IGNITE ACTIVITY

MAGIC SLIME

STEM²D Topics: SCIENCE AND MANUFACTURING

Target Population:
Students, ages 11-14

Magic Slime is part of the STEM²D **Student Activities Series** developed by FHI 360 for Johnson & Johnson's WiSTEM²D initiative (**W**inning in **S**cience, **T**echnology, **E**ngineering, **M**ath, **M**anufacturing, and **D**esign). The series features interactive and fun, hands-on activities for youth.

Magic Slime

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ACTIVITY DESCRIPTION

Students will learn about chemistry, polymers, and the manufacturing process by creating slime.

ESTIMATED TIME

This activity is intended to be done at a career fair, science fair, exhibit, or other type of "booth" event. It typically takes **10 to 15 minutes** to complete.

STUDENT DISCOVERIES

Students will:

- Participate in a team-based learning experience.
- Build important STEM²D skills, such as critical thinking and laboratory skills.
- Learn how STEM²D knowledge and skills are relevant to and essential for all employees and in every workplace.
- Have fun experiencing STEM²D.
- Be inspired to participate in other types of STEM²D experiences.

GETTING READY

Materials:

- Pre-Activity Checklist
- Tell My Story Form, *optional*
- Student Handout: Magic Slime Recipe, *4–5 copies*
- Hand wipes or paper towels (for cleanup)
- Tablecloths (number required depends on tables being used)
- Measuring spoons

STEM²D Skills

- Creative Thinking
- Laboratory Skills

TIP!

Tip! Trying new materials and troubleshooting their use is an active part of the manufacturing process. In fact, it generally takes multiple trials and sometimes new ideas for experiments to work. As an extension activity, substitute glue for salt. With the supervision of an adult, combine 15mL (1 tablespoon) of the liquid soap with 30mL (2 tablespoons) of glue. Mix them together and take note of what you see. Compare the consistency of the slime made with salt versus the glue. What is different? Why might this be?

KEY WORDS

- **Chemistry**
- **Manufacturing**
- **Polymer**
- **Science**
- **STEM²D**

- Magic Slime materials, *1 set of the following items for the activity leader demonstration and per student/group of students making slime:*
    - 3 tablespoon (44 ml) dish soap, liquid hand soap, or shampoo
    - Salt (There is no a specific measurement for the salt, because each brand of soap reacts differently. Simply add one pinch of salt at a time until the soap thickens during mixing.)
    - 1 spoon
    - 1 small mixing bowl
    - Glitter, *optional*
    - Food coloring, *optional*
- STEM²D brochures, flyers, or other informational materials, *optional*

Estimated Cost:

Activity leaders can expect to incur less than $10.00 in materials costs when completing this activity.

Activity Leader Preparation

1. Read **Spark WiSTEM²D**. This is essential reading for all volunteers interested in working with youth. It defines the STEM²D principles and philosophy and provides research-based strategies and tips for engaging and interacting with students. Download at www.STEM2D.org.
2. See the **STEM²D Student Activities Overview** for additional information.
3. Review the **Pre-Activity Checklist** (at the end of this document) for details and specific steps for planning, preparing, and implementing this activity.
4. Set up the display. Line the table(s) with a tablecloth and create two stations (areas): 1) an Activity Leader Demonstration Station with the pre-made magic slime and 2) a Maker Station with 4–5 copies of the Student Handout and the slime-making materials for student experiments. See Materials section for a list of required materials and the **Pre-Activity Checklist** with instructions for pre-mixing a sample batch of slime.

STEP-BY-STEP INSTRUCTIONS: MAGIC SLIME

1. **Welcome & Introductions (3–5 minutes)**
    - Welcome the students as they arrive at the table/booth.
    - Introduce yourself by saying your name, title, and your organization/company.
    - Explain that your career is one of many **STEM²D** careers. Indicate:
        - STEM²D refers to science, technology, engineering, math, manufacturing, and design.
        - Individuals with an interest or degree in these areas are in demand.
    - Ask the other volunteers and students to introduce themselves.
2. **Learning Activity: Making Magic Slime (5–10 minutes)**
    - Introduce the activity. Show students the pre-made slime and invite them to play with it. Consider asking:
        - How many of you have made slime before?
        - Is slime considered a solid? A liquid? Something else?
        - How does making slime relate to STEM²D careers?
    - Talk about the properties of slime:
        - Slime is neither a solid nor a liquid. It is a polymer.
        - A **polymer** is a chemical compound with large molecules made of many smaller molecules of the same kind.
        - The size of the polymer's molecule is the important factor; a polymer's molecule has many, many atoms, all joined together in a repeating sequence to form one molecule. In contrast, think about water. A single water molecule is simply three atoms formed to create a discrete molecule: H_20.
        - There are both synthetic and natural polymers. Many plastics and rubber used in common products are polymers; your DNA is also a polymer.
        - Polymers have several unique properties that make them particularly useful. Polymers are:
            - Resistant to many chemicals—think about the plastic packaging for dangerous chemicals.
            - Insulate against heat and electricity—think about the rubbery, heat-resistant hand-holds on pots, pans, and other cooking tools.

