

EXPERIMENT NO.1

pH OF SAMPLES

Aim:

To determine the pH of given samples using pH paper or universal indicator. The samples whose pH has to be determined are-

1. Dilute CH3COOH
2. Dilute NaOH
3. Salt NaCl
4. Dilute NaHCO3
5. Water
6. Lemon juice

Materials required:

1. Six test tubes
2. Test tube stand
3. Dilute acid CH3COOH
4. Dilute base NaOH
5. Salt NaCl (preparation: dissolve 1 gram salt in 10 mL distilled water)
6. Water
7. Lemon juice
8. Dilute NaHCO3
9. Glass rod
10. Measuring cylinder (10 mL)
11. Standard pH colour chart
12. pH paper
13. Glass rod
14. Dropper
15. Universal indicator

Procedure:

1. Wash six test tubes with distilled water and put them on test tube stand and label them A, B, C, D, E, F.
2. Add 2ml of CH3COOH in test tube A, Add 2ml of NaOH in test tube B, Add 2ml of NaCl in test tube C, Add 2ml of NaHCO3 in test tube D, Add 2ml of Water in test tube E, Add 2ml of Lemon juice in test tube F.
3. Take white tile, place 6 pH paper and label them A, B, C, D, E, F.
4. Use a dropper or glass rod to put the respective sample solutions on the labelled pH paper placed on the white tile.
5. Observe the colour change.

Observation:

|  |  |
| --- | --- |
| Sample | Colour on pH paper |
| A | Orange |
| B | Dark blue |
| C | Red |
| D | Light blue |
| E | Green |
| F | Pink |

Result and Conclusion:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test tube | Solution | pH colour paper | pH | Nature |
| Sample A | CH3COOH | Orange | 3 | Weak acid |
| Sample B | NaOH | Dark blue | 14 | Strong base |
| Sample C | NaCl | Red | 1 | Strong acid |
| Sample D | NaHCO3 | Light blue | 9 | Weak base |
| Sample E | Water | Green | 7 | Neutral |
| Sample F | Lemon juice | Pink | 2 | Weak acid |

EXPERIMENT NO.2

PROPERTIES OF ETHANOIC ACID

Aim:

To study the following properties of acetic acid (ethanoic acid)-

1. Odour (Smell)
2. Solubility in water
3. Effect on litmus
4. Reaction with sodium bicarbonate

Materials required:

1. Test tube
2. Litmus paper
3. Dropper
4. Cork fit
5. Test tube stand
6. Water
7. Beaker
8. Acetic acid
9. Sodium bicarbonate
10. Distilled water
11. Lime water (freshly prepared)

Procedure:

* To determine the odour:

Step 1: Take a test tube of 10 mL.

Step 2: Add 5 mL of ethanoic acid into it

Step 3: Bring the test tube near your nose and smell it by wafting.

* To check the solubility in water:

Step 1: Take a test tube of 20 mL.

Step 2: Add 2 mL of ethanoic acid to it

Step 3: Pour 10-15 mL of distilled water and mix it.

* To determine the effect on litmus:

Step 1: Take a clean dropper

Step 2: Take a blue litmus paper

Step 3: Pour 2-3 drops of ethanoic acid on the litmus paper.

* Reaction with sodium bicarbonate:

Step 1: Take a test tube of 5 mL.

Step 2: Add a pinch of sodium bicarbonate to it

Step 3: Pour 1 mL of dilute ethanoic acid in the test tube.

Step 4: To the mouth of the test tube fix a cork with bent delivery tube

Step 5: The other end of delivery tube is required to be dipped in lime water.

Observation and results:

|  |  |
| --- | --- |
| **Properties** | **Observation** |
| Determination of odour | Pungent/vinegar smell |
| Checking its solubility in water | Dissolves in water |
| Determining the effect on litmus | Blue litmus paper turns red in colour |
| Reaction with sodium bicarbonate | A colourless gas is produced which turns the lime water milky |

Results:

1. Ethanoic acid or acetic acid or glacial acetic acid smells like vinegar.
2. Glacial acetic acid is water soluble.
3. Ethanoic acid turns blue litmus paper red.
4. When acetic acid reacts with [sodium bicarbonate](https://byjus.com/chemistry/nahco3/), carbon dioxide gas liberated.

EXPERIMENT NO.3

HARDNESS OF WATER

Aim:

The aim of this experiment – Studying the comparative cleaning capacity of a sample of soap in soft and hard water.

Materials required:

1. Test tube (2)
2. Measuring cylinder
3. Test tube stand

Procedure 1:

1. Take a test tube and mark it as X.
2. Add 10 mL of soft water in it.
3. Take another test tube and mark it Y.
4. Add 10 mL of hard water in the test tube Y.
5. Add a few drops of soap solution in both the test tubes.
6. Shake test tube X and Y strongly for equal amount of time.
7. Place both the test tubes in the test tube stand.
8. Observe and record the results.

Observation and results:

|  |  |
| --- | --- |
| Test tube | Observation |
| X | Forms lather |
| Y | White precipitate is formed |

Results:

* The test tube which is marked X forms foam when mixed with soap solution.
* The test tube which is marked Y does not form foam but forms a white precipitate when mixed with soap solution.

