Acidity Ph And Indicators

1 What is the color of bromcresol green indicator in a solution with a pH value of 2.0?

(1) blue (3) red

(2) green (4) yellow

2 Which statement describes characteristics of a 0.01 M KOH(aq) solution?

(1) The solution is acidic with a pH less than 7.

(2) The solution is acidic with a pH greater than 7.

(3) The solution is basic with a pH less than 7.

(4) The solution is basic with a pH greater than 7.

3 Phenolphthalein is pink in an aqueous solution having a pH of

(1) 5 (3) 7

(2) 2 (4) 12

4 The acidity or alkalinity of an unknown aqueous solution is indicated by its

(1) pH value

(2) electronegativity value

(3) percent by mass concentration

(4) percent by volume concentration

5 What is the color of the indicator thymol blue in a solution that has a pH of 11?

(1) red (3) pink

(2) blue (4) yellow

6 Three samples of the same solution are tested, each with a different indicator. All three indicators, bromthymol blue, bromcresol green, and thymol blue, appear blue if the pH of the solution is

(1) 4.7 (3) 7.8

(2) 6.0 (4) 9.9

Base your answers to questions 7 on the information below and on your knowledge of chemistry.

A sample of normal rainwater has a pH value of 5.6 due to dissolved carbon dioxide gas from the atmosphere. Acid rain is formed when other gases, such as sulfur dioxide, dissolve in rainwater, which can result in lake water with a pH value of 4.6. The equation below represents the reaction of water with $SO_2(g)$.

$$H_2O(\ell) + SO_2(g) \rightarrow H_2SO_3(aq)$$

7 State the color of methyl orange in a sample of normal rainwater.

Base your answers to questions 8 on the information below and on your knowledge of chemistry.

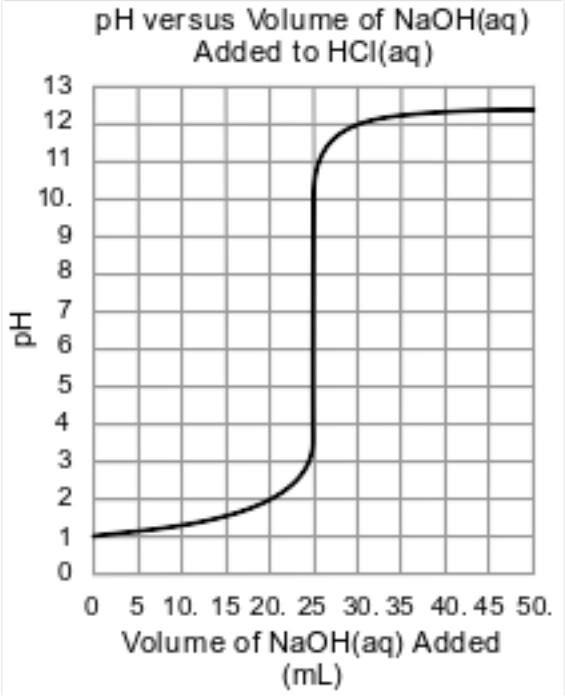
In a laboratory investigation, an HCl(aq) solution with a pH value of 2 is used to determine the molarity of a KOH(aq) solution. A 7.5-milliliter sample of the KOH(aq) is exactly neutralized by 15.0 milliliters of the 0.010 M HCl(aq). During this laboratory activity, appropriate safety equipment is used and safety procedures are followed.

8 State the color of the indicator bromcresol green if it is added to a sample of the KOH(aq) solution.

Base your answers to questions 9 on the information below and on your knowledge of chemistry.

A student is to determine the concentration of an NaOH(aq) solution by performing two different titrations. In a first titration, the student titrates 25.0 mL of 0.100 M H_2SO_4(aq) with NaOH(aq) of unknown concentration.

In a second titration, the student titrates 25.0 mL of 0.100 M HCl(aq) with a sample of the NaOH(aq). During this second titration, the volume of the NaOH(aq) added and the corresponding pH value of the reaction mixture is measured. The graph below represents the relationship between pH and the volume of the NaOH(aq) added for this second titration.

