pH of Samples

Introduction

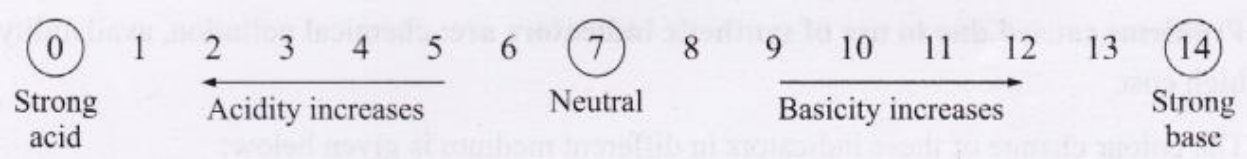
The chemicals used in lab, has its nature, which can be acidic, basic or neutral. This characteristic of the chemical depends on the release of H^+or OH^- ions in its aqueous solution.

> Chemicals which releases H^+ ions are acidic whereas which releases OH^- are basic in nature.

1. pH: It is the power of H^+ ions in a solution.

- It is defined as the negative logarithm of hydrogen ions in a solution. It is used to determine the strength of aci d/base.
- The term pH refers to the "potential of hydrogen ion."
- pH is the negative logarithm of the molarity of H^+.
  $PH = -\log_{10}[H^+]$
  H^+ is the concentration of hydrogen ion in the solution.
- The pH scale is logarithmic, meaning that an increase or decrease of an integer value changes the concentration by a ten fold. For example, a pH of 3 is ten times more acidic than a pH of 4. Likewise, a pH of 3 is one hundred times more acidic than a pH of 5. Similarly a pH of 11 is ten times more basic than a pH of 10.

2. pH scale: pH is normally measured in a range of 0-14. [Due to mathematical definition and calculation it is possible to get negative pH and pH above 14]



3. Nature of Solution on the basis of pH value

• **pH < 7:** The solutions having pH value below 7 are acidic in nature. These solutions turn blue litmus red.

• **pH = 7:** The solutions having pH equal to 7 are neutral in nature. These solutions do not show any colour change of litmus.

• **pH > 7:** The solutions having pH more than 7 are basic in nature. These solutions turn red litmus blue.

4. Measuring pH: The pH of a solution can be determined using an instrument like pH meter or various indicators which changes their colour accordingly depending upon the nature of test solution.

(i) **pH Meter:** A calibrated instrument called a **pH meter** can give the pH upto two decimal places.

• pH meters are calibrated using buffer solutions which have an accurately known pH.

• It measures pH more accurately than indicators.
• Now a days pH sensors are used to measure the pH.

(ii) **Indicators:** It is a substance that can be used to identify the nature of chemicals due to its colour change.
• The indicator changes its colour when the pH of the solution slightly changes.
• When using indicators, it is best that the solution to be tested is colourless. If the solution has a colour, it could interfere with the indicators colour.
Universal indicator or pH paper gives approximate value of the pH.

Types of indicators:
(a) Natural Indicators: Exist in nature and generally extracted from plants like turmeric, rose, hibiscus, juice from grapes, cherries, beets, blueberries, radishes, red cabbage and other vegetables or fruits and petals of some flowers contain compounds that can act as indicators, which changes colour in acid or base or in both.
• **Litmus:** Litmus is a dye extracted from various species of lichen. Lichens are a symbiotic partnership of two organisms, a fungus and an algae that changes colour in acid and base. Red litmus turns blue in basic and blue litmus turns red in acidic medium.
• **Cochineal solutions** obtained from cochineal insects are yellow in acidic solution and deep violet in alkaline solution. .

(b) Olfactory indicators: An indicator that changes its smell depending on whether it is mixed with an acidic or basic solution is called an olfactory indicator, e.g., onion, clove oil and vanilla extract.

(c) Synthetic Indicators: These indicators are made artificially from chemicals.
Examples:
• **Phenolphthalein –** It changes its colour in bases (turns red or pink). –
• **Methyl orange –** It changes its colour in acids (turns red or pink).
• **Bromothymol blue –** It changes colour around the neutral range (green in neutral, yellow in slightly acidic and blue in slightly basic).
• **Problems caused due to use of synthetic indicators are:** chemical pollution, availability problems and high cost.
The colour change of these indicators in different medium is given below:

Indicator	Acidic Medium	Basic Medium	Neutral Medium
Blue litmus	Red	Blue	Blue
Red litmus	Red	Blue	Red
Phenolphthalein	Colourless	Pink	Colourless
Methyl orange	Pink	Yellow	Pink

5. Universal Indicator: Universal indicator is a mixed indicator (it contains several different colour-changing substances) and shows a range of colours depending on the pH of the solution. It comes in two forms,.either in a liquid solution of ethanol or in a pH paper that has been soaked in the indicator solution.

