NCERT Solutions for Class 10 Science Chapter 2 – Acids, Bases and Salts

Intext Questions with Solutions of Class 10 Science Chapter 2 – Acids, Bases and Salts

1.

You have been provided with three test tubes. One of them contains distilled water and the other two contain an acidic solution and a basic solution, respectively. If you are given only red litmus paper, how will you identify the contents of each test tube?

Ans: (i) Insert the red litmus paper, one by one, into each test tube. A basic solution will be the one that turns red litmus blue. The acidic solution can now be tested using the blue litmus paper that was created here.
(ii) Fill the other two test tubes, one after the other, with the blue litmus paper that was obtained previously. The acidic solution is the one that causes the blue litmus paper to become red.
(iii) Distilled water is the solution that is neutral and has no effect on any litmus paper.

2.

Why should curd and sour substances not be kept in brass and copper vessels?

Ans: Lactic acid is found in curd, and other sour foods also include certain acids. Therefore, the acid in curd and sour things reacts with the metal when they are stored in brass and copper jars, releasing hydrogen gas and other toxic chemicals that cause the food to decay.

3.

Which gas is usually liberated when an acid reacts with a metal? Illustrate with an example. How will you test for the presence of this gas?

Ans: When an acid reacts with any metal, salt and hydrogen gas are produced.

Metal + Acid → Salt + Hydrogen gas

4.

Metal compound A reacts with dilute hydrochloric acid to produce effervescence. The gas evolved extinguishes a burning candle. Write a balanced chemical equation for the reaction if one of the compounds formed is calcium chloride.

Ans: Calcium carbonate is a metal compound that produces calcium chloride, carbon dioxide, and water when it combines with diluted hydrochloric acid. A burning candle can be extinguished by the carbon dioxide created since it will cut off the oxygen supply. The reaction's balanced chemical equation is:

$$CaCO_3\,(s) + 2HCl\,(Aq) \rightarrow CaCl_2(\,Aq) + CO_2\,(g) + H_2O\,(l)$$

5.

Why do HCl, HNO_3 , etc., show acidic characters in aqueous solutions while solutions of compounds like alcohol and glucose do not show acidic character?

Ans: When an H+ ion is released in water, a chemical becomes either acidic or non-acidic. When acids mix with water, they break down and make hydrogen ions. Certain substances have an acidic nature when they separate in an aqueous solution, producing hydrogen ions (acids such as HCl and HNO3).

Although they do contain a hydrogen atom, compounds that resemble glucose or alcohol do not exhibit any acidic properties. The hydrogen in them won't break apart like the hydrogen in acids. When they dissolve in water, they won't split into hydrogen ions.

6.

Why does an aqueous solution of an acid conduct electricity?

Ans: Acids tend to break down into hydrogen ions (H^+) or hydronium ions ($H3O^+$) when they are in water. The solution can carry electricity because the ions are moving around. So, an acid dissolved in water can carry electricity.

7.

Why does dry HCl gas not change the colour of the dry litmus paper?

Ans: Because HCl does not emit hydrogen ions, it exhibits no acidic behavior, and the color of the litmus paper remains unchanged when reacting with HCl gas.

8.

While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?

Ans: Since a lot of heat is released all at once when water is added to concentrated acid to dilute it, it is advised that the acid be introduced to the water rather than the other way around. Acid burns can result from splashing acid on one's face or clothing due to the heat's explosive transformation of some water into steam.

9.

How is the concentration of hydronium ions (H_3O^+) affected when a solution of an acid is diluted?

Ans: There are a set number of hydronium ions per volume of the solution when a specific amount of an acid is introduced to water. Both the concentration and the number of hydronium ions per volume drop with dilution.

10.

How is the concentration of hydroxide ions (OH^-) affected when excess base is dissolved in a solution of sodium hydroxide?

Ans: When too much base dissolves in a sodium hydroxide solution, the concentration of hydroxide ions will rise, but only to a certain extent; beyond that, the concentration will be nearly constant.

11.

