

Chemical Changes

Task Information

Grade: 8th grade

Content:

- Block H (the chemistry of matter). Section II, 5.D. page 14 -15.

Format:

Manipulative

Purpose:

The student will determine what evidence indicates that a chemical change is occurring.

Skills:

Primary: Observing, generalizing and inferring

Secondary: Predicting and measuring

Time: 10 - 15 minutes

Materials:

Teacher:

- 1 lb box of baking soda
- 1 quart of white vinegar
- small cups or containers

Per Student or station:

- 2 resealable bags labeled A and B
- 2 twist ties
- 1 plastic teaspoon
- 50 ml graduated cylinder
- baking soda
- white vinegar
- water
- paper towels
- safety goggles

Preparation:

- A 1 pound box of baking soda and one (1) quart of vinegar is sufficient for a class of approximately thirty (30) students.
- a supply of baking soda and vinegar in small labeled containers must be placed at each student station.
- The resealable bags may be washed and reused.
- Use a 'good' brand of vinegar. Not all vinegars have the same acid content.

Safety:

- Check MSDS (Materials Safety Data Chart) for further laboratory precautions.
- Laboratory safety procedure is required.
- Safety goggles must be worn during this experiment
- Be aware that the baking soda and vinegar bag will expand greatly due to the carbon dioxide production.

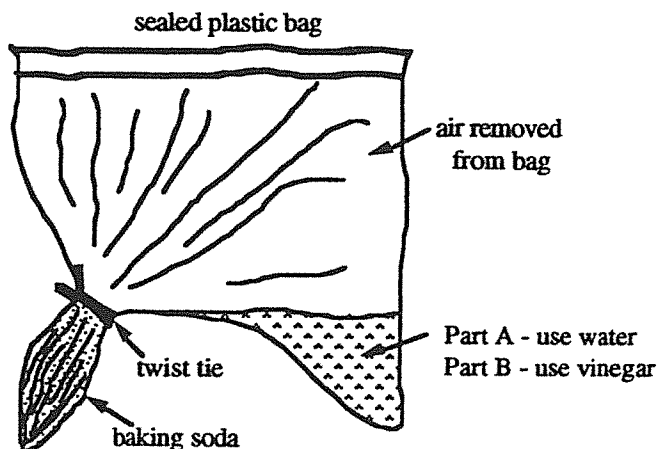
Extension/Modification: None

Chemical Changes

Task: At this station, you will observe two types of interactions, and then be asked to answer some questions about the interactions.

Materials

- 2 resealable plastic bags
- 2 twist ties
- 1 half teaspoon measure
- 1 - 50 ml graduated cylinder
- baking soda
- vinegar
- water
- paper towels
- safety goggles



Background

In nature many types of matter (chemicals) interact as they come in contact with one another. With some chemical interactions no change occurs, but with other chemical interactions, change can occur.

Directions:

Part A

Put on your safety goggles. Do not touch or taste any chemical. Clean up spills immediately.

1. In one of the bags, put 1/2 teaspoon of baking soda into one corner.
2. Tie off the corner of the bag with a twist tie as shown in the diagram.
3. Measure 30 mL of WATER and pour it into the empty corner.
4. Remove as much air as possible and seal the bag tightly.
5. Remove the twist tie from the bag and gently mix the baking soda with the water.
6. Describe what you observed after you mixed the contents of this bag. List 2 observations.

7. Set the bag aside, and continue with Part B.

Please Continue on the Next Page

Part B

1. In the **other** bag, put 1/2 teaspoon of baking soda into one corner.
2. Tie off the corner of the bag with a twist tie as shown in the diagram.
3. Measure 30 mL of VINEGAR and pour it into the empty corner.
4. Remove as much air as possible and seal the bag tightly.
5. Remove the twist tie from the bag and gently mix the baking soda with the vinegar.
6. Describe what you observed after you mixed the contents of this bag. List 2 observations.