TIPS FOR ENGAGING STUDENTS

Involve students in the demonstration:

- Check frequently for understanding by asking open-ended, topic-specific, or process questions. Try: "Can you tell me what a polymer is in your own words?" "How does a polymer compare/contrast with other substances?"
- Encourage students to ask questions to gain deeper understanding.

        - Lightweight but strong—polymers are used for everything from bulletproof vests to construction.
        - Easily moldable—think about the plastics used for toys or other household items.
    - Link this learning activity to the broader disciplines of STEM²D. Indicate:
        - The study of polymers and their use are examples of **chemistry**—a subdiscipline of science that focuses chemicals, their properties, and the ways in which they interact and react. Chemists and Chemical Engineers participate in important careers and are integral to our daily lives—they help produce food, create medicines, and study how pollution affects the environment.
        - Producing or making slime is an example of **manufacturing**: creating something from raw materials by hand or by machinery. Manufacturing also requires engineers to figure out the best *processes* for making products.
    - Point students to the "maker station" booth/table. Invite them to manufacture slime. Encourage students to use the glitter and food coloring and to experiment with different ratios of the ingredients to customize their final product.

3. **Student Reflection (2 minutes)**
    - As students are lingering or working at the second station, ask them to reflect on the activity. Pose one or more of the following questions:
        - What did you learn about polymers?
        - What did you learn about the manufacturing process?
        - What did you learn about STEM²D careers and professionals?
        - Can you see yourself as a STEM²D professional? Why or why not?
        - What do you need to do to make this happen?

Key Words

Chemistry: a subdiscipline of science that deals with the identification of the substances of which matter is composed; the investigation of their properties and the ways in which they interact, combine, and change; and the use of these processes to form new substances.
Manufacturing: Creating something from raw materials by hand or by machinery.
Polymer: A substance that has a molecular structure consisting chiefly or entirely of many similar units bonded together; e.g., many synthetic organic materials used as plastics and resins. Polymers have properties associated with both liquids and solids.
Science: Observing, studying, and experimenting to better understand the natural world and how it works.
STEM²D: An acronym for the Science, Technology, Engineering, Math, Manufacturing, and Design disciplines.

Resources and References

The following resources provide additional information or activities:

- "The Basics: Polymer Definition and Properties." American Chemistry Council. Accessed 9 November 2018. https://plastics.americanchemistry.com/plastics/The-Basics/
- "Making Slime Lesson Plan." *Edgalaxy.com.* Accessed 9 November 2018. https://static1.squarespace.com/static/50b88908e4b012760ada1011/t/50f23fb2e4b022c54496ac6d/1358053298331/Making+Slime+Science+experiment.pdf
- "The Science of Slime." 1 January 2016. *Elmers.* Accessed 9 November 2018. http://elmers.com/lesson-plans/lesson-plan/the-science-of-slime
- "Slime STEM Activities—Learning with Slime, STEM and Fun!" 22 March 2017. STEAM Powered Family. Accessed 9 November 2018. https://www.steampoweredfamily.com/activities/slime-stem-activities-learning-with-slime-stem-and-fun/

TIPS ABOUT STEM²D CAREERS

Share with students that there are many different kinds of careers related to STEM²D. Some STEM²D careers related to this activity are:

- Chemist
- Chemical Engineer
- Chemical Health & Safety Engineer
- Operations Manger
- Organic Chemist
- Quality Assurance/ Quality Control Manager

ACTIVITY LEADER CHECKLIST

Magic Slime

The following checklist helps activity leaders plan and prepare to conduct the ***Magic Slime*** *activity with students.*

DID YOU . . .