You have two solutions, A and B. The pH of solution A is 6 and pH of solution B is 8. Which solution has more hydrogen ion concentration? Which of this is acidic and which one is basic?

Ans: We may utilize the rule that says, "The pH of any solution is inversely proportional to the hydrogen ion concentration," to find the hydrogen ion concentration. So, this indicates that a solution with a lower pH number will have more hydrogen ions. So, solution A will have more hydrogen ions in it. Also, A will be acidic and B will be basic.

12.

What effect does the concentration of H^+ (aq) ions have on the nature of the solution?

Ans: The concentration of hydrogen ions determines the kind of solution. The solution becomes basic if the concentration of hydrogen ions falls, and acidic if the concentration of hydrogen ions rises.

13.

Do basic solutions also have H+ (aq) ions? If yes, then why are these basic?

Ans: H+ (aq) ions are present in basic solutions. However, the OH-ions that give them their essential essence are significantly more numerous than these.

14.

Under what soil condition do you think a farmer would treat the soil of his fields with quick lime (calcium oxide) or slaked lime (calcium hydroxide) or chalk (calcium carbonate)?

Ans: Chalk (calcium carbonate), slaked lime (calcium hydroxide), or quick lime (calcium oxide) are all regarded as suitable bases. In the event that the soil is too acidic for agriculture, the farmer would apply these compounds to the soil to make it more basic.

15.

What is the common name of the compound $Ca(ClO)_2$?

Ans: Bleaching powder.

16.

Name the substance which on treatment with chlorine yields bleaching powder.

Ans: Slaked lime Ca $(OH)_2$ (Calcium Hydroxide).

17.

Name the sodium compound which is used for softening hard water.

Ans: Sodium carbonate.

18.

What will happen if a solution of sodium hydrocarbonate is heated? Give the equation of the reaction involved.

Ans: Water and sodium carbonate are produced together with the evolution of carbon dioxide gas when a solution of sodium hydrocarbonate or sodium hydrogen carbonate is heated.

$$2NaHCO_3 \xrightarrow{heat} Na_2CO_3 + H_2O + CO_2$$

19.

Write an equation to show the reaction between Plaster of Paris and water.

Ans:

$$\underset{\text{Plaster of Paris}}{CaSO_4 \cdot \frac{1}{2}H_2O} + 1\frac{1}{2}H_2O \longrightarrow \underset{\text{Gypsum}}{CaSO_4 \cdot 2H_2O}$$

Exercise Questions with Solutions of Class 10 Science Chapter 2 – Acids, Bases and Salts

1.

A solution turns red litmus blue, its pH is likely to be
(a) 1 (b) 4 (c) 5 (d) 10

Ans: When the solution reacts with a basic solution (PH greater than 7), litmus paper turns blue, hence the answer is 10. Therefore, the answer is 10.

2.

A solution reacts with crushed egg-shells to give a gas that turns lime-water milky. The solution contains
(a) NaCl
(b) HCl
(c) LiCl
(d) KCl

Ans: (b). The acid HCl in the solution combines with broken eggshells to produce carbon dioxide, a gas that gives lime water a milky appearance. Calcium carbonate (base) can be found in egg shells.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

3.

10 mL of a solution of NaOH is found to be completely neutralised by 8 mL of a given solution of HCl. If we take 20 mL of the same solution of NaOH, the amount HCl solution (the same solution as before) required to neutralise it will be
(a) 4 mL (b) 8 mL (c) 12 mL (d) 16 mL

Ans: Since 10 ml of NaOH requires 8 ml of HCl, 20 ml of NaOH will require 8 x 2 = 16 ml of HCl. Therefore, the correct answer is option (d) 16mL.

4.

Which one of the following types of medicines is used for treating indigestion?
(a) Antibiotic (b) Analgesic (c) Antacid (d) Antiseptic

Ans: Indigestion results from the overproduction of acid in the stomach. Medications utilized for the treatment of indigestion are referred to as antacids.

5.