Questions:

1. In which of the bags did a chemical change occur? **Circle** your answer.

The baking soda &
water bag

The baking soda &
vinegar bag

Both bags

Neither bag

2. Based on your knowledge of science and your observations, explain why you think a chemical change occurred. Give 2 reasons to support your answer.

3. If you could pour the solution from the baking soda and water bag into an open, shallow dish, and let it sit out in the sun, what would you find in the dish at the end of one week? Explain the reason for your answer.

Chemical Changes - Scoring Rubric

Maximum Score - 9 points

Part A6. Baking soda and water observations

2 points total

Point Criteria:

- Allow 1 point for each valid observation up to a maximum of 2 points. If more than 2 observations are listed, correct the first 2 only.

Sample of acceptable responses:

- A solution of baking soda is made.
- A white paste is made.
- The powder dissolves/disappears in the water or liquid.
- It feels cool. (Tap water temperature can effect bag temperature.)

Sample of unacceptable responses:

- Nothing happens.
- Any incorrect observations.
- No credit is awarded if the student did not follow directions.

Part B6. Baking soda and vinegar observations

2 points total

Point Criteria:

- Allow 1 point for each valid observation up to a maximum of 2 points. If more than 2 observations are listed, correct the first 2 only.

Sample of acceptable responses:

- The baking soda and vinegar fizzed or bubbled.
- The bag felt cold.
- The solution turned white or milky.
- The bag blew up.

Sample of unacceptable responses:

- Nothing happens.
- Any incorrect observations.
- No credit is awarded if the student did not follow directions.

1. Where did a chemical change occur?

1 point total

- Identifying the baking soda and vinegar bag
 - Accept any student's response correctly based on his/her data

2. Explain why a chemical change occurred**2 points total****Point Criteria:**

- Allow 1 point for each valid reason up to a maximum of 2 points. If more than 2 reasons are listed, correct the first 2 only.

Sample of acceptable responses:

- The solution bubbled or fizzed.
- The temperature changed.
- A gas or new substance was produced.
- The bag blew up.
- When baking soda and vinegar are mixed, a gas (CO₂) is produced.

(Credit is awarded even if the gas is incorrectly identified.)

- When an acid combines with a base, there is a chemical change.

Sample of unacceptable responses:

- There was a color change.

3. Substance left if the solution sat out in the sun**2 points total****Point Criteria:**

- Allow 1 point for identifying the remaining substance as a dry powder (baking soda) or white substance.
- Allow 1 point for identifying the reason as evaporation.

Highest possible score - 9 points

Student ID _____

Scoring Form - Chemical Changes

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

| Question | Circle Point Breakdown | Points Earned |
|--|------------------------|---------------|
| Part A 6. Baking soda and water bag | | |
| First observation | 0 1 | |
| Second observation | 0 1 | _____ |
| Part B 6. Baking soda and vinegar bag | | |
| First observation | 0 1 | |
| Second observation | 0 1 | _____ |
| 1. Location of chemical change | 0 1 | _____ |
| 2. Reasons for change | 0 1 2 | _____ |
| 3. What remains? | | |
| Description of substance | 0 1 | |
| Reason for answer | 0 1 | _____ |

Total Score _____

Total possible score - 9 points

Student ID 8-TS2-55

Scoring Form - Chemical Changes

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

| Question | Circle Point Breakdown | Points Earned |
|---|--------------------------|---------------|
| Part A 6. Baking soda and water bag First observation Second observation | 0 <u>1</u> <u>0</u> 1 | <u>1</u> |
| Part B 6. Baking soda and vinegar bag First observation Second observation | <u>0</u> 1 <u>0</u> 1 | <u>0</u> |
| 1. Location of chemical change | 0 <u>1</u> | <u>1</u> |
| 2. Reasons for change | <u>0</u> 1 2 | <u>0</u> |
| 3. What remains? Description of substance Reason for answer | <u>0</u> 1 <u>0</u> 1 | <u>0</u> |

Total Score 2
Total possible score - 9 points

ANSWER SHEET

1. Describe what you observed after you mixed the contents of Bag A.

Baking water settled below

2. Describe what you observed after you mixed the contents of Bag B.

it exploded

3. In which of the bags did a chemical change occur? Circle your answer.

IN NEITHER
BAG

ONLY IN
BAG A

ONLY IN
BAG B

IN BOTH
BAGS

4. Explain why you think a chemical change occurred.

because I put too much
baking soda and vinegar
in.

