Acid and Base Testing 1
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: 8 - 10 minutes

Materials:

- solution A - Water
- solution B - acid - (Citric or Ascorbic acid)
- solution C - base (Limewater)
- Red and blue litmus paper
- Plastic reaction plate or transparency paper
- phenolphthalein
- permanent fine line black marker
- dropper bottles
- small plastic cup
- water for cleaning
- paper towels
- goggles
- waste container

Teacher Preparation:

1. **Stock Solution Preparation:** for thirty (30) students (60 ml.) dropper bottles which can be used for 5 classes
   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 limewater ($Ca(OH)_2$.
      For best results purchase just prior to the activity as limewater has a short shelf life.
      Place in dropper bottles labeled "C".
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 should wear safety goggles
- Check MSDS (Materials Safety Data Sheets) for further laboratory precautions.
- Laboratory safety procedures required.

Extensions/Modifications:

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

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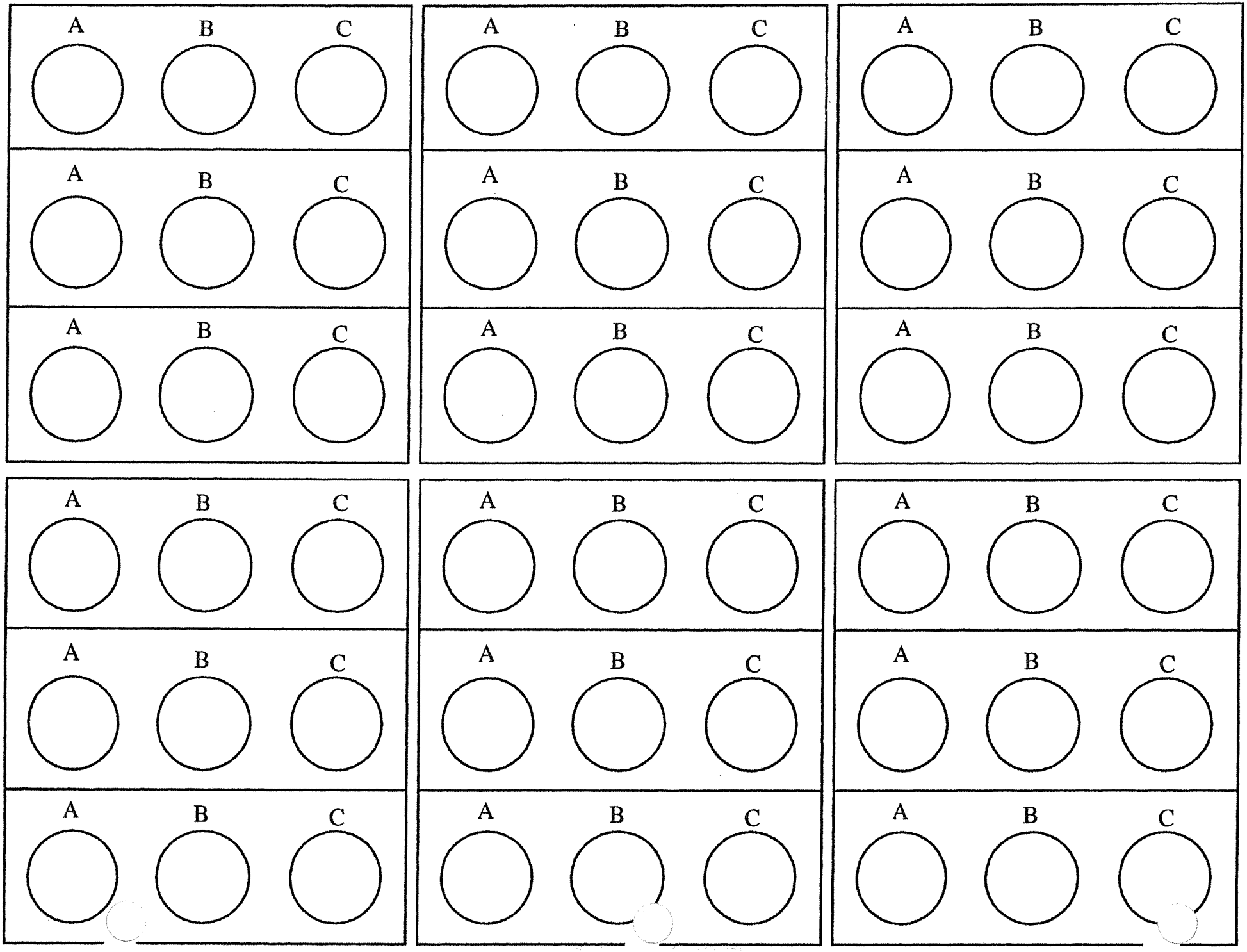
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Acid and Base Testing 1

