



Project Exploration creates transformative learning opportunities for youth underrepresented in the sciences --particularly students of color and girls -- by equipping them with the skills, practices, and mindset needed for a lifelong pursuit of learning. STEM@Home makes activities around science, technology, engineering, and math accessible and fun to do at home. This STEMbook activity, resources, and more are available at www.projectexploration.org/stemathome.

In this activity, you will:

Use a classic chemical reaction to provide the power and learn about Newton's third law of motion. Can you make a boat propel through the water on its own?



Supplies Required:

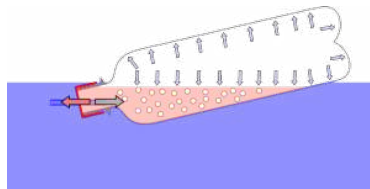
- Plastic bottle with a pop-top cap
- Measuring cups and spoons
- Food coloring
- Toilet paper
- 1 ½ cups vinegar
- 1 tablespoon baking soda

Video

Newton's Third Law of Motion: <https://tinyurl.com/4drb4fru>

Overview

Newton's third law of motion states that for every action, there is an equal but opposite reaction. The action is the carbon dioxide bubbles rushing out the back of the boat and pushing against the water. The reaction is the water behind the boat pushing against the boat with the same force, causing the boat to move forward. Baking soda and vinegar react to form carbon dioxide gas. As the carbon dioxide forcefully bubbles out, it takes some of the solution with it out the back.



Instructions

1. Fill the bathtub with water until it is about 6 inches deep.
2. Make sure the bottle's pop-top cap is popped up, meaning it is open.
3. Unscrew the cap and add the vinegar to the bottle.
4. Add a few drops of food coloring.
5. Tear off 2 squares of toilet paper and lay them flat. Pour the baking soda on the squares and fold them up so that the baking soda is in a little pouch.
6. Hold the bottle over the bathtub. Drop the baking soda pouch into the vinegar in the bottle and quickly screw the cap on tight.
7. Let the bottle go in the water and watch your boat propel itself around.
8. Observations What happens to the boat after the cap is screwed on? What interesting things do you notice?
9. Now Try This! Experiment with different amounts of baking soda and vinegar to see how you can propel the boat even longer.

Additional Resources

1. Different types of boats: <https://tinyurl.com/5xc8e7dn>

Share It Out

Share on social media: Record a video or take a picture of your activity and post the results online using the hashtags:

#SpeedBoat
#ProjectExploration
#StemAtHome

Tag a friend and challenge them to do it, too!

For more activities like this one, go to www.projectexploration.org/stemhome. If you're interested in learning more about Project Exploration and our free events, programs, and activities, please find us on social media and be sure to follow!



Call or text us for help: 312-772-6634

www.projectexploration.org