• **pH paper:** It is a blotting paper with universal indicator absorbed in it.

• To test the chemical either take a drop of universal indicator on the white tile and add a drop of liquid under test on it or onto the pH paper.

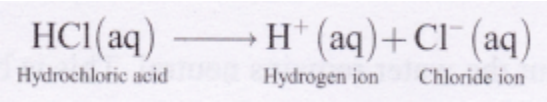
6. Nature of chemicals used in this experiment:

(a) Hydrochloric acid (HCl):

• Hydrochloric acid occurs as an aqueous solution or as hydrogen chloride gas (anhydrous hydrochloric acid).

• Hydrogen chloride gas is a colourless, non-flammable, corrosive gas with an irritating pungent odour.

• When added to water it dissociates completely to form H^+ ions and Cl^- ions.



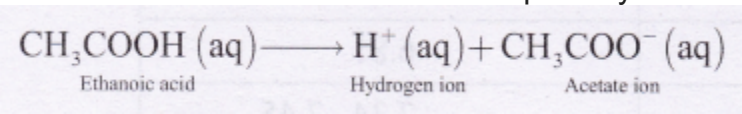
• Its pH range is below 7.

• It is used in making fertilizers, in textile and in rubber industries.

(b) Ethanoic acid (CH_3COOH):

• It is commonly known as acetic acid and is a weak acid.

• When added in water it dissociates partially to form H^+ ions and acetate ions CH_3COO^-



• Its pH range is less than 7.

• It is used as preservatives and in making of polymers.

(c) Lemon juice:

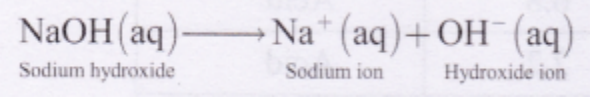
• Lemon juice is a natural mineral acid which consists of mixture of acids.

• Its pH is less than 7.

(d) Sodium hydroxide (NaOH):

• It is commonly called caustic soda and is a strong base, corrosive in nature.

• When added in water it dissociates completely to form Na^+ and OH^- ions.



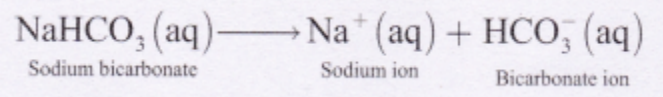
• Its pH range is above 7.

• It is used in making soaps and detergents.

(e) Sodium Bicarbonate ($NaHCO_3$):

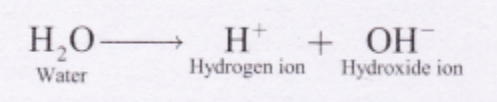
• It is commonly known as baking soda.

• It is a weak base, on dissolving in water it dissociates partially to form Na^+ and HCO_3^- ions.



• Its pH range is more than 7.
• It is used in making baking powder.

(f) Water (H_20):
• It is neutral in nature and has pH 7 (at 25°C).
• It is a weak electrolyte.
• Its ionization is partial. On ionization it dissociates to equal number of H^+ and OH^- ions.



Extended Learning
> The pH of a substance depends on its temperature if the temperature changes the pH shows variation.
> The pH of water at 25°C is 7.
> If the temperature of water increases its pH is less than 7 but the water is neutral. This is because at higher temperature the water will dissociate more into ions.
> If the temperature of water decreases its pH is more than 7 but the water remains neutral. This is because at lower temperature the water will dissociate less into ions.

pH in living system	pH
Gastric acid	1
Human skin	5.5
Urine	6.0
Neutral H2O at 37°C	6.81
Blood	7.34-7.45
Pancreatic secretion	8.1
Cerebrospinal fluid	7.3
Saliva	6.0-8.0

pH of some common substances used in daily life.

