

Physical Science 1120

Acids and Bases

1. _____
2. _____
3. _____
4. _____

INTRODUCTION:

Acid and base indicators, such as litmus and red cabbage juice, turn different colors in acidic and basic solutions. They can, therefore, be used to show if a solution is acidic or basic. **An acid turns blue litmus paper red and a base turns red litmus paper blue.** Red cabbage water is an indigo blue-purple when it is in a neutral solution. **When the red cabbage water is in an acidic solution it turns to a red color and green when it is in a basic solution.** The acidity of a solution can be expressed using the pH scale. Acidic solutions have pH values less than 7, basic solutions have pH values greater than 7 and neutral solutions have a pH equal to 7.

<u>pH</u>	<u>H₃O⁺ (Moles/L)</u>	<u>Property</u>	<u>Substance</u>	<u>pH</u>	<u>Substance</u>	<u>pH</u>
-1	1.0×10^1	Very acidic	Battery acid	0.0	Bread	5.5
1	1.0×10^{-1}		Stomach acid	1.2	Potatoes	5.8
2	1.0×10^{-2}		Lemons	2.3	Coffee	6.0
3	1.0×10^{-3}		Vinegar	2.8	Rainwater	6.2
5	1.0×10^{-5}		Soft drinks	3.0	Corn	6.3
6	1.0×10^{-6}	Acidic	Apples	3.1	Milk (cow)	6.5
7	1.0×10^{-7}	Neutral	Grapefruit	3.1	Pure water	7.0
8	1.0×10^{-8}	Basic	Wines	3.2	Blood (human)	7.4
9	1.0×10^{-9}		Oranges	3.5	Eggs	7.8
10	1.0×10^{-10}		Tomatoes	4.2	Sea water	8.5
12	1.0×10^{-12}		Beer	4.5	Clorox	9.0
14	1.0×10^{-14}		Bananas	4.6	Household NH ₃	11.9
15	1.0×10^{-15}	Very basic	Carrots	5.0	Oven cleaner	13.0

PROCEDURE:

1. **Make sure not to contaminate the straws by letting them touch any other solution.**
2. Use the straws to put one drop of each solution on two or three pieces of blue litmus paper and one drop on two or three pieces of red litmus paper.
3. Fill in your observations (change or no change in color) in the data table.
4. **Make sure that your mixing container is clean by rinsing it with distilled water.**
5. Use the straw to transfer a small amount of solution number 1 into the mixing container.

6. Use the straw in the red cabbage juice container to transfer a small amount of that solution into the mixing container as well.
7. Record your observation, (color change) in the data table.
8. Empty the mixing container in the sink and repeat procedures 4 through 7 for the rest of the solutions.
9. **Use a wash bottle filled with distilled water to thoroughly rinse the pH electrode as demonstrated by the instructor.**
10. Place the pH electrode in the container with the distilled water and write down the reading. _____

Since the reading should be 7.00 record the difference _____ because this amount will need to be added or subtracted from your readings for each of the solutions.

11. Place the pH electrode in solution number 1 and note the pH reading on the computer. Add or subtract your correction factor and fill in that number in the data table.
12. **Rinse the electrode thoroughly after it has been in a solution so that the next solution doesn't become contaminated.** Use the electrode to obtain the pH of the other solutions and complete the data table.

Data Table 1

Solution	Blue Litmus change to Red (Acid)	Red Litmus change to Blue (Base)	Red Cabbage Juice Color	pH	Acid Base Neutral
1					
2					
3					
4					
5					
6					
7					