EXPERIMENT NO.4

TYPES OF REACTIONS

Aim

Performing and observing the actions of-

1. Water on quicklime
2. Heat on ferrous sulphate crystals
3. Iron nails dipped in copper sulphate solution
4. Reaction between sodium sulphate and barium chloride solution

On the following reactions-

1. Combination reaction
2. Decomposition reaction
3. Displacement reaction
4. Double displacement reaction

Experiment 4(A)

Materials Required

1. Quick lime (Calcium oxide)
2. Borosil beaker
3. Glass rod
4. Distilled water
5. Dropper
6. Test tube
7. Litmus paper strips

Procedure

1. Wash a borosil beaker with distilled water and dry it.
2. Take a small amount of calcium oxide (quick lime) and slowly add water to it.
3. Wash and take a clean glass rod to stir the mixture of quick lime and water.
4. Touch the beaker carefully from outside.
5. Observe the change.
6. With the help of dropper take a few drops of the mixture from the beaker and place it on red and blue litmus paper strips.
7. Wait and observe.

Observation

|  |  |
| --- | --- |
| Experiment | Observation |
| Mixture in beaker | A hissing sound is heard during the reaction when water is added to the beaker containing quick lime. Due to the evolution of heat during the reaction the temperature increases and makes the solution hot. |
| Solution on litmus paper | Drops on the red litmus paper strip change the colour of the paper to blue whereas there is no colour change observed on the blue litmus paper. |

Result and Conclusion

From the above experiment we can conclude that the reaction occurred between calcium oxide (Quick lime) and water combine to produce one single product slaked lime (Ca(OH)2) is called combination reaction as well as an exothermic reaction.

## Experiment 4(B)

Materials Required

1. Ferrous sulphate crystals
2. Test tube holder
3. Boiling tube
4. Bunsen burner
5. Safety glass
6. Litmus paper strips

Procedure

1. Wash a boiling tube with distilled water and dry it.
2. Take 2 grams of ferrous sulphate crystals in the tube.
3. Make a note of the colour of the crystals.
4. Use a test tube holder to hold the boiling tube.
5. Heat the boiling tube on the bunsen burner as shown in the figure.
6. Observe the colour of the residue got and smell the odour of the gases evolved.
7. Tiny colourless water droplets are seen near the neck of the tube.
8. Gently turn it towards your nose and smell for any gas evolved.
9. Wet blue and red litmus paper strips.
10. Hold the litmus paper strips near the mouth of the boiling tube.
11. Observe the change
12. Classify the type of reaction.

Observation

|  |  |
| --- | --- |
| Experiment | Observation |
| Boiling tube test | * Colour of Ferrous sulphate crystals changes from green to white and later brown. * The gas evolved smells like burning sulphur. |
| Litmus paper test | * Blue litmus paper strip turns red when comes in contact with gas. |

Result and Conclusion

From the above experiment 3 (B) we can conclude that the reaction occurred on heating ferrous sulphate crystals is decomposition reaction which decomposes to produce Fe2O3, SO2, and SO3. Since this decomposition reaction is carried out by heating it is also known as a thermal [decomposition reaction](https://byjus.com/chemistry/decomposition-reaction/).

Experiment 4(C)

Materials Required

1. Test tube stand
2. Two test tubes
3. Two iron nails
4. Measuring cylinder
5. Beaker
6. Sandpaper
7. Copper sulphate solution
8. Laboratory stand with clamp
9. Distilled water
10. Thread

Procedure

1. Wash two test tubes with distilled water and dry them.
2. Label the test tube as P and Q.
3. Add 20mL of distilled water in the test tube and mix copper sulphate crystals in P.
4. Transfer 10Ml of solution from P to Q.
5. Take two iron nails by cleaning them with sandpaper.
6. Take one iron nail and dip it in the CuSO4 in test tube P for 15 minutes.
7. Take another iron nail and dip it in the CuSO4 in test tube Q for 15 minutes.
8. Observe the intensity of the blue colour of CuSO4 before and after the experiment performed in test tube P and Q.
9. Record your results.

Observation

|  |  |  |
| --- | --- | --- |
| Experiment | Before Experiment | After Experiment |
| Colour of CuSo4 | Blue | Green |
| Colour of iron nail | Silvery grey | Brownish red coating |

Result and Conclusion

From the above experiment 3 (C) we can conclude that the reaction occurred when iron nails were dipped in the copper sulphate solution for 15 minutes the colour of the solution changes to green and brownish red copper metal is deposited on the nail. Therefore this is a [displacement reaction](https://byjus.com/chemistry/displacement-reactions/).

Fe(s) + CuSO4(aq) → FeSO4(aq) + Cu(s)

## Experiment 4(D)

Materials Required

1. Test tube stand
2. Measuring cylinder
3. Two test tubes
4. Glass rod
5. Conical flask
6. Barium chloride solution
7. Sodium sulphate solution

Procedure

1. Take two test tubes, wash them with distilled water and dry them.
2. Label the test tube as P and Q.
3. Pour 5mL of barium chloride in the test tube P and observe the colour.
4. Pour 5mL of sodium sulphate in the test tube Q and observe the colour.
5. Take a conical flask and pour the solutions from both the test tube into it.
6. Stir the mixture added to the conical flask with a glass rod.
7. Keep it undisturbed for some time.
8. Observe the change in colour of the solution.
9. Record your results in the below-given table.

Observation

|  |  |
| --- | --- |
| Experiment | Observation |
| Colour of test tube P and test tube Q | Colourless |
| Mixture of solution in conical flask | Precipitation is formed |

Result and Conclusion

From the above experiment 4 (D) we can conclude that the reaction occurred on mixing the solutions of barium chloride and sodium sulphate produce a white precipitate This reaction is known as a double displacement reaction.