

Acid and Base Testing 2

Task Information

Grade: 8th Grade

Content:

- Block H (The Chemistry of Matter). Section VI, 1 and 2. page 29 - 30

Format: Manipulative

Purpose: The student will use indicators to identify an acid and a base.

Skills:

Primary; Interpreting data, Recording data
Secondary; Observing

Time: 10 - 15 minutes

Materials:

- | | |
|---|--|
| <ul style="list-style-type: none"> • solution A : Water • solution B: citric or ascorbic acid • solution C: Lime water, Ca(OH)₂ • Red litmus paper • Blue litmus paper • goggles • paper towels | <ul style="list-style-type: none"> • water for cleaning • plastic reaction plates
or
transparency paper • waste container • phenolphthalein • dropper bottles • permanent fine line black marker |
|---|--|

Preparation:

1. Stock Solution Preparation:

- a. Solution A - water in dropper bottles labeled "A"
- b. Solution B - acid solution - dilute citric or ascorbic acid.
If using purchased citric acid, follow manufacturer's directions for making a dilute solution.
If using "Fruit Fresh", dissolve 3 teaspoons in 1500 ml of water.
Test with litmus paper. Place in dropper bottles labeled "B"
- c. Solution C - base solution - dilute lime water, Ca(OH)₂. in dropper bottles labeled "C". For best results purchase just prior to the activity as limewater has a short shelf life.
- d. phenolphthalein in dropper bottles labeled "phenolphthalein"
Dilute solutions are appropriate. Check the solutions with litmus paper before using

2. Materials Preparation:

- a. Label dropper bottles "A", "B", "C", and "Phenolphthalein".
- b. For best results. fill phenolphthalein bottles just prior to the activity.
- c. Keep litmus paper in closed containers.
- d. Use the permanent marker or a copy machine to transfer the template onto transparency paper. Cut into strips. Discard strips after using.
- e. Alternative: purchase reaction Plates (24 wells) . Use flat sides of both tops and bottoms of reaction plates. Wash well between uses.

Safety:

Students must wear safety goggles.
Check MSDS (Materials Safety Data Sheet) for further laboratory precautions
Laboratory safety procedures required.

Extensions/Modifications:

Variations of this task include; Acid and Base Testing 1, and 3, with different degrees of structure.
Acid and Base Testing 1, 2, and 3 - Micro, with different materials

C		B		C	
A		B		C	
A		B		C	

A				C	
A		B		C	
A		B		C	

A		B		C	
A		B		C	
A		B		C	

A		B		C	
A		B		C	
A		B		C	

A		B		C	
A		B		C	
A		B		C	

A		B		C	
A		B		C	
A		B		C	

Acid and Base Testing 2

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

Materials:

- dropper bottles A, B, & C
- dropper bottle with phenolphthalein
- reaction transparency or reaction plate
- blue litmus paper
- red litmus paper
- safety goggles
- paper towels
- waste cup
- water

Background:

Phenolphthalein turns pink in a basic solution.

Blue litmus paper turns red (pink) when dipped in an acidic solution.

Red litmus paper turns blue (purple) when dipped in a basic solution.

Directions:

1. Put your safety goggles on.
2. Think carefully about an experiment you could do to determine which of the three solutions are acidic and which are basic.
3. In the space below, describe the procedures you followed in conducting your experiment.

4. CARRY OUT YOUR EXPERIMENT.

Please Continue on the Next Page

5. Record your observations in the data table below.

Indicator	Solution A	Solution B	Solution C
Blue Litmus			
Red Litmus			
Phenolphthalein			

6. Wash the reaction plate with water. Throw the transparency strip into the waste container.
7. Using the data you have collected and the background information, which solution is acidic?

In the space below, explain the reason for your answer.

8. Using the data you have collected and the background information, which solution is basic?

In the space below, explain the reason for your answer.

Acid and Base Testing 2 - Scoring Rubric

Maximum Score - 11 points

Question 3 Experimental procedures.

