Acid and Base Testing 2 - Micro
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:

- solution A - water
- solution B - citric acid (Fruit Fresh)
- solution C - Lime water, $Ca(OH)_2$
- Red litmus paper
- Blue litmus paper
- phenolphthalein
- goggles
- paper towels
- disposable pipettes
- plastic reaction plates
  or
  transparency paper
- cassette case
- waste container
- small plastic cup
- permanent fine line black marker
- water for cleaning

Preparation:

1. **Stock Solution Preparation:**
   a. Solution A - water
   b. Solution B - acid solution - dilute citric acid (ex.: Fruit Fresh™) or vinegar dissolved in water).
   c. Solution C - base solution - dilute lime water, $Ca(OH)_2$ or baking soda.
2. **Materials Preparation:**
   a. Label disposable pipettes "A", "B", "C", and "Phenolphthalein".
   b. Pour individual stock solutions in small plastic cups. To fill pipettes, place a handful of pipettes into the solutions (tips down), and squeeze bulbs simultaneously. Capillarity will keep solutions in the pipettes without sealing.
   c. For best results, fill phenolphthalein pipettes just prior to the activity.
   d. Pipettes will fit inside of the cassette case with tips up for easy storage and handling. Styrofoam can be used as spacers between pipettes
   e. Pipettes - 2" Specialty Transfer Pipettes (1 ml, 43 drops/ml)
   f. For best results, keep litmus paper in closed containers.
   g. Use the permanent marker or a copy machine to transfer the template onto the transparency. Use the smooth side of the transparency to avoid contamination. Discard after each use.
   h. Alternative: purchase reaction plates (24 wells). Use Flat sides of both lids and bottoms of reaction plates. Wash between uses.

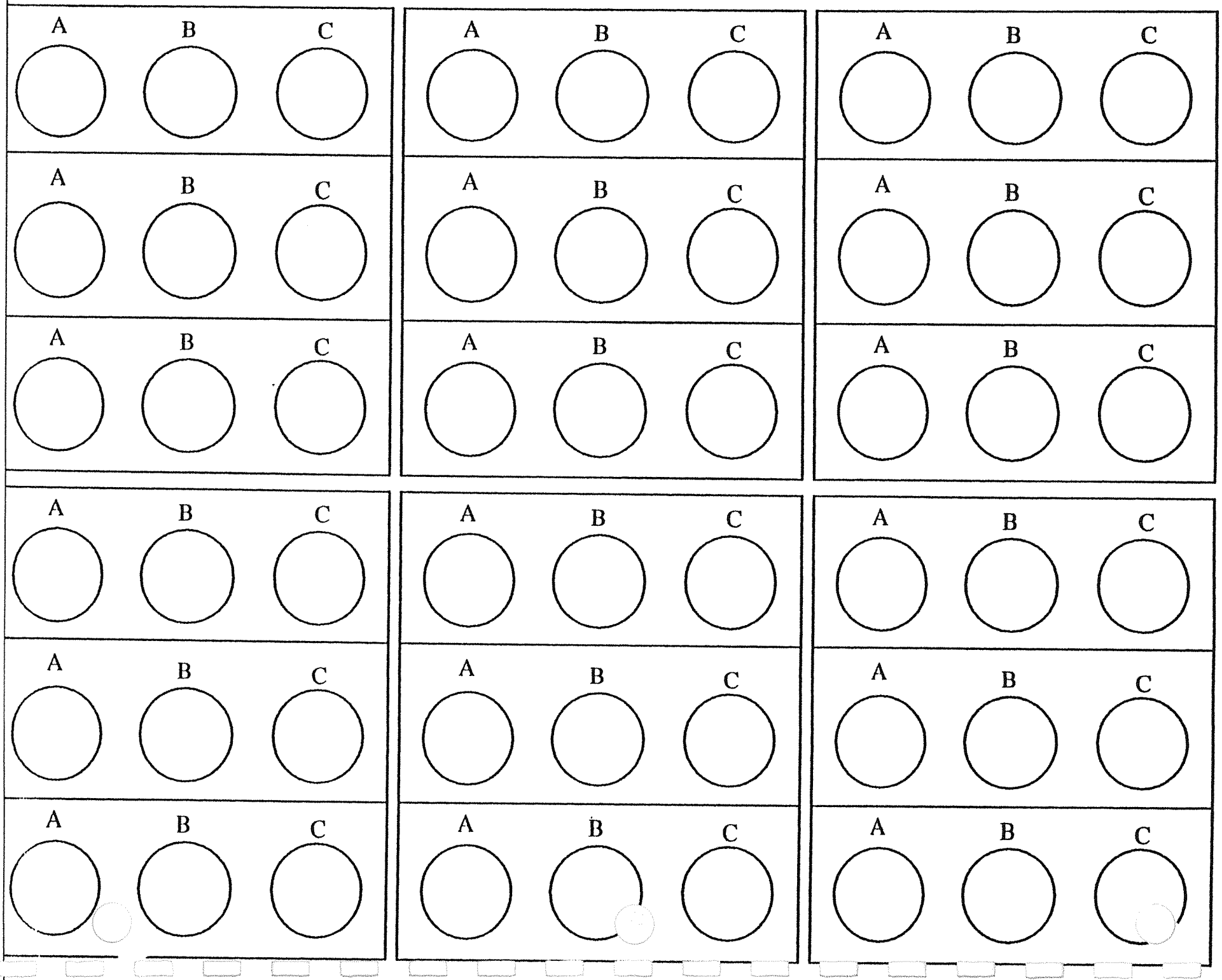
Safety:

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

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506


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
A B C
A B C
A B C
A B C

Acid and Base Testing 2 - Micro

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

Materials:

- solution filled disposable pipettes A, B, & C
- disposable pipette with phenolphthalein
- reaction plate or transparency strip
- blue litmus paper
- red litmus paper
- safety goggles
- waste cup
- paper towels
- cassette case
- water

Background on Indicators:

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. Do not taste or touch any solution.** Clean up all spills with a paper towel.
2. Before you are 3 unknown solutions A, B, and C. Think carefully about an experiment you could do to determine which of the three solutions is acidic and which is basic. You may use any or all of the three indicators given to you.
3. In the space below, describe the procedures you will follow in conducting your experiment.