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

Materials:

- solution filled dropper bottles A, B, & C
- dropper bottle with phenolphthalein
- reaction transparency or plate
- blue litmus paper
- red litmus paper
- safety goggles
- waste cup
- paper towels
- 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.** Do **not** taste or touch any solution. Clean up all spills with a paper towel.
2. Place one drop of each solution, A, B, & C, on the circle with the same letter in each of the three rows.
3. Dip the end of a different piece of blue litmus paper into each of the three solutions in **the top row** and lay them on the plate.
4. Immediately record the COLOR of the litmus paper on the data table.
5. Repeat steps 3 and 4 using the red litmus paper in **the middle row** and lay them on the table.

Table 1: COLOR results of litmus paper

	Indicator	Solution A	Solution B	Solution C
Row 1	Blue Litmus			
Row 2	Red Litmus			

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6 Add one drop of phenolphthalein to each of the three solutions in **the bottom row.**

7. Record the COLOR of the phenolphthalein on the data table below.

Table 2: COLOR results of phenolphthalein

	Indicator	Solution A	Solution B	Solution C
Row 3	Phenolphthalein			

8. Wash the reaction plate or transparency with water and dry with a paper towel. Throw any garbage into the waste cup.

9. Using the data you have collected in Tables 1 & 2 and the background information, which solution is acidic? _____

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

_____

_____

_____

10. Using the data you have collected in Tables 1 & 2 and the background information, which solution is basic? _____

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

_____

_____

_____

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Acid and Base Testing 1 - Scoring Rubric

Maximum Score - 12 points

Questions 5. Litmus paper data table 1 — **4 points total**

	Indicator	Solution A	Solution B	Solution C
Row 1	**Blue Litmus**	*blue or same or no change*	*red or pink*	*blue or same or no change*
Row 2	**Red Litmus**	*red or same or no change*	*red or same or no change*	*blue or purple*

Point Criteria:

- Blue Litmus
  - Allow 1 point if both Solutions A and C are correct.
  - Allow 1 point if Solution B is correct.
- Red Litmus
  - Allow 1 point if both Solutions A and B are correct.
  - Allow 1 point if Solution C is correct.

Question 7. Phenolphthalein data table. — **2 points total**

	Indicator	Solution A	Solution B	Solution C
Row 3	Phenolphthalein	*clear or same or no change*	*clear or same or no change*	*pink*

Point Criteria:

- Phenolphthalein
  - Allow 1 point if both Solutions A and B are correct.
  - Allow 1 point if Solution C is correct.

Question 9. Identify acidic solution and explain your answer. — **3 points total**

Point Criteria:

- Allow 1 point for identifying the acidic solution as solution 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 only 1 point if the student states the background information without relating it to his/her data.

Question 10. Identify basic solution and explain your answer. — **3 points total**

Point Criteria:

- Allow 1 point for identifying the basic solution as solution 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 only 1 point if the student states the background information without relating it to his/her data.

Highest possible Score - 12 points

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Student ID _____ **Scoring Form - Acid & Base Testing 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
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	0 1	
Solution B	0 1	
Red Litmus		
Solutions A & B	0 1	
Solution C	0 1	_____
7. Phenolphthalein Data Table 2		
Solutions A & B	0 1	
Solution C	0 1	_____
9. Acidic Solution		
Solution Named	0 1	
Reason for choice	0 1 2	_____
10. Basic Solution		
Solution Named	0 1	
Reason for choice	0 1 2	_____

Total Score _____

Highest Possible Score - 12 points

Student ID 8-TS2-28 **Scoring Form - Acid & Base Testing 1** #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
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	0 (1)	
Solution B	0 (1)	
Red Litmus		
Solutions A & B	(0) 1	3
Solution C	0 (1)	
7. Phenolphthalein Data Table 2		
Solutions A & B	0 (1)	2
Solution C	0 (1)	
9. Acidic Solution		
Solution Named	(0) 1	
Reason for choice	(0) 1 2	0
10. Basic Solution		
Solution Named	(0) 1	
Reason for choice	(0) 1 2	0

Total Score 5

Highest Possible Score - 12 points

Acid and Base Testing

Task: At this station, you will 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**
- test card
- wax paper sheet
- dropper bottle with phenolphthalein
- blue litmus paper
- red litmus paper
- 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. Place a wax paper sheet over the test card.
2. Place one drop of each solution on the wax paper over the appropriate circle on the test card.
3. Add one drop of phenolphthalein to one drop of each solution.
4. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
PHENOL	no changes	white stuff in drop	turned [illegible]

5. Discard the wax paper and wipe off the test card.
6. Place a new sheet of wax paper over the test card.
7. Place three drops of each solution on the wax paper over the appropriate circle on the test card.
8. Dip one piece of blue litmus and one piece red litmus in each solution.