- ☐ Read **Spark WiSTEM²D**? *This is essential reading for all volunteers interested in working with youth. It defines the STEM2D principles and philosophy and provides research-based strategies and tips for engaging and interacting with students. Download at www.STEM2D.org.*
- ☐ Visit the event venue and/or finalize the logistics with the organizer? Ask:
  - ☐ What is the date, time, and location of the event?
  - ☐ How will the room be arranged? Do I have access to a table? How big is it?
  - ☐ How many students do you expect? How will the students be organized/participate in the event? *For example, are students free to visit any booth of interest for an unspecified amount of time or will groups of students rotate to specific stations for timed activities? Knowing this will help you decide how many displays to create, as well as the appropriate materials to purchase.*
- ☐ Recruit additional volunteers, if needed?
- ☐ Prepare for the activity? Be sure to:
  - ☐ Read the entire activity text prior to implementation.
  - ☐ Customize the activity, if desired, to reflect your background and experiences, as well as the cultural norms and language of the students in your community.
  - ☐ Complete the **Tell My Story Form**, which will prepare you to talk about your educational and career path with the students?
- ☐ Obtain the required materials? Photocopy the Student Handout? *See the Materials and Estimated Materials Costs sections.*
- ☐ Practice your presentation? Do the demonstration activity? *Make sure you can explain the concepts to students, if needed, and that you know the correct answers.*

- ☐ Pre-make a batch of magic slime for demonstration/display purposes? *Measure 3 tablespoons (44 ml) dish soap. Pour the soap into a small mixing bowl. Add a pinch of salt. Stir the mixture for about 5 minutes. Keep adding pinches of salt and stir until the mixture thickens and becomes dense. There is no specific measurement for the salt, as each brand of soap reacts differently. Store the slime in an air-tight container and remix on-site.*
- ☐ Set up the site appropriately for the activity? Be sure to:
  - ☐ Line table(s) with a tablecloth to contain spills or leaks and ease cleanup.
  - ☐ Set up 2 stations (areas) at the booth/table(s): 1) an Activity Leader Demonstration Station with the pre-made magic slime and 2) a Maker Station with 4–5 copies of the Student Handout and the slime-making materials for student experimentations.
- ☐ Bring a camera, if desired, to take photographs?
- ☐ Obtain and collect permission slips and photo release forms for conducting the activity, if applicable?
- ☐ **Have fun!**

Tell My Story Form

This form will help activity leaders and other volunteers prepare to talk about their STEM²D interests, education, and career path.

ABOUT YOU

Name:_____

Job Title: _____

Company: _____

When/Why did you become interested in STEM²D? _____

_____

_____

What do you hope young people will get out of this activity? _____

_____

FUN FACT

Share a little about your background. Ideas:

- Share a memory from childhood when you had your first 'spark' or 'interest' in STEM²D.
- Detail your journey—highlight what you've tried, what you learned, steps to success, etc.
- Failures or set backs are also great to talk about difficulties and/or challenges and how you overcame them

EDUCATION AND CAREER PATH

What classes/courses did you take in secondary school and in college that helped or interested you most?

_____

_____

How did you know you wanted to pursue a STEM²D career?

_____

_____

What was your postsecondary path, including the institution you attended and your degree? *If you switched disciplines, make sure you explain why to the students.*

_____

_____

What your current position entails. *Be sure to include how you use STEM²D during a typical work day.*

_____

_____

MAGIC SLIME RECIPE

STUDENT HANDOUT

Ingredients:

- 3 tablespoon (44 ml) dish soap, liquid hand soap, or shampoo
- Salt
- 1 spoon
- 1 small mixing bowl
- Glitter, *optional*
- Food coloring, *optional*

Directions:

1. Measure 3 tablespoons (44 ml) dish soap.
2. Pour the dish soap into a small mixing bowl.
3. Add a pinch of salt.
4. Stir the mixture for about 5 minutes.
5. Add pinches of salt and stir until the mixture thickens and becomes dense.

There is no specific measurement for the salt, because each brand of soap reacts differently. Simply add one pinch of salt at a time until the soap thickens during mixing.

This activity was produced by Johnson & Johnson's Bridge to Employment (BTE) Student Ambassadors 2018: Yeina Kizziz Danara Castro Arriaga, BTE-Yumbo, Colombia; Rubens Magri, BTE-High Wycombe, UK; Nancy Esquivel Simbron, BTE-Mexico City, Mexico; and Emilitza Trujillo, BTE-Norristown Area, Pennsylvania, USA.

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