S.No	Name	pH	Nature
1.	Milk of Magnesia	10	Base
2.	Milk	6.8	Acid
3.	Lemon Juice	2.2	Acid

4.	Tomato Juice	4.2	Acid
5.	Pure Distilled Water	7	Neutral
6.	Coffee	5-6	Acid
7.	Vinegar	3	Acid

Science Practicals Experiment 1

Aim
To find the pH of the following samples by using pH paper/universal indicator.

(a) Dilute hydrochloric acid
(b) Dilute NaOH solution
(c) Dilute ethanoic acid solution
(d) Lemon juice
(e) Water
(f) Dilute sodium bicarbonate solution

Theory

● pH is the measure of the hydrogen ion concentration $[H^+]$ of a solution.
$PH = - \log_{10} [H^+]$
● Acids release H^+ ions when dissolved in water.
● Bases release OH ions when dissolved in water.

pH scale: pH is normally measured in a range of 0-14. [Due to mathematical definition and calculation it is possible to get negative pH and pH above 14]

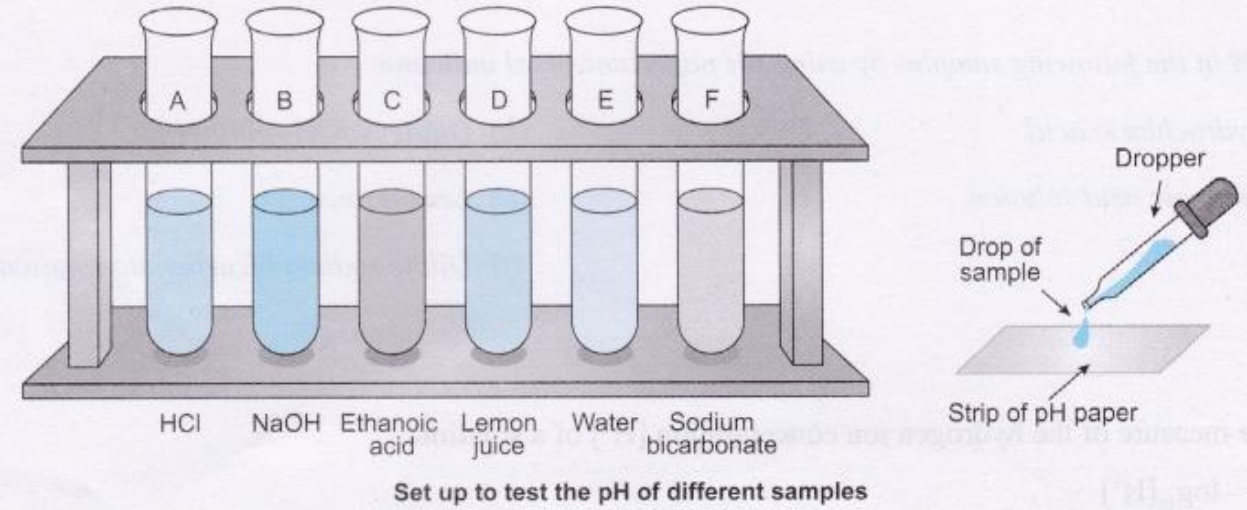
If pH < 7 then it is acidic solution.
If pH > 7 then it is basic solution.
If pH = 7 then it is neutral.

● **Components of Universal Indicator:** Universal indicator consists of a mixture of indicators such that there is a continuous colour change on slight change in pH. Some important constituents of universal indicator are:

• Sodium hydroxide • Thymol blue
• Methyl red • Bromothymol blue
• Phenolphthalein • Propanol

● Acids convert blue litmus paper red. For example, HCl, CH_3COOH, etc.
● Bases convert red litmus paper blue. For example, NaOH, $NaHCO_3$, etc.
● Neutral solutions have no affect on either blue or red litmus paper.

Materials Required
Six test tubes, six droppers, white tile, pH paper (with coloured chart strip of pH scale) and test tube stand.



Set up to test the pH of different samples

Set up of test the pH of different samples

Chemicals required: Dilute hydrochloric acid, dilute solution of sodium hydroxide, dilute ethanoic acid, lemon juice, distilled water and dilute solution of sodium bicarbonate.