5. If you could pour the solution from Bag A into an open, shallow dish, and let it sit out, what would you find in the dish at the end of one week?

Student ID 8-TS2-26

Scoring Form - Chemical Changes

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

| Question | Circle Point Breakdown | Points Earned |
|---|------------------------|---------------|
| Part A 6. Baking soda and water bag First observation Second observation | 0 (1) 0 (1) | <u>2</u> |
| Part B 6. Baking soda and vinegar bag First observation Second observation | 0 (1) 0 (1) | <u>2</u> |
| 1. Location of chemical change | (0) 1 | <u>0</u> |
| 2. Reasons for change | (0) 1 2 | <u>0</u> |
| 3. What remains? Description of substance Reason for answer | 0 (1) (0) 1 | <u>1</u> |

Total Score 5
Total possible score - 9 points

ANSWER SHEET

1. Describe what you observed after you mixed the contents of Bag A.

The dissolved totally on the side
that was not tied off
And dissolved into a thick substance on the
tied off side

2. Describe what you observed after you mixed the contents of Bag B.

The ~~bein~~ dissolved together and
fizzed up.

3. In which of the bags did a chemical change occur? Circle your answer.

IN NEITHER
BAG

ONLY IN
BAG A

ONLY IN
BAG B

IN BOTH
BAGS

4. Explain why you think a chemical change occurred.

Because the forms of Both materials
were altered.

5. If you could pour the solution from Bag A into an open, shallow dish, and let it sit out, what would you find in the dish at the end of one week?

It would harden
into a doughy substance

Student ID 8-TS2-20

Scoring Form - Chemical Changes

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

| Question | Circle Point Breakdown | Points Earned |
|--|------------------------|---------------|
| Part A 6. Baking soda and water bag | | |
| First observation | 0 <u>1</u> | <u>2</u> |
| Second observation | 0 <u>1</u> | <u> </u> |
| Part B 6. Baking soda and vinegar bag | | |
| First observation | 0 <u>1</u> | <u>2</u> |
| Second observation | 0 <u>1</u> | <u> </u> |
| 1. Location of chemical change | 0 <u>1</u> | <u>1</u> |
| 2. Reasons for change | 0 <u>1</u> 2 | <u>1</u> |
| 3. What remains? | | |
| Description of substance | <u>0</u> 1 | <u>1</u> |
| Reason for answer | 0 <u>1</u> | <u> </u> |

Total Score 7
Total possible score - 9 points

ANSWER SHEET

1. Describe what you observed after you mixed the contents of Bag A.

the baking soda mixed in w/ the water
then went back down to the
bottom of the bag

2. Describe what you observed after you mixed the contents of Bag B.

everything bubbled and fizzed
a lot, gradually died down
Air filled the bag

3. In which of the bags did a chemical change occur? Circle your answer.

IN NEITHER
BAG

ONLY IN
BAG A

ONLY IN
BAG B

IN BOTH
BAGS

4. Explain why you think a chemical change occurred.

because vinegar is an acid +
when it mixed w/ the ~~vinegar~~ b. soda
it fizzed + bubbled because they
reacted as a chemical change
Air filled the bag from the gases released

5. If you could pour the solution from Bag A into an open, shallow dish, and let it sit out, what would you find in the dish at the end of one week?

the b soda would still be on
the bottom in a clump +
it wouldn't mix in with the
water.