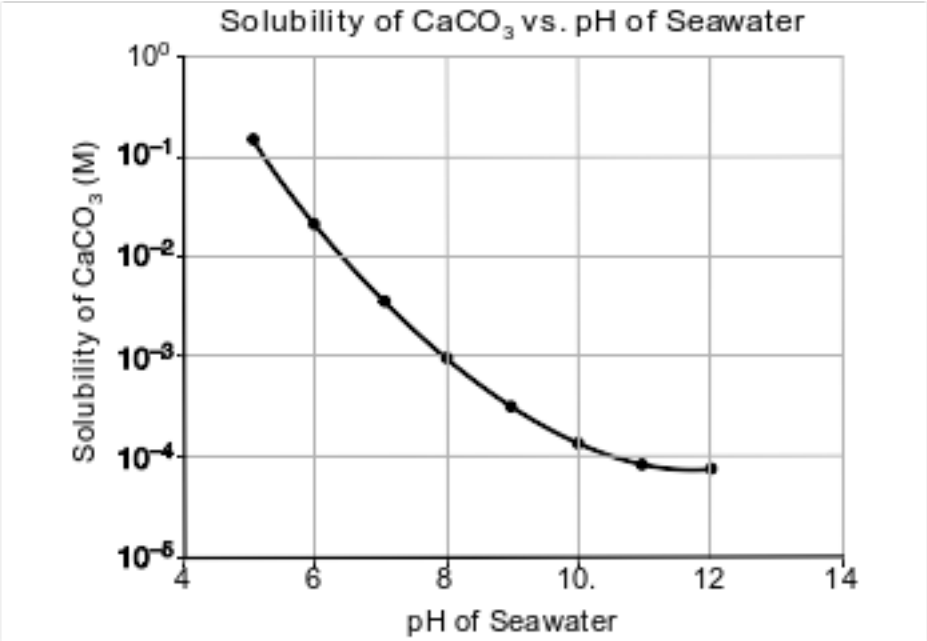


9 State the color of phenolphthalein indicator if it were added after the HCl(aq) was titrated with 50. mL of NaOH(aq).

Base your answers to questions 10 on the information below and on your knowledge of chemistry.

Carbon dioxide is slightly soluble in seawater. As carbon dioxide levels in the atmosphere increase, more CO_2 dissolves in seawater, making the seawater more acidic because carbonic acid, $H_2CO_3(aq)$, is formed.

Seawater also contains aqueous calcium carbonate, $CaCO_3(aq)$, which is used by some marine organisms to make their hard exoskeletons. As the acidity of the sea water changes, the solubility of $CaCO_3$ also changes, as shown in the graph below.



10 State the color of bromcresol green in a sample of seawater in which the $CaCO_3$ solubility is 10^{-2} M.

11 State the color of methyl orange indicator after the indicator is placed in a solution of 0.10 M $NH_3(aq)$.

Base your answers to questions 12 on the information below and on your knowledge of chemistry.

Vinegar is a commercial form of acetic acid, $HC_2H_3O_2(aq)$. One sample of vinegar has a pH value of 2.4.

12 State the color of bromthymol blue indicator in a sample of the commercial vinegar.

Base your answers to questions 13 on the information below and on your knowledge of chemistry.

The hydrangea is a flowering plant. The color of the flowers it produces can change depending on the pH value of the soil in which the plant grows. Adding aluminum sulfate makes the soil more acidic and adding calcium hydroxide makes the soil more basic.

A student performed an experiment by varying soil pH and recording the color of the flowers. The following table summarizes the results of the experiment.

Hydrangea Soil pH and Flower Color

Soil pH	Flower Color
5.5 and below	blue
between 5.5 and 6.5	purple
6.5 and above	pink

13 Hydrangea plants can be grown in soil that turns litmus red. What color are the flowers of the plants grown in this soil?

Base your answers to questions 14 on the information below and on your knowledge of chemistry.

A company produces a colorless vinegar that is 5.0% $HC_2H_3O_2$ in water. Using thymol blue as an indicator, a student titrates a 15.0-milliliter sample of the vinegar with 43.1 milliliters of a 0.30 M NaOH(aq) solution until the acid is neutralized.

14 Based on Table M, what is the color of the indicator in the vinegar solution before any base is added?

Base your answers to questions 15 on the information below and on your knowledge of chemistry.

The incomplete data table below shows the pH value of solutions A and B and the hydrogen ion concentration of solution A.

Hydrogen Ion and pH Data for HCl(aq) Solutions

HCl(aq) Solution	Hydrogen Ion Concentration (M)	pH
A	1.0×10^{-2}	2.0
B	?	5.0

15 State the color of methyl orange in a sample of solution A.

Answer Keys

1 4

2 4

3 4

4 1

5 2

6 4

7 Allow 1 credit for yellow.

8 Allow 1 credit for blue.

9 Allow 1 credit for pink.

10 Allow 1 credit for blue.

11 Allow 1 credit for yellow.

12 Allow 1 credit for yellow.

13 Allow 1 credit for blue.

14 Allow 1 credit for yellow.

15 Allow 1 credit for red.