Procedure
1. Take six test tubes, wash them with distilled water and place them on test tube stand.
2. Mark these test tubes as A, B, C, D, E and F.
3. Take 2 mL each of the above chemicals and add them to the test tubes marked.
Test tube A – add 2 mL of dil. HCl acid Test tube B – add 2 mL of dil. NaOH solution
Test tube C – add 2 mL of dil-. ethanoic acid Test tube D – add 2 mL of lemon juice
Test tube E – add 2 mL of distilled water Test tube F – add 2 mL of dil. sodium bicarbonate solution
4. Take a white tile and place small strips of pH paper on it, mark them as A to F.
5. Take clean droppers rinsed with distilled water.
6. Use each dropper to suck the contents present in the test tubes A to F and pour a drop of each content on marked pH paper respectively.
E.g., the contents of test tube A to be placed on the pH paper with label A.
7. Observe the colour change in the pH paper and match it with the colour pH chart given. Record your observations.
Observations

Test tube	Sample	Colour of pH Paper	Approximate pH	Nature
A	Dil. HCl	Red colour	1	Strong acid

B	Dil. NaOH	Dark blue colour	14	Strong base
C	Dil. CH,COOH	Orange colour	3	Weak acid
D	Lemon juice	Pink colour	2	Weak acid
E	Water	Green colour	7	Neutral
F	Dil. NaHCO3	Light blue colour	9	Weak base

Conclusion

Test tube	Sample
A	Hydrochloric acid
B	Sodium hydroxide
C	Ethanoic acid
D	Lemon juice
E	Water (distilled)
F	Sodium bicarbonate

Precautions

1. The test sample solutions should be freshly prepared and the firuit juice samples should also be fresh.
2. Use clean and rinsed droppers.
3. Use clean test tubes and mark them carefully.
4. Rinse the test tubes and droppers with distilled water only.
5. Use clean tile.

Sources of Error

1. Be careful while using the dropper, ensure that everytime you use a clean dropper.
2. Do not use tap water for rinsing, the pH may go wrong.

Science Lab Manual Viva Voce

Question 1:
What does “pH of a solution” mean?
Answer:
pH is defined as negative logarithm of the hydrogen ions concentration in a solution.

Question 2:
Name the scientist who introduced pH.
Answer:
Sorensen.

Question 3:
What is the pH of human blood?
Answer:
pH of human blood is 7.34 – 7.45.

Question 4:
What is the range of pH of human saliva?
Answer:
Range of pH of human saliva is 6.0-8.0.

Question 5:
Define ‘indicator’.
Answer:
It is a chemical which changes its colour when comes in contact with acid or base.

Question 6:
Name two synthetic indicators.
Answer:
Methyl orange and phenolphthalein.

Question 7:
Name two plants used to obtain natural indicators.
Answer:
Red cabbage and hibiscus.

Question 8:
Which method of measuring pH is more accurate?
Answer:
Using pH meter for measuring pH gives more accurate result.

Question 9:
If the water is heated and its temperature is increased to 50°C, what would be the pH of water?
Answer:
At 50°C, the pH of water will be 6.55.

Question 10:
What are the components of universal indicator?
Answer:
Components of universal indicator are thymol blue, methyl red, bromothymol blue, phenolphthalein etc.

Question 11:
What will be the colour of the pH paper if the pH value is 7?
Answer:
The colour of pH paper when pH value is 7 will be green.

Question 12:
What will be the colour of pH paper when hydrochloric acid is added to it?
Answer:
On adding hydrochloric acid, the pH paper will obtain pink or red colour.

Chemistry Lab Manual Practical Based Questions:

Question 1:
What are strong acids?
Answer:
Those acids which release a large number of H+ ions are called strong acids.

Question 2:
How is pH paper made?
Answer:
A blotting paper is dipped in a universal indicator. When the paper absorbs the indicator it is allowed to dry.

Question 3:
What is pH scale?
Answer:
The pH scale ranges from 0-14 and is used to measure the strength of acids and bases.

Question 4:
Give the use of pH in daily life.
Answer:
Use of antacid during indigestion, using toothpastes to prevent tooth decay, using baking soda when stung by bee, etc.

Chemistry Lab Manual Practical Based Questions

Question 5:
Name two natural indicators.
Answer:
Litmus obtained from lichens and turmeric.

Question 6:
Why is the pH of water 7 at 25°C?

Answer:
pH of water is 7 at 25°C because both H+ ion concentration and OH concentration are about 10-7 mol/dm3.

Question 7:
What is the application of pH?
Answer:
pH is used in medicine, agriculture, oceanography etc.

Question 8:
Name two chemicals which will turn pH paper into blue colour.
Answer:
The pH paper becomes blue when sodium hydroxide and sodium bicarbonate solutions are added to it.

Lab Manual Questions

Question 1:
What do you mean by pH?
Answer:
pH is power of hydrogen ion concentration in a solution.

Question 2:
What is the pH of pure water at 25°C (298 K)?
Answer:
The pH of pure water at 25°C is 7.

Question 3:
What according to you should be the pH of dil. HCl and dil. NaOH solutions? Observe and explain your findings.
Answer:
The pH of dil. HC1 is less than 7 because when it is dissolved in water it dissociates to release H^+ ions.
The pH of dil. NaOH is more than 7 because when it is dissolved in water it dissociates to release OH^- ions.

Question 4:
On opening the soda water bottle the dissolved CO_2 comes out, would the pH of the solution increase or decrease as the gas comes out? Explain your answer either way.
Answer:
Soda water bottle is carbonic acid with CO_2 gas dissolved in it. Its pH is less than 7. But when we open it the CO_2 gas is released out and concentration of acid decreases. Hence, the pH increases.

Science Practicals Multiple Choice Questions (MCQs)

Questions based on Procedural and Manipulative Skills

1. Which one of the following is not required to find the pH of a solution?
(a) pH paper
(b) HCl
(c) Universal indicator
(d) Standard pH value chart.

2. Which one of the following solutions would you use to test the pH of a given sample?
(a) Blue litmus solution
(b) Red litmus solution
(c) Universal indicator solution
(d) Mixture of red and blue litmus solution.

3. Which of the following is not a component of universal indicator?
(a)Methyl red
(b) Thymol blue
(c) Safranin
(d) Phenolphthalein

4. Which of the following turns pH paper to red?
(a) Milk of magnesia
(b) Baking soda
(c) Oxalic acid solution
(d) NaCl solution.

5. If a pH indicator paper is dipped in a grape juice solution, what will be the possible colour of the pH paper?
(a) Deep red
(b) Blue
(c) Orange
(d) Violet

6. The pH of water at 25°C and at 37°C will be respectively.
(a) 6.8 and 7
(b) 1 and 6.8
(c) 7.8 and 6
(d) 6 and 7.8

7. The nature of tea and coffee is:
(a) acidic

(b) highly acidic
(c) basic
(d) highly basic.

8. If pH of the solution changes from 6 to 4, the solution become:
(a) less basic
(b) less acidic
(c) more acidic
(d) neutral.

9. On adding few drops of milk in water, the pH of this solution will be:
(a) 7
(b) 6.8
(c) 8.4
(d) 10.3

10. The acid present in curd is:
(a) acetic acid
(b) oxalic acid
(c) lactic acid
(d) tartaric acid.

11. Water on ionization dissociates to form:
(a) [H+] and [OH^-] ions
(b) [H_3O^+] and [OH^-] ions
(c) both (a) and (b) are correct
(d) none of these.

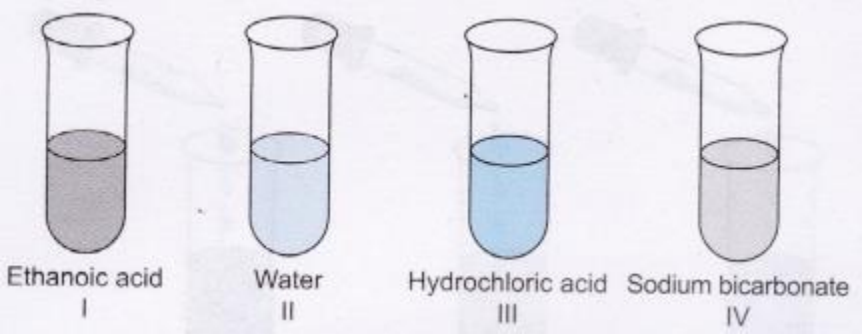
Questions based on Observational Skills

12. Solid sodium bicarbonate was placed on a strip of pH paper. The colour of the strip
(a) turned blue
(b) did not change
(c) turned green and then yellow
(d) turned light pink.

13. The two colours seen on the extreme ends of the pH chart are:
(a) red and blue
(b) red and green
(c) green and blue
(d) orange and green.