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

4. **CARRY OUT YOUR EXPERIMENT.**
5. Record your color observations in the data table below.

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

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

_____

In the space below, use your observations to explain your answer.

_____

_____

_____

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

_____

In the space below, use your observations to explain your answer.

_____

_____

_____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Acid and Base Testing 2 - Micro - Scoring Rubric

Maximum Score - 11 points

Question 3. Experimental procedures. **2 points total**

Point Criteria:

- Allow 1 point for a correct testing method with phenolphthalein
- Allow 1 point for correct testing method with litmus
- 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	*blue or same or no change*	*red or pink*	*blue or same or no change*
Red Litmus	*red or same or no change*	*red or same or no change*	*blue or purple*
Phenolphthalein	*clear, same, or no change*	*clear, same, or no change*	*pink*

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.
- 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.
- 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

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Acid and Base Testing 2 - Micro**

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 Phenolphthalein Method Litmus 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 1H-8 **Acid and Base Testing 2 - Micro Scoring Form** #1

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 Phenolphthalein Method Litmus Method	0 (1) 0 (1)	2
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	0 (1) 0 (1) (0) 1	2
7. Acidic Solution Solution Named Reason for choice	(0) 1 (0) 1 2	0
8. Basic Solution Solution Named Reason for choice	(0) 1 (0) 1 2	0

Total Score 4

Highest Possible Score - 11 points

Acid and Base Testing 2 - Micro

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

MATERIALS:

disposable pipettes A - C
chem plate marked A - C (3 rows)
disposable pipette with phenolphthalein
blue litmus paper
red litmus paper
safety goggles
waste cup
paper towels
cassette case

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. **CARRY OUT YOUR EXPERIMENT.**
4. Record your observations in the data table below.

Indicator	Solution A	Solution B	Solution C
Blue Litmus	Stayed the same	turned pink	Stayed the same
Red Litmus	stayed the same	got lighter	stayed the same
Phenolphthalein	turned blue	got cloudy then clear then cloudy	got cloudy then clear

5. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

6. In the space below, describe the procedures you followed in conducting your experiment.

I put three drops of each solution in the containers marked A, B, C. (Solution A in slot A etc.) Then I tested each solution first w/the the blue litmus paper then the red then I put 4 drops of phenolphthalein in each slot.

7. Using the data you have collected and the background information, which solution is acidic?

Solution C

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

Because it was the only one which did not turn cloudy when the base was added.

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

Solutions A & B

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

Because they turned cloudy when the base was added

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#2

Student ID 1H-15 **Acid and Base Testing 2 - Micro**

(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 Phenolphthalein Method Litmus Method	0 (1) 0 (1)	2
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	(0) 1 0 (1) (0) 1	1
7. Acidic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	3
8. Basic Solution Solution Named Reason for choice	(0) 1 (0) 1 2	0

Total Score 6

Highest Possible Score - 11 points

2

Acid and Base Testing 2 - Micro

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

MATERIALS:

disposable pipettes A - C
chem plate marked A - C (3 rows)
disposable pipette with phenolphthalein
blue litmus paper
red litmus paper
safety goggles
waste cup
paper towels
cassette case

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. **CARRY OUT YOUR EXPERIMENT.**
4. Record your observations in the data table below.

Indicator	Solution A	Solution B	Solution C
Blue Litmus	Blue	Pink	Blue
Red Litmus	~~Purple~~	Red	Purple
Phenolphthalein	clear	clear	clear

5. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

6. In the space below, describe the procedures you followed in conducting your experiment.

In the chem plate, I put the 3 different solution in 1 I put solution A in a solution B + in 3 I put solution C I then tested each one with litmus - paper and phenolphthalein.

7. Using the data you have collected and the background information, which solution is acidic?

B

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

The blue litmus turned pink

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

A + B

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

The red litmus paper stayed red

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#3

Student ID 1H-20 **Acid and Base Testing 2 - Micro**

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 Phenolphthalein Method Litmus Method	0 (1) 0 (1)	2
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	0 (1) 0 (1) (0) 1	2
7. Acidic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	3
8. Basic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	3

Total Score 10

Highest Possible Score - 11 points

3

Acid and Base Testing 2 - Micro

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

MATERIALS:

disposable pipettes A - C
chem plate marked A - C (3 rows)
disposable pipette with phenolphthalein
blue litmus paper
red litmus paper
safety goggles
waste cup
paper towels
cassette case

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. **CARRY OUT YOUR EXPERIMENT.**
4. Record your observations in the data table below.

Indicator	Solution A	Solution B	Solution C
Blue Litmus	Stayed Blue	Turned Pink	stayed Blue.
Red Litmus	Stayed Red	Stayed Red.	Stayed Red
Phenolphthalein	Cloudy	Cloudy	Clear

5. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

6. In the space below, describe the procedures you followed in conducting your experiment.

I Put a Drop of A in each circle for A and D,d The same thing fo B & C, I first tested with the phenothalene in The first row. K. Litmus paper in The secand aN Red litmus paper in The third.

7. Using the data you have collected and the background information, which solution is acidic?

Solution B

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

It turned Blue litmus paper PINK & Red Stayed Red

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

NONE

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

Because of, None of The solutions turned red litmus paper purple.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506