Write word equations and then balanced equations for the reaction taking place when –
(a) dilute sulphuric acid reacts with zinc granules.
(b) dilute hydrochloric acid reacts with magnesium ribbon.
(c) dilute sulphuric acid reacts with aluminium powder.
(d) dilute hydrochloric acid reacts with iron filings

Ans:

(a) Zinc + dilute sulphuric acid → Zinc sulphate + Hydrogen
$Zn\ (s) + H_2SO_4\ (aq) \rightarrow ZnSO_4\ (aq) + H_2\ (g)$
(b) Magnesium ribbon + dil. Hydrochloric acid → Magnesium chloride + Hydrogen
$Mg\ (s) + 2\ HCl\ (aq) \rightarrow MgCl_2\ (aq) + H_2\ (g)$
(c) Aluminium powder + dil. Sulphuric acid > Aluminium sulphate + Hydrogen
$2Al\ (s) + 3H_2SO_4\ (aq) \rightarrow Al_2\ (SO_4)_3\ (aq) + 3H_2\ (g)$
(d) Iron filings + Dilute hydrochloric acid > Ferric chloride + Hydrogen
$2Fe\ (s) + 6HCl\ (aq) \rightarrow 2FeCl_3\ (aq) + 3H_2\ (g)$

6.

Compounds such as alcohols and glucose also contain hydrogen but are not categorised as acids. Describe an Activity to prove it.

Ans: Activity:
a. A cork kept in a 100 mL beaker has two nails on it.

b. Next, a light and a switch are used to connect the nails to the plate ends of a 6-volt battery.

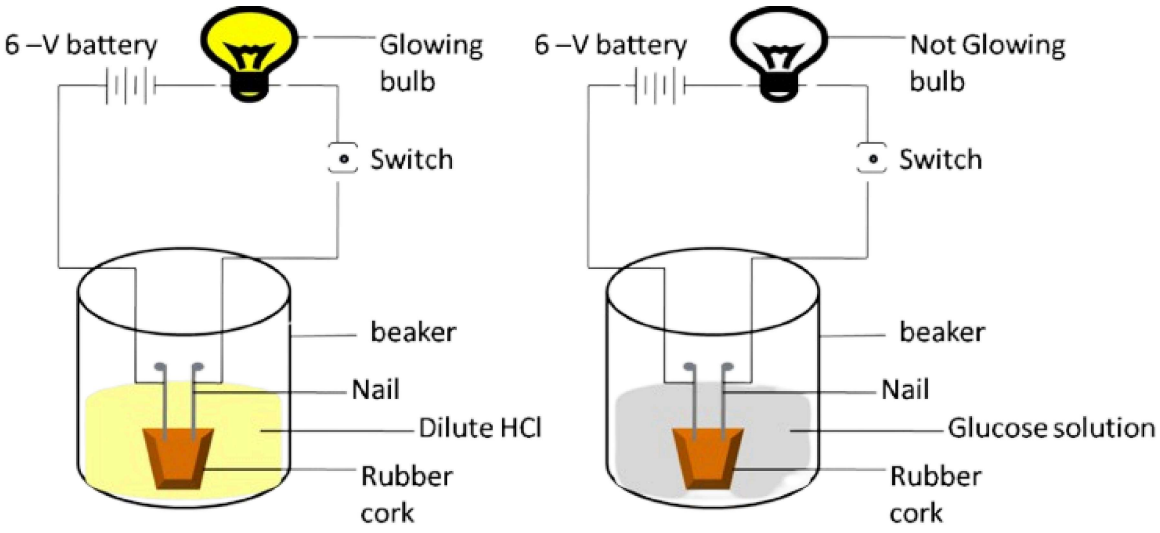
c. Some weak HCl is put into the beaker, and the current is turned on.

d. The trial is then done again, this time with glucose solution and alcohol solution.

Observations:
If you put the bulb in HCl, it lights up, but not if you put it in glucose or alcohol.

Result:

When HCl is mixed with water, it breaks apart into H^+ and Cl^- ions. These ions move electricity around in the solution, which is what makes the bulb glow. The glucose or alcohol mix, on the other hand, does not break apart into ions. That's why the bulb doesn't glow.



