

CBSE Class 10 Science

NCERT Solution

Science Chapter 2 - Acids, Bases and Salts

In text Questions

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Question 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?

Answer:

- (i) Put the red litmus paper in all the test tubes, turn by turn. The solution which turns red litmus to blue will be a basic solution. The blue litmus paper formed here can now be used to test the acidic solution.
- (ii) Put the blue litmus paper obtained above in the remaining two test-tubes, turn-by-turn. The solution which turns the blue litmus paper to red will be the acidic solution.
- (iii) The solution which has no effect on any litmus paper will be neutral and hence it will be distilled water.

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Question 1:-Why should curd and sour substances not be kept in brass and copper vessels?

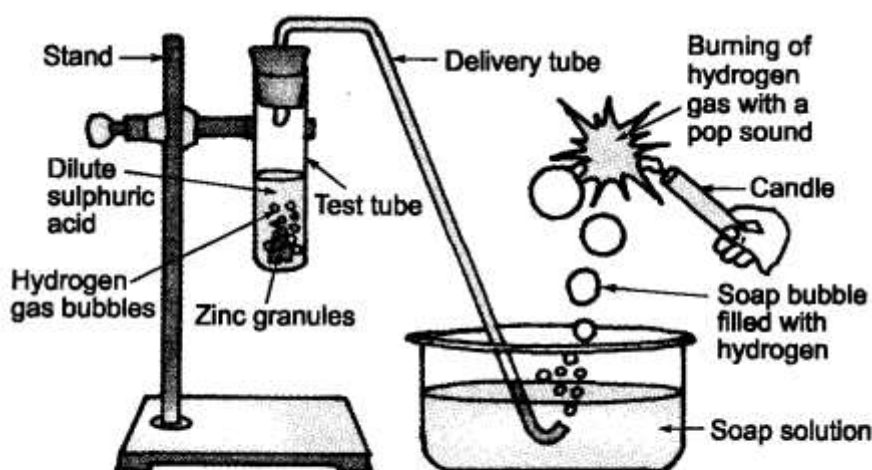
Answer:

Curd and sour substances should not be kept in brass and copper vessels because these and other sour food-stuffs contain acids which can react with the metal of the vessel to form poisonous metal compounds which can cause food poisoning and affect our health adversely.

Question 2:-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?

Answer:

- (i) Hydrogen (H_2) gas is liberated when an acid reacts with a metal.
- (ii) Illustration: Set up the apparatus as shown in the given figure. Take some zinc granules in the test tube. Add about 5 mL dilute hydrochloric acid slowly. Soon the reaction between zinc and hydrochloric acid starts and hydrogen gas is evolved.



Reaction of zinc granules with dil. H_2SO_4 and testing for hydrogen gas by burning candle.

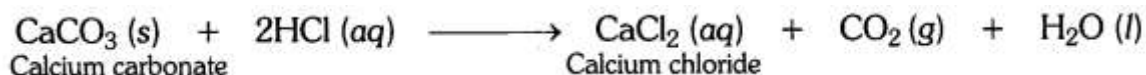
(iii) Test for H_2 gas:

H_2 gas is not soluble in water. When passed through soap solution, it gets trapped into bubbles. Bring a burning candle near the soap bubble filled with gas. The soap bubble bursts and hydrogen gas burns with a pop sound.

Question 3:-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.

Answer:

As the end product is calcium chloride and the gas formed is carbon dioxide, the metal compound A must be calcium carbonate. Therefore, the reaction between calcium carbonate and hydrochloric acid is



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Question 1:-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?

Answer:

H^+ ions in aqueous solution are responsible for acidic character. HCl , HNO_3 , etc. give H^+ ions in water while alcohol and glucose do not give H^+ ion in water. Therefore, alcohol and glucose do not show acidic character.

Question 2:-Why does an aqueous solution of an acid conduct electricity?

Answer:

The aqueous solution of an acid conducts electricity due to the presence of charged particles called ions in it.

Question 3:-Why does dry HCl gas not change the colour of the dry litmus paper?

Answer:

Dry HCl gas does not give H^+ ions and therefore does not change the colour of dry litmus paper.

Question 4:-While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?

Answer:

While diluting an acid it is recommended that the acid should be added to water and not water to the acid because if water is added to concentrated acid to dilute it, then a large amount of heat is evolved at once. This heat changes some of the water to steam explosively which can splash the acid on one's face or clothes and cause acid burns.

Question 5:-How is the concentration of hydronium ions (H_3O^+) affected when a solution of an acid is diluted?

Answer:

When a given amount of an acid is added to water, there is a fixed number of hydronium ions per volume of the solution. On dilution, the number of hydronium ions per volume decreases and concentration decreases.

Question 6:-How is the concentration of hydroxide ions (OH^-) affected when excess base is dissolved in a solution of sodium hydroxide?

Answer:

The concentration of hydroxide ions will increase when excess base is dissolved in a solution of sodium hydroxide, but it happens to a limited extent only after which the concentration becomes almost constant.

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Question 1:-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?

Answer:

A pH value of less than 7 indicates an acidic solution, while greater than 7 indicates a basic solution. Since solution A has more hydrogen ion concentration, solution A is acidic and solution B is basic.

Question 2:-What effect does the concentration of H^+ (aq) ions have on the nature of the solution?

Answer:

More the concentration of H^+ ions, higher the acidic nature of the solution.

Question 3:-Do basic solutions also have H^+ (aq) ions? If yes, then why are these basic?

Answer:

Basic solutions have H^+ (aq) ions. But these are far less in number than OH^- ions that is responsible for their basic nature.

Question 4:-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)?

Answer:

If the soil is too acidic (having low pH) then it is treated with materials like quick lime (calcium oxide) or slaked lