

Environmental Engineer: Clean Energy

Adventure Description:

In this adventure, students will think like an environmental engineer and create a new source of renewable energy!



Activity

- Teacher Note: Each group of students will need baggies of materials prepared ahead of time. This should take about 15 minutes to do. See [Handout: Teacher Prep](#) for instructions.
- Teacher Note: Groups will need access to warm water to put in the bags during the experiment.

Step 1: Background Information on Environmental Engineers (5-10 minutes)

- Ask students if they know where the electricity they use every day comes from.
- Explain to students that most electricity still comes from non-renewable resources like oil and coal. This means that once we use these resources up, we cannot make more.
- Environmental engineers are scientists that work to come up with energy sources that we can't run out of. These energy sources are called renewable resources.
- Discuss how environmental engineers develop new products that are better for the environment. One way that they do this is by finding new sources of energy that can make fuel!

Step 2: Activity Set Up (5-10 minutes)

- Explain to students that they will do an experiment to see if they can use yeast to make fuel!
- Yeast is a living microscopic organism that naturally creates a gas. This gas can eventually be harvested as fuel.
- Provide students with [Handout: Experiment Steps](#). As a class, read through the steps.
- While reading the steps, students will notice a large stopwatch on the page. This is a symbol that is a reminder that you must draw what the bags look like immediately after you put the water in. You cannot wait to draw the pictures.
- Explain to students that if they wait to draw the pictures, they won't have information about what the bags looked like right after the experiment started.
- Teacher note: Make sure that groups know that they must immediately draw the pictures when they see the symbol.
- Divide students into groups of 2-4.
- Provide each group with the following materials:
 - 3 zipper baggies that are labeled and filled with ingredients

Please contact Allison Bischoff, Director of Teacher Support, at allison@rozzylearningcompany.com or 314-272-2560 with questions.

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- 4 teaspoons of yeast
- Measuring spoons
- Warm water
- Timer
- Teacher note: If students need more guidance doing science experiments, divide students into groups of 4. Assign each student to a role. See [Handout: Roles for Group Members](#).

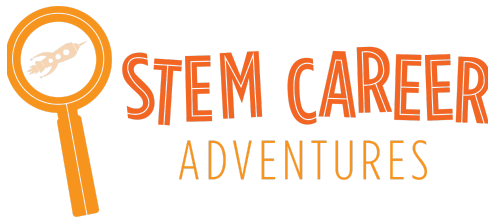
Step 3: Experiment (25+ minutes)

- Explain to students that they will first complete Part 1 on the handout to set up their experiment.
- Tell students to check off each step as they go to make sure they don't miss any steps.
- Have students complete Part 1. Remind students to look for the big stopwatch and immediately draw a picture of what each bag looks like in their chart!
- Have students complete Part 2. They will write their observations down in the chart right after they close the bags and then every 3 minutes after that.
- As students are working, ask the following questions:
 - What is happening to some of the bags and why do you think it is happening? (Discuss how the sugar bag is inflating because the yeast is making gas.)
 - What "food" did you give the yeast in each bag? (Nothing in the first bag, sugar and milk in the other two bags.)

Step 4: Reflection (5 minutes)

- Have each group decide which bags created fuel. Have groups volunteer to share their answers.
- Discuss how the only bag that had bubbles that got larger was the one with yeast and sugar. This was because the yeast ate the sugar! The sugar is food for the yeast. The yeast and sugar then work together to create gas that can be used for fuel.
- Next, ask students if they can think of other ingredients that they can combine with yeast to make fuel. Encourage students to think about another ingredient that has sugar in it.
- If time permits, discuss problems that could arise from using sugar to make gas (e.g., it would take a ton of sugar to produce enough gas for a car to move, there would need to be sugar stations around the country for people to fill up their cars).

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Materials List

Provided online:

- Handout: Teacher Prep
- Handout: Experiment Steps
- Handout: Roles for Group Members

Not provided (each student or group needs):

- Measuring spoons
- 1 tablespoon of sugar
- 1 tablespoon of milk (any kind as long as its not lactose free)
- 3 zipper baggies
- Sharpie
- 3 teaspoons of dry yeast
- 3/4 cups of very warm tap water
- Timer

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