14. Solution of sodium bicarbonate was placed on a strip of pH paper. The colour of the strip
(a) turned blue
(b) did not change
(c) turned green and suddenly yellow
(d) turned light pink

15. Observe the following figures and choose the correct option.



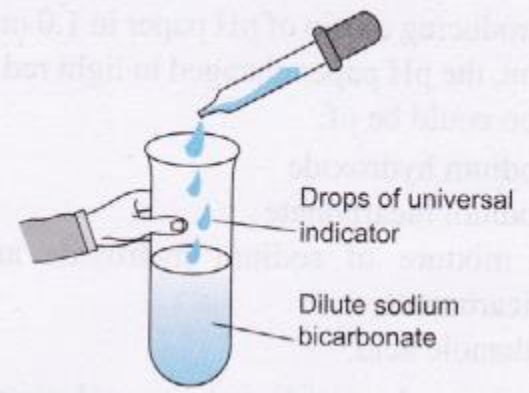
(a) pH of I is greater than II and IV.
(b) pH of I is less than 111 and IV.
(c) pH of IV is less than 1, II, III.
(d) pH of IV is the highest.

16. The colours obtained on a pH paper for a highly acidic, basic and neutral solutions respectively are
(a) blue, orange, green
(b) yellow, blue, green
(c) red, blue, green
(d) red. green, blue.

17. A student tests the pH of distilled water using pH paper and observed green colour. After adding a few drops of dilute NaOH solution, the pH was tested again. The colour change now observed would be
(a) blue
(b) green
(c) red
(d) orange.

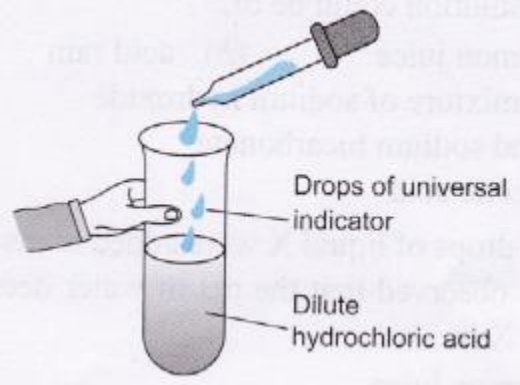
18. A student was given four unknown colourless samples labelled A, B, C and D. He was asked to testtheirpH with pH paper. He observed the following colour changes:
A – light green B – dark red
C – light orange D – dark blue
The correct sequence of increasing order of pH of sample is:
(a) A < B < C < D (b) A<D<C<B
(c) C < B < A < D (d) B < C < A < D.

19. A student adds a few drops of universal indicator to a dilute solution of sodium bicarbonate taken in a test tube.



Which of the following colours would be observed?
(a) Blue
(b) Green
(c) Mustard
(d) Yellow.

20. A student adds a few drops of universal indicator to a solution of dilute hydrochloric acid in the way shown here. He would observe that the colour of the solution changes from colourless to



(a) red
(b) yellow
(c) violet
(d) green.

21. A person X tested the pH of his saliva immediately after drinking coffee. The pH range he got is:
(a) 2.0-3.0 (b) 13.0-14.0
(c) 8.0-9.0 (d) 6.0-7.0

Questions based on Reporting and Interpretation Skills

22. A drop of liquid sample was put on the pH paper. The colour of the pH paper turned blue. The liquid sample could be that of:
(a) lemon juice
(b) hydrochloric acid
(c) sodium bicarbonate solution
(d) ethanoic acid.

23. A colourless liquid sample was tested with pH paper strip. The colour of the strip changed to green. The colourless liquid is
(a) tap water
(b) sodium bicarbonate solution
(c) lemon juice
(d) hydrochloric acid.

24. The colour of the pH paper strip turned red when it was dipped in a sample. The sample could be of
(a) dilute sodium bicarbonate solution
(b) tap water
(c) dilute sodium hydroxide solution
(d) dilute hydrochloric acid.

25. On introducing a strip of pH paper in 1.0 ml of a given solution, the pH paper changed to light red. The given solution could be of:
(a) sodium hydroxide
(b) sodium bicarbonate
(c) a mixture of sodium hydroxide and sodium bicarbonate
(d) ethanoic acid.