2 points total

Point Criteria:

- Allow 1 point for a correct testing method for an acid
- Allow 1 point for correct testing method for a base.

Acceptable responses include:

- Use phenolphthalein in all three solutions. (1 point)
 - Use litmus in all three solutions. (1 point)
 - Record and compare which are acid and base.
- or**
- Use blue litmus to test for acids. (1 point)
 - Use red litmus to test for bases. (1 point)
- or**
- Use litmus paper to test for acids and bases. (2 points)

Question 5 Litmus and phenolphthalein data table.

3 points total

Indicator	Solution A	Solution B	Solution C
Blue Litmus	<i>blue, same, or no change</i>	<i>red or pink</i>	<i>blue, same, or no change</i>
Red Litmus	<i>red, same, or no change</i>	<i>red, same, or no change</i>	<i>blue or purple</i>
Phenolphthalein	<i>clear, same, or no change</i>	<i>clear, same, or no change</i>	<i>pink</i>

Point Criteria:

- Allow 1 point for correct data for solution A based on student plan in question #3.
- Allow 1 point for correct data for solution B based on student plan in question #3.
- Allow 1 point for correct data for solution C based on student plan in question #3.

Question 7. Identify acidic solution and explain your answer.

3 points total

Point Criteria:

- Allow 1 point for identifying the acidic solution as B.
 - Accept any student's response correctly based on his/her data.
 - Multiple answers receive no credit.
- Allow 2 points for an explanation relating student data to background information.
 - Solution B turned blue litmus red which indicates an acid.
 - Allow 1 point if the student states the background information without relating it to his/her data.

Question 8. Identify basic solution and explain your answer.

3 points total

Point Criteria:

- Allow 1 point for identifying the basic solution as C.
 - Accept any student's response correctly based on his/her data.
 - Multiple answers receive no credit.
- Allow 2 points for an explanation relating student data to background information.
 - Solution C turned red litmus blue and/or phenolphthalein pink which indicates a base.
 - Allow 1 point if the student states the background information without relating it to his/her data.

Highest Possible Score - 11 points

Student ID _____
 Male or Female (circle one)

Acid and Base Testing 2
Scoring Form

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
3. Experimental procedures Base Testing Method Acid Testing Method	0 1 0 1	_____
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	0 1 0 1 0 1	_____
7. Acidic Solution Solution Named Reason for choice	0 1 0 1 2	_____
8. Basic Solution Solution Named Reason for choice	0 1 0 1 2	_____

Total Score _____
Highest Possible Score - 11 points

Student ID 8-TS3-11

Acid and Base Testing 2

Male or Female (circle one)

Scoring Form

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
3. Experimental procedures Base Testing Method Acid Testing Method	0 (1) 0 (1)	<u>2</u>
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	(0) 1 (0) 1 (0) 1	<u>0</u>
7. Acidic Solution Solution Named Reason for choice	(0) (0) 1 (0) 1 2	<u>0</u>
8. Basic Solution Solution Named Reason for choice	(0) (0) 1 (0) 1 2	<u>0</u>

Total Score 2

Highest Possible Score - 11 points

Acid and Base Testing

Task: At this station, you will design and carry out an experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

- dropper bottle marked A
- dropper bottle marked B
- dropper bottle marked C
- dropper bottle with phenolphthalein
- blue litmus paper
- red litmus paper
- test card
- wax paper sheets
- waste container
- paper towels

BACKGROUND:

- Phenolphthalein is a colorless indicator. When phenolphthalein is added to a basic solution, the solution turns pink.
- Litmus paper is another indicator. Blue litmus paper turns red (pink) when dipped in an acidic solution, while red litmus paper turns blue when dipped in a basic solution.

DIRECTIONS:

1. Using the information above, what will you do to determine which solution(s) are acidic and which are basic? Using only the materials listed above, outline the plan for your experiment in the space below.