Conclusion:

Although hydrogen is present in all acids, not all hydrogen-containing substances are acids.So, glucose and alcohols both have hydrogen in them, but they are not acids.

7.

Why does distilled water not conduct electricity, whereas rain water does?

Ans: Since there are no ionic compounds (such as acids, bases, or salts) dissolved in distilled water, it does not transmit electricity.
Rainwater dissolves the acidic gas carbon dioxide in the air as it descends through the atmosphere to generate carbonic acid (H_2CO_3). Rainwater contains carbonate ions (CO(aq)32) and hydrogen ions (H^+ (aq)) from carbonic acid. Therefore, rainfall conducts electricity because it contains carbonic acid, which gives it ions.

8.

Why do acids not show acidic behaviour in the absence of water?

Ans: The existence of hydrogen ions, or [H+ (aq) ions], in acids is what causes their acidic behavior. Only when water is present does the acid produce hydrogen ions. Therefore, an acid will not produce hydrogen ions and will not exhibit its acidic properties in the absence of water.

9.

Five solutions A,B,C,D and E when tested with universal indicator showed pH as 4,1,11,7 and 9, respectively. Which solution is

(a) neutral?

(b) strongly alkaline?

(c) strongly acidic?

(d) weakly acidic?

(e) weakly alkaline?

Arrange the pH in increasing order of hydrogen-ion concentration.

Ans:

In increasing order of hydrogen ion concentration,

pH 11(C) < pH 9(E) < pH 7 (D) < pH 4 (A) < pH 1 (B)

PH11 – Strongly alkaline

pH9 – Weakly alkaline

PH7 – Neutral

pH4 – Weakly acidic

pH1 – Strongly acidic

10.

Equal lengths of magnesium ribbons are taken in test tubes A and B. Hydrochloric acid (HCl) is added to test tube A, while acetic acid (CH3COOH) is added to test tube B. Amount and concentration taken for both the acids are same. In which test tube will the fizzing occur more vigorously and why?

Ans: Test tube A will experience more strong fizzing. Acetic acid (CH_3COOH) is a mild acid, while hydrochloric acid (HCl) is a strong acid. As a strong acid, the hydrochloric acid solution has a significantly higher concentration of hydrogen ions, which causes the fizzing to happen more forcefully in test tube A. The fizzing is caused by the generation of hydrogen gas, which is created when acid reacts with the magnesium ribbon's metal.

11.

Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd? Explain your answer.

Ans: Fresh milk has a pH of 6. The pH will drop when it turns into curd because curd contains lactic acid, which lowers pH.

12.

A milkman adds a very small amount of baking soda to fresh milk.

(a) Why does he shift the pH of the fresh milk from 6 to slightly alkaline?

(b) Why does this milk take a long time to set as curd?

Ans: (a) To prevent lactic acid from forming in milk and making it sour, milk is made slightly alkaline.
(b) Because the lactic acid that is generated must first neutralize the alkali in the milk, the alkaline milk takes longer to set into curd.

13.

Plaster of Paris should be stored in a moisture-proof container. Explain why?

Ans: Because moisture can cause hydration, which slows down the setting process, plaster of Paris should be stored in a moisture-proof container. The plaster of Paris will eventually become unusable as a result of this.

$$CaSO_4.\frac{1}{2}H_2O + 1\frac{1}{2}H_2O \rightarrow CaSO_4.2H_2O$$

14.

What is a neutralisation reaction? Give two examples.

Ans: A neutralization reaction occurs when an acid and base react to produce salt and water as a byproduct.

Examples

$$NaOH + HCl \rightarrow NaCl + H_2O$$
$$Mg(OH)_2 + H_2CO_3 \rightarrow MgCO_3 + 2H_2O$$

15.

Give two important uses of washing soda and baking soda.

Ans: Applications for washing soda:

(i) The paper, soap, and glass industries utilize washing soda.
(ii) It is employed to eliminate the water's persistent hardness.

Applications for baking soda:

(i) Baking soda is used as an antacid in medications to reduce stomach acidity.
(ii) Baking soda is used to make baking powder, which is used to make bread, cakes, and other baked goods.