

LESSON 3:

DANCING RAISINS

Students will learn about acids, bases, and pH levels by exploring how they react with everyday items to produce different colors.

OBJECTIVES

- ✓ What happens when vinegar and bakingsoda mix?
- ✓ How does this solution affect the density of different foods?
- ✓ What is the evidence that a chemical reaction has occurred?

SUPPLIES

- 12 clear plastic cups
- 12 plates
- 1 bottle of vinegar (32 fluid oz)
- 1 box of baking soda
- Large bag of raisins or 6 small boxes of raisins
- 1 1L bottle of Sprite or other clear, carbonated drink
- 1 box of brown rice
- 1 bag of beans
- 12 pieces of paper and 12 pencils
- 12 teaspoons or small plastic spoons

Extension Supplies:

- 3-4 glue sticks or 4-5 school glue bottles
- Paper Plates or Construction paper
- Bin or cake tin to catch things

HOOK

⌚ 3-5 min

- Review with students what acids and bases are from the previous lesson. Show them the baking soda and vinegar and ask them if each is an acid or a base?
- Acids are liquids with a pH of 0-6, while bases have a pH of 8-14. Neutral liquids have a pH of 0.
- Tell students that today they will experiment with acids and bases, while exploring the density of other objects.

HYPOTHESIS

⌚ 3-5 min

Have the students copy down or create a chart like the scientist worksheet. Then, have them predict:

- What happens when baking soda and vinegar mix?
- If we add raisins to this new solution, do you think they will sink or float?
- If we add rice to this new solution, do you think it will sink or float?
- If we add beans to this new solution, do you think they will sink or float?

EXPERIMENT

⌚ 20-25 min

1. To start the experiment, give each student a clear plastic cup and plate (to put the cup on for any mess).
2. Have each group fill their glass halfway of the way up with vinegar (approximately 2/3 cup).
3. Then, add some raisins.
4. Next, add a teaspoon or two of baking soda.
5. Observe and record what happens to the raisins.

Have students dispose of the solution and repeat the experiment but this time adding rice instead of raisins. Observe and record what happens to the rice. Have students dispose of the solution and repeat the experiment, but this time adding beans instead of raisins/rice.



CHEMICAL REACTION

A chemical reaction is where different substances (reactants) are changed into a new substance (product)


SIGNS

- change of color
- change of temperature
- change of smell
- production of gas
- production of a solid
- emission of light

KEYWORDS

- pH level
- Acid
- Base
- Carbon Dioxide
- Density
- Surface

OBSERVATION


 5-10 min

Ask students to discuss:

- What happened when the baking soda and vinegar mixed?
- Did the raisins sink or float?
- Did the rice sink or float?
- Did the beans sink or float?

Students should note that when the baking soda was added, the mixture fizzed. The material added to the cup began to 'jump' up and down.

CONCLUSION


 3-5 min

Ask students to share their findings.

- Why did the baking soda and vinegar fizz?
- What type of solution was made by the baking soda and vinegar?
- Why did the materials added to the solution jump up and down?

Students should note that a chemical reaction occurred. Students should apply their knowledge of acids and bases to realize that they have combined one acid and one base to make a neutral solution. Many different predictions may be developed for why the materials jumped up and down.

EXPLANATION


 5-10 min

When the baking soda and vinegar combine, a chemical reaction occurs. Vinegar is an acid and contains hydrogen ions. Baking soda is a base and contains sodium and bicarbonate ions. When vinegar and baking soda combine, they react, and the ions change to form new substances. As a result, carbon dioxide is formed, creating bubbles and foam.

In this experiment, when the materials (raisins, rice, and beans) were dropped into the vinegar, they sank to the bottom. This was because each material had a greater density than the vinegar. However, when the baking soda is added and the solution reacts to make carbon dioxide, the carbon dioxide bubbles begin to stick to the raisins/rice/beans.



EXTENSION

 5-10 min

If there is extra time, ask students to predict if the results would be the same if they used a different type of object or even a different liquid.

Art Project:

Utilizing a glue stick or standard school glue and ask the kids to create a design with the glue on a paper plate or piece of construction paper. Then dump some beans or rice or even a mix of the two onto the glue and let rest until close to the end of class. (or 2-5 minutes) Then dump the excess rice and beans off the design and let the kids take home their dancing raisin project!


Tip: Avoid a giant mess by using a cake tin, paper towels, or paper plates underneath the project when dumping handfuls of rice or beans onto the glue

EXPLANATION

When the carbon dioxide bubbles are on the surface of the material, it changes the density of the material. As more carbon dioxide bubbles stick to the surface of the material, its density becomes less than that of the solution and therefore the rice/raisins/beans rise to the top of the cup.

When the raisin/rice/bean reaches the surface of the liquid, the carbon dioxide bubbles begin to pop. As they pop, this makes the density of the material increase again and it sinks back down. This process continues until all the carbon dioxide bubbles have dissolved, or not enough are left to change the density of the material to less than that of the density of the solution.

CLEAN UP & DISMISSAL

 3-5 min

Students must then clean their workspace. Dispose of the liquids carefully. Make sure to leave the classroom the way you found it.



SCIENTIST'S WORKSHEET

Tip: Can draw or write the following down on whiteboard!

| | Hypothesis - Sink or Float? | Observation - What happened? |
|---------|--------------------------------|------------------------------|
| Raisins | | |
| Rice | | |
| Beans | | |