Test solution A with Phenolphthalein
 Record then do the same with
 B and C solution. Then clean up
 and test all with blue litmus paper
 then clean up and test all with
 red litmus paper. Record all information;

2. CARRY OUT YOUR PLAN.

When carrying out your experiment, place a wax paper sheet over the test card to protect it.

3. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
Phenolphthalein	acidic	acidic	basic
blue litmus Paper	base	acidic	base
Red litmus Paper	acidic	acidic	acidic

4. Based on your observations, which solution is acidic?

all

Explain the reason for your conclusion in the space below.

Because each had one test were the turned to a color that indicated that they were acidic

5. Based on your observations, which solution is basic?

none

Explain the reason for your conclusion in the space below.

Student ID 8-TS3-10

Acid and Base Testing 2

Male or Female (circle one)

Scoring Form

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
3. Experimental procedures Base Testing Method Acid Testing Method	0 (1) 0 (1)	<u>2</u>
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	(0) 1 (0) 1 (0) 1	<u>0</u>
7. Acidic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	<u>3</u>
8. Basic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	<u>3</u>

Total Score 8
Highest Possible Score - 11 points

Acid and Base Testing

Task: At this station, you will design and carry out an experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

- dropper bottle marked A
- dropper bottle marked B
- dropper bottle marked C
- dropper bottle with phenolphthalein
- blue litmus paper
- red litmus paper
- test card
- wax paper sheets
- waste container
- paper towels

BACKGROUND:

- Phenolphthalein is a colorless indicator. When phenolphthalein is added to a basic solution, the solution turns pink.
- Litmus paper is another indicator. Blue litmus paper turns red (pink) when dipped in an acidic solution, while red litmus paper turns blue when dipped in a basic solution.

DIRECTIONS:

1. Using the information above, what will you do to determine which solution(s) are acidic and which are basic? Using only the materials listed above, outline the plan for your experiment in the space below.

Test Solution A with blue litmus paper, Pheno., Red Litmus
 Test Solution B with Phenolphthalein, Blue + Red Litmus
 Test solution C with red litmus paper, Pheno., Blue Litmus

Student ID 8-753-96

Acid and Base Testing 2
Scoring Form

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
3. Experimental procedures Base Testing Method Acid Testing Method	0 (1) 0 (1)	<u>2</u>
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	0 (1) 0 (1) 0 (1)	<u>3</u>
7. Acidic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	<u>3</u>
8. Basic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	<u>3</u>

Total Score 11
Highest Possible Score - 11 points

Acid and Base Testing

Task: At this station, you will design and carry out an experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

dropper bottle marked A
dropper bottle marked B
dropper bottle marked C
dropper bottle with phenolphthalein
blue litmus paper
red litmus paper
test card
wax paper sheets
waste container
paper towels

BACKGROUND:

- Phenolphthalein is a colorless indicator. When phenolphthalein is added to a basic solution, the solution turns pink.
- Litmus paper is another indicator. Blue litmus paper turns red (pink) when dipped in an acidic solution, while red litmus paper turns blue when dipped in a basic solution.

DIRECTIONS:

1. Using the information above, what will you do to determine which solution(s) are acidic and which are basic? Using only the materials listed above, outline the plan for your experiment in the space below.

I will put small amounts of solution A, B, + C on their spots on the test card. I will add a drop of phenolphthalein to each to see if it turns pink. If it doesn't, then I will test it with blue litmus paper to see if it is an acid

2. CARRY OUT YOUR PLAN.

When carrying out your experiment, place a wax paper sheet over the test card to protect it.

3. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
phenolphthalein	no change	no change	pink
blue litmus	no change	red	X
X	—————		

4. Based on your observations, which solution is acidic?

 B

Explain the reason for your conclusion in the space below.

Solution B turned red when
tested with blue litmus
paper

5. Based on your observations, which solution is basic?

 C

Explain the reason for your conclusion in the space below.

Solution C turned pink when
phenolphthalein was added.