glue
- Pencil
- Food coloring

Additional Materials:

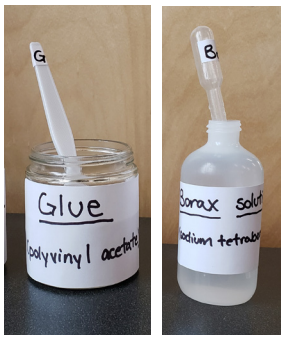
- Table or other flat place to work
- Tray or table covering to protect your workspace from spills (Optional)
- Small bowl or container
- Water
- 3–4 examples of stretchy or slimy materials, such as rubber bands, plastic wrap, chewing gum, playdough, or stretchy toys

Lab Safety

1. All the chemicals you will use in this activity are safe to touch and can be washed down the sink drain or thrown in your regular trash when you are finished.
2. While the chemicals aren't harmful, you should still follow these lab safety rules:
   - **Don't touch your face or eyes** with hands that have touched the materials. Some of the materials could irritate your eyes.
   - **Wash your hands** with soap when you finish, or whenever you take a break to do something else.
   - **Don't taste the materials** or put them in your mouth for any reason.

Lab Prep

1. Gather your supplies. Make sure you have all your science tools and materials from the list above in one place.
2. Set up your lab space. Find a table or other flat surface that you can safely work on. If you have something like a baking sheet or school lunch tray with raised sides, that makes a good "lab station" to do your experiments on and contain any spills. If not, you may want to cover your lab surface with paper or plastic, or keep some towels handy to wipe up spills.



3. Label your tools. You will use pipettes to measure some materials (borax mixture) and spoons to measure other materials (glue and cornstarch). To keep the chemicals from accidently getting mixed together, you should **use a separate pipette or spoon for each material**. Mark or label each one (like "G" for glue and "B" for borax) so you don't mix them up.
4. Practice using your science tools to measure precisely. Try using the pipette and the spoon a few times until you can easily measure the same amount each time:
   - Squeeze the bulb of the pipette, put the tip of the pipette in the liquid, and let go of the bulb to let it fill up. Then, squeeze the bulb gently to let one drop at a time come out of the tip.
   - Scoop up a powder or liquid with the spoon and hold the spoon straight to check the amount in it. The powder or liquid should fill the spoon all the way to the top edge, without being rounded or dripping over.
5. Prepare your borax mixture. Add one spoonful of borax and ½ cup of warm water to the small bowl or container. Stir for one to two minutes until all or most of the borax is dissolved in the water. Label the container "borax mixture" so you remember what it is.
6. Look at the materials chemist picture on page 13 in your lab notebook and read about what materials chemists do. What do you think you will do in this activity that is like what a real materials chemist does?

Part 1: Research

Explore how different types of stretchy or slimy materials behave. Then, decide what features your slime toy material will have.

1. Choose one of the stretchy or slimy materials you found at home, such as the rubber band. Make some observations about the material. Notice how it changes when you touch, squeeze or stretch it. List your observations in the blank space at the top of page 5 in your lab notebook.
   - *What does the material feel like? Is it smooth, wet, or sticky?*
   - *What happens if you squeeze it into a ball? Does it stay in a ball shape, or bounce back to its original shape?*
   - *When you pull it apart, does it stretch or break? Can you make it do both?*
   - *How far does it stretch? What happens when you let go?*
2. Make observations about the rest of your stretchy or slimy materials in the same way. Then compare the lists you made. How are the materials similar and how are they different?
3. Think about what kind of material would make a fun slime toy. Would any of the materials you tested work well as a slime toy? What would you change about them to make a better toy? Write down what features you would like your slime toy material to have, for example: feels smooth, stretches into thin strings, and oozes flat from a ball shape.

Part 2: Testing

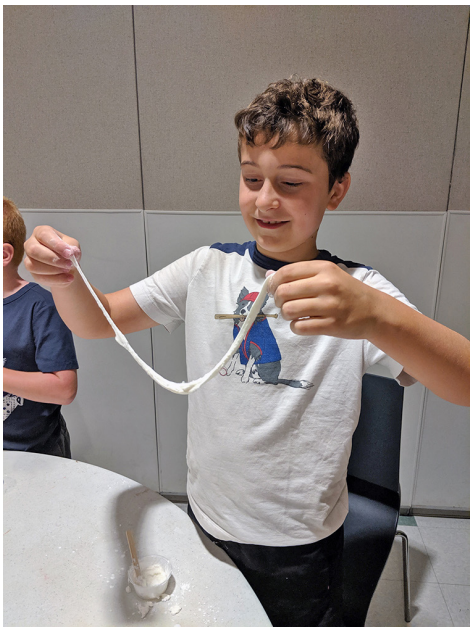
Make a sample slime formula and decide how well it matches the features you want for your slime toy.

1. Use the slime formula on page 4 of your lab notebook to make your slime sample:
   - Add one spoonful of glue and one spoonful of water to a paper cup. Use a wooden craft stick to mix them well.
   - Add one full pipette of borax mixture to the cup and stir again with the wooden craft stick. When the mixture becomes stiff, you can take it out of the cup and stretch it with your hands.
2. Make some observations about this slime material. How does it change when you squeeze or stretch it? Compare it to the list you made of features you want for your slime toy. How well does this material match those features? What could you change to make it match even better?

Part 3: Improve

Make changes to the slime formula to create a material that is the best match for your slime toy.

1. Choose one thing to change about the formula that you think will make the slime closer to the features you want. For example, you could use more or less of one ingredient; you could add a new ingredient like cornstarch; or you could change which materials you mix together first. Use the chart on page 5 in your lab notebook to record the formula you will try.
2. Make a second sample of slime using your new formula. Observe and record the results in the chart. Compare this slime to the list of features for your toy material. How well does it match now? What could you change to make it even better?
3. Now try making a different change to the formula to improve your slime even more. Record the new formula and the results in the chart. Keep testing different formulas to see how the changes affect what the slime is like. Remember to write each formula in your lab notebook (or on another piece of paper, if you run out of space) in case you want to make it again later.
4. Decide which of your formulas is the best choice for making the material for your slime toy. Write that formula at the bottom of page 5 in your lab notebook.
5. (Optional) Make a larger batch of your best formula, and add in some food coloring to show what the finished slime toy might look like. If you want this sample to be twice as big as your test, how much of each ingredient will you need to add? What if you want it to be three times as big? How and when will you add the food coloring to the mixture?



Part 4: Reflect

1. Think about your research, testing, and improvement of your slime. What advice would you give to the toy company about a formula for creating a new slime toy? What features would this slime toy have? Why do you think your formula is the best choice for this kind of slime toy?
2. Think about how you were like a materials chemist in this activity. What did you do that might be like what a materials chemist does? What science skills did you use? Use page 2 in your lab notebook to draw or write about your ideas. Add some skill stickers from the sticker sheet to show some of the science skills you used in this activity.
3. Find out more about being a chemist! Try out the three other chemist activities featured in your lab notebook using the other *GSK Science in the Summer Be a Chemist* videos and activities found at scienceinthesummer.fi.edu. Or, check out some of the books and websites listed on the back of your lab notebook.

Want even more science? The Franklin Institute has created Franklin@Home (fi.edu/franklin-at-home), a series of science videos, do-at-home experiments, and live virtual science experiences that allow you and your family to continue discovering, exploring, and experimenting at home all summer long!