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9. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
BLUE LITMUS	Stayed Same Color	turned pink	turned a little more pink
RED LITMUS	Stayed same color	Stayed same color	Stayed same color

10. Discard the wax paper and wipe off the test card.

11. Based on your observations, which solution is acidic? B

Explain the reason for your conclusion in the space below.

Because litmus paper is soppost to turn red when in acid And It did in Solution B

12. Based on your observations, which solution is basic? C

Explain the reason for your conclusion in the space below.

I turned red with an indecator

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Student ID 8-T52-100 Scoring Form - Acid & Base Testing 1 #2

(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
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	0 (1)	
Solution B	0 (1)	
Red Litmus		
Solutions A & B	0 (1)	
Solution C	(0) 1	3
7. Phenolphthalein Data Table 2		
Solutions A & B	0 (1)	
Solution C	0 (1)	2
9. Acidic Solution		
Solution Named	0 (1)	
Reason for choice	0 1 (2)	3
10. Basic Solution		
Solution Named	0 (1)	
Reason for choice	(0) 1 2	1

Total Score 9

Highest Possible Score - 12 points

Acid and Base Testing

Task: At this station, you will 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**
- test card
- wax paper sheet
- dropper bottle with phenolphthalein
- blue litmus paper
- red litmus paper
- 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. Place a wax paper sheet over the test card.
2. Place one drop of each solution on the wax paper over the appropriate circle on the test card.
3. Add one drop of phenolphthalein to one drop of each solution.
4. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
PHENOL	nothing	nothing	turned Pink

5. Discard the wax paper and wipe off the test card.
6. Place a new sheet of wax paper over the test card.
7. Place three drops of each solution on the wax paper over the appropriate circle on the test card.
8. Dip one piece of blue litmus and one piece red litmus in each solution.

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9. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
BLUE LITMUS	Purple	Pink	blue
RED LITMUS	light purple	light purple	purple

10. Discard the wax paper and wipe off the test card.

11. Based on your observations, which solution is acidic? Solution C

Explain the reason for your conclusion in the space below.

Because when I put the Phenol Red into Solution C it turned pink

12. Based on your observations, which solution is basic? Solution A

Explain the reason for your conclusion in the space below.

Also when I put the Phenol Red into Solution A nothing happened.

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Student ID 8-TS2-24 **Scoring Form - Acid & Base Testing 1** #3
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
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	0 (1)	
Solution B	0 (1)	
Red Litmus		
Solutions A & B	0 (1)	
Solution C	0 (1)	4
7. Phenolphthalein Data Table 2		
Solutions A & B	0 (1)	
Solution C	0 (1)	2
9. Acidic Solution		
Solution Named	0 (1)	
Reason for choice	0 1 (2)	3
10. Basic Solution		
Solution Named	0 (1)	
Reason for choice	0 1 (2)	3

Total Score 12

Highest Possible Score - 12 points

Acid and Base Testing

Task: At this station, you will 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
- test card
- wax paper sheet
- dropper bottle with phenolphthalein
- blue litmus paper
- red litmus paper
- 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. Place a wax paper sheet over the test card.
2. Place one drop of each solution on the wax paper over the appropriate circle on the test card.
3. Add one drop of phenolphthalein to one drop of each solution.
4. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
PHENOL	clear/ same	clear/ same	Pink

5. Discard the wax paper and wipe off the test card.
6. Place a new sheet of wax paper over the test card.
7. Place three drops of each solution on the wax paper over the appropriate circle on the test card.
8. Dip one piece of blue litmus and one piece red litmus in each solution.

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9. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
BLUE LITMUS	Blue	Pink	Blue
RED LITMUS	Pink	Pink	Blue

10. Discard the wax paper and wipe off the test card.

11. Based on your observations, which solution is acidic? B

Explain the reason for your conclusion in the space below.

The Blue litmus paper turned Pink in the solution

12. Based on your observations, which solution is basic? C

Explain the reason for your conclusion in the space below.

The red litmus paper turned blue in the solution

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