26. On putting a drop of liquid on a pH paper a student observes a small circular patch of blue colour on the pH paper. The liquid is most probably:
(a) R,0
(b) HCl
(c) NaOH
(d) H_2SO_4

27. On introducing a strip of pH paper in 1.0 ml of a given solution the pH paper changed to blue. The given solution could be of:
(a) lemon juice
(b) acid rain
(c) a mixture of sodium hydroxide and sodium bicarbonate
(d) acetic acid

28. A few drops of liquid X were added to distilled water. It was observed that the pH of water decreased. The liquid X is

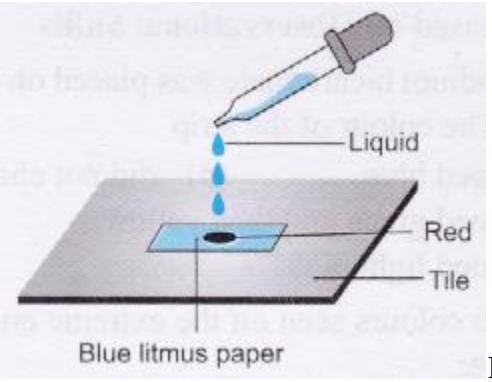
(a) lemon juice
(b) sugar solution
(c) common salt solution
(d) baking soda solution.

29. A moist litmus paper is introduced in a gas jar containing gas. After sometime, the paper becomes colourless. The gas present in the jar is
(a) hydrogen
(b) carbon dioxide
(c) sulphur dioxide
(d) ammonia.

30. On putting a drop of liquid on a pH paper a student observes a small circular patch of red colour on the pH paper. The liquid is most probably
(a) H_2O
(b) HCl
(c) NaOH
(d) Na_2CO_3

31. A fruit juice is tested for its pH value. What could be the possible pH if the colour is changed to yellow?
(a) Less than 3.5
(b) More than 7.5
(c) 7
(d) Between 5.5 and 6.5.

32. When a pH paper is dipped in a solution, the colour of the pH paper changes to deep red. What will be the possible pH of the solution?
(a) 2
(b) 6
(c) 8
(d) none of these.

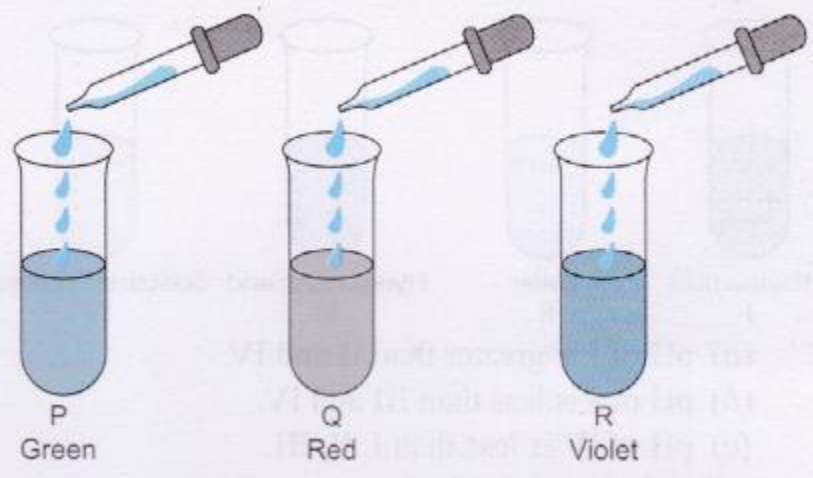


PH of Samples and behaviour using Blue Litmus Paper

33. A student placed a few drops of liquid over a portion of the blue litmus paper as shown here. He observed that the blue litmus paper turned red. The liquid could be:

(a) dilute hydrochloric acid
(b) dilute sodium hydroxide
(c) dilute sodium bicarbonate solution
(d) water.

34. On adding a few drops of universal indicator to three unknown colourless solutions P, Q and R, taken in three test tubes separately, as shown in the figure. A student observed the changes in colour as green in (P), red in (Q) and violet in (R).



The decreasing order of pH of the solution taken is
(a) P > Q > R (b) R > P > Q
(c) Q > P > R (d) R > Q > P.

35. Four students were asked to test the pH of four samples as shown under. Whose result is reported correctly?

Student	Water	Ethanoic acid	HCl	NaOH
(a)	7	1	1	1
(b)	7	3	1	1
(c)	7	1	1	13
(d)	7	3	1	13

36. In an experiment to test the pH, of a given sample using pH paper, four students recorded the following observations. Which statement is incorrect?

Sample taken	pH paper colour turned to
(I) Water	blue
(II) Dil. HCl	red
(III) Dil. NaOH	blue

(IV) Dil. Acetic acid orange
(a) I (b) II (c) III (d) IV.

37. What will be the pH of dil. HCl if its concentration is 0.01 M?
(a) 2 (b) 3 (c) 1 (d) 4.

38. What is the pH of dil. NaOH if its concentration is 0.01M?
(a) 2 (b) 10 (c) 12 (d) 14.

39. On opening the soda water bottle what will be the pH of the solution when measured after few minutes?
(a) pH increases
(b) pH decreases
(c) pH remains the same
(d) pH is 7.

40. If the pH paper colour is obtained orange on putting a drop of solution, the solution is:
(a) acidic
(b) highly acidic
(c) basic
(d) highly basic.

ANSWERS

1. (b)	2. (c)	3. (c)	4. (c)	5. (c)
6. (b)	7. (a)	8. (c)	9. (b)	10. (c)
11. (c)	12. (b)	13. (a)	14. (a)	15. (d)
16. (c)	17. (a)	18. (d)	19. (a)	20. (a)
21. (d)	22. (c)	23. (a)	24. (d)	25. (d)
26. (c)	27. (c)	28. (a)	29. (c)	30. (b)
31. (d)	32. (a)	33. (a)	34. (b)	35. (d)
36. (a)	37. (a)	38. (c)	39. (a)	40. (a)

Chemistry Practicals CBSE Class 10 Lab Manual Scoring Key With Explanation

1. (b) HCl is not an indicator others are.
2. (c) pH can be tested by Universal indicator and not by litmus solutions.
3. (c) Safranin is used in stains and not in indicators.
4. (c) Acids turn pH paper red.
5. (c) Grape juice is weakly acidic in nature.
6. (b) pH of a sample decreases with increase in temperature.

7. (a) They are acidic in nature.
8. (c) Acids have lower pH.
9. (b) Milk is mild acidic.
10. (c) Milk and curd has lactic acid in it.
11. (c) Water has both the ions as given.
12. (h) In solid no ions are present, the litmus works only with ions which are present in molten or in aqueous solution.
13. (a) The pH paper shows red colour for strong acids and blue colour for strong bases.
14. (a) $NaHCO_3$ is a strong base.
15. (d) pH of base is above 7 and higher than water or acid.
16. (c) Strong acid is red, neutral solution is green and strong base is blue with pH paper.
17. (a) NaOH is a strong base. Hence, the color of pH paper is blue.
18. (d) The pH increases from acid to base and its color shade is from red to blue.
19. (a) Sodium bicarbonate is a base. Hence, the color observed is blue.
20. (a) Acids turn universal indicator to red.
21. (d) Coffee is slightly acidic in nature.
22. (c) It is base, rest all are acids.
23. (a) Water is neutral and the colour of pH paper for neutral solutions is green.
24. (d) Acids turn pH paper strip red.
25. (d) Rest all are bases. Acids change pH paper red.
26. (c) NaOH is base, and base turns pH paper into blue colour.
27. (c) pH paper is blue in base and rest are acids.
28. (a) Acid has pH range from 0-6. Hence, the pH will decrease with addition of acid in water.
29. (c) Sulphur dioxide has bleaching effect.
30. (b) Only acids turn pH paper red.
31. (d) Yellow colour is given by weak acids which is present in fruits and are edible, the pH range of weak acids is between 5 to 6.
32. (a) Deep red colour is seen at the ends of the pH paper and the pH range is 0-2.
33. (a) Acids turn blue litmus paper red.
34. (b) The pH value is above 7 for basic solutions, 7 for neutral solutions and is below 7 for acidic solutions.
35. (d) The pH value is above 7 for basic solutions, 7 for neutral solutions and is below 7 for acidic solutions.
36. (a) Water is neutral in nature. So, it turns pH paper green in colour.
37. (a) HC1 is a strong acid and $pH = -\log_{10}[10^{-2}] = 2$.
38. (c) $pOH = -\log[OH] = -\log[0.01] = -\log[10^{-2}]$
Now, $pH + pOH = 14$
$\Rightarrow pH = 14-2=12$
39. (a) The acidic gas is released out.
40. (a) Orange colour is given by acids.