STEM CAREER ADVENTURES

Egyptologist: Testing Mummification

Adventure Description:

In this adventure, students will think like an egyptologist and analyze the best way to preserve dead bodies.

Activity

- Teacher Note: This lesson requires about 5 minutes of teacher prep. See Handout: Teacher Prep.
- Teacher Note: This lesson must be completed across 2 days. One Day 1, students will set up the experiment. On day 2, students will make observations. There should be 5-8 days between set up and observation.

Step One: Background Information on Egyptologists and Mummies (5 minutes)

- Ask students if they have ever heard of an egyptologist. Explain to students that egyptologists study ancient Egypt. This can include art, such as paintings and sculptures, or burial practices. Explain that when people in ancient Egypt died, their bodies were preserved in a process called mummification. Show Handout: Mummification.
- Tell students that they will be performing an experiment to determine which of the chemicals found in natron are best to use for mummifying an organism.

Step Two: Experiment Set Up (20 minutes)

- Explain to students that they will be performing an experiment to determine which group of substances would be best to preserve..... an apple! Explain to students that they will investigate which group of substances removes the most moisture from an apple. They will put different chemicals on an apple and wait a week to see what happens. The apple will represent a body from ancient Egypt.
- Provide students with Handout: Steps for Experiment Set Up. Walk through the steps together as a class.
- Explain to students that their experiment contains both a positive and negative control. A positive control is something that we know works and will cause the reaction that we are looking for. In this situation, it is all three chemicals that make up natron (baking soda, soda ash, and salt). A negative control is something that we know doesn't work and won't cause the reaction that we are looking for. In this experiment, it is a baggie with no chemicals whatsoever. Baggie #1 and Baggie #2 will be the negative and positive controls.
- Next, explain to students that the other Baggies will have different amounts of ingredients. The goal of the experiment is to see which ingredients remove the most moisture from the apple.
- Divide students into pairs. Provide each pair with the following materials:
  - 8 zipper baggies
  - Permanent marker for labeling.
- Have pairs complete Step 1 on the handout, labeling the bags.

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- Provide each pair with the following materials:
  - 8 apple slices
  - 1/8 cup soda ash (for 'Positive Control' bag)
  - 1/8 baking soda (for 'Positive Control' bag)
  - 1/8 cup salt (for 'Positive Control' bag)
  - 1/8 cup soda ash (for 'Soda Ash 1' bag)
  - 1/4 cup soda ash (for 'Soda Ash 2' bag)
  - 1/8 cup baking soda (for 'Baking Soda 1' bag)
  - 1/4 cup baking soda (for 'Baking Soda 2' bag)
  - 1/8 cup of salt (for 'Salt 1' bag)
  - 1/4 cup of salt (for 'Salt 2' bag)
- Have students complete steps 4-6 on the handout.

Step Three: Making Observations (20 minutes)

- Teacher Note: students will complete this step 5-7 days after completing the previous step.
- Teacher Note: see Handout: Teacher Key for experiment results.
- Explain to students that they will now make observations of their mummified apples.
- Instruct students to collect their bags and lay them out on a table or desk. Have students fill out the table on Handout: Making Observations. use the table under Step 2 on their handout to make observations of them.
- Remind students that the goal of mummification is to remove all of the moisture from the apple. This will cause the apple to turn brown and shrink.
- When students have finished making observations, ask them the following questions:
  - What happened to the negative control? (It turned a little brown, and it was rotting)
  - Why did this happen? (Because we didn't add any chemicals to this apple)
  - What happened to the positive control? (It dried out and shrunk and turned a dark color.)
  - Why did this happen? (Because we added all three preservation chemicals to the apple)
  - Which chemical worked the best on its own? (Soda ash worked the best on its own, but it still left the apple wet instead of dried)
  - Did any of the chemicals work as well as the positive control? (No, the positive control worked the best because it left the apple the driest)
  - How did the chemicals change during the test? (They got clumpy from all of the moisture they absorbed)

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  - What happened if there wasn't enough of the chemical, like in Baking Soda 1? (The chemical got wet and mushy and couldn't absorb any more water from the apple)
  - How do you think Egyptologists can use this information when they study mummies? (The best preserved mummies were probably preserved using a mixture of chemicals that would dry out the bodies. Mummies that don't last as long may not have had enough of each chemical)
- Extra Time? Explain that people cannot eat soda ash, but they can eat baking soda and salt. Have groups design and test different ways to preserve different fruits and then do a taste test to see if they would want to eat these mummified fruits.

Materials List

Provided online:

- Handout: Teacher Prep
- Handout: Mummification
- Handout: Steps for Experiment Set Up
- Handout: Teacher Key
- Handout: Making Observations

Not provided (Each group needs):

- Apple (pre-cut)
- 8 zipper baggies
- 1/4 and 1/2 cup measuring cups
- Each of the following are total measurements. Students need the following amounts split into 1/4 cup, 1/8 cup, and 1/8 cup quantities.
  - 1/2 cup sodium carbonate (soda ash)
  - 1/2 cup sodium bicarbonate (baking soda)
  - 1/2 cup regular salt

Not provided (Teacher Prep):

- Sharp Knife
- Cutting Board

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