

pH Measurements/Indicator Kit #81R

Student Work Sheet and Guide

An important method of determining pH values involves the use of "indicators". Indicators are certain organic substances that have the property of changing color in dilute solutions when the hydrogen-ion concentration of the solution reaches a definite value. For example, phenolphthalein solution is a colorless liquid in any aqueous solution of which the pH is less than 9. In solutions for which the pH is greater than 9, the phenolphthalein imparts a red or pink color to the solution. Substances like phenolphthalein are called acid-base indicators and are often used for determining the approximate pH of solutions.

This lab activity is designed to allow you to study and gain a better understanding of pH and its relationship to acids and bases as well as its effect on indicator dyes.

You will be working individually or in a team depending on the instructions given to you by your teacher.

One CHEMPLATE® per student/team is required. Several paper towels are needed.

In all activities replace the cap after use and do not touch the tip of the bottle to the CHEMPLATE® or to the solution in the cavities. When dropping, hold the bottle vertically then squeeze gently.

ACTIVITY I. THE EFFECT OF pH ON INDICATOR DYES

PURPOSE: To determine the color change for each of three indicators: methyl orange, brom thymol blue and phenolphthalein.

PROCEDURE:

1. Place the CHEMPLATE® on a sheet of white paper.
2. Place one drop of methyl orange in cavities #1 and #2.
3. Place one drop of brom thymol blue in cavities #5 and #6.
4. Place one drop of phenolphthalein in cavities #9 and #10.
5. Carefully add one drop of pH 1 to cavities #1, #5 and #9.
6. Carefully add one drop of pH 13 to cavities #2, #6 and #10.

OBSERVATIONS:

1. Methyl orange solution is what color? _____
2. Methyl orange changes to _____ in an acid (pH 1) solution.
(color)
3. Methyl orange changes to _____ in a basic (pH 13) solution.
(color)
4. Brom thymol blue solution is what color? _____
5. Brom thymol blue changes to _____ in an acid (pH 1) solution.
(color)
6. Brom thymol blue changes to _____ in a base (pH 13) solution.
(color)
7. Phenolphthalein solution is what color? _____
8. Phenolphthalein changes to _____ in an acid (pH 1) solution.
(color)
9. Phenolphthalein changes to _____ in a base (pH 13) solution.
(color)

Rinse the CHEMPLATE® with tap water and dry with a paper towel.

ACTIVITY II. DETERMINATION of pH RANGE with INDICATOR DYES

PURPOSE: To establish the specific pH range in which the color changes for each indicator.

PROCEDURE:

IIA.

1. Place 1 drop of methyl orange in each cavity #'s 1-7.
2. Carefully add 1 drop of pH 1 to cavity #1; 1 drop of pH 3 to cavity #2; 1 drop of pH 5 to cavity #3; 1 drop of pH 7 to cavity #4; 1 drop of pH 9 to cavity #5; 1 drop of pH 11 to cavity #6; And 1 drop of pH 13 to cavity #7.

OBSERVATIONS:

Methyl orange changes to _____ at _____ pH.
(color) (number)

Rinse the CHEMPLATE® and dry.

IIB. _____

- Place 1 drop of brom thymol blue in each cavity #'s 1-7.
- Repeat step 2 from Procedure IIA.

OBSERVATIONS:

brom thymol blue changes to _____ at _____ pH.
(color) (number)

Rinse the CHEMPLATE® and dry.

IIC. _____

- Place 1 drop of phenolphthalein in each cavity #'s 1-7.
- Repeat step 2 from Procedure IIA.

OBSERVATIONS:

Phenolphthalein changes to _____ at _____ pH.
(color) (number)

Rinse the CHEMPLATE® and dry.

ACTIVITY III. USING UNIVERSAL INDICATOR

PROCEDURE:

- Place 1 drop of Universal Indicator in each cavity #'s 1-7.
- Repeat step 2 from Procedure IIA.

OBSERVATIONS:

- Describe the color in each cavity.
#1 (pH 1) _____
#2 (pH 3) _____
#3 (pH 5) _____
#4 (pH 7) _____
#5 (pH 9) _____
#6 (pH 11) _____
#7 (pH 13) _____

DO NOT MIX OR RINSE THE SOLUTIONS IN THE CHEMPLATE®

ACTIVITY IV. DETERMINING THE pH OF UNKNOWN SOLUTIONS

PROCEDURE:

- Place 1 drop of Universal Indicator in cavities #10, #11 and #12.
- Place 1 drop of Unknown I in cavity #10.
- Place 1 drop of Unknown II in cavity #11.
- Place 1 drop of Unknown III in cavity #12.
- Compare the colors in cavities #10, #11, and #12 with the colors in cavities #'s 1-7.

OBSERVATIONS:

- The pH of Unknown I is _____
- The pH of Unknown II is _____
- The pH of Unknown III is _____

Student's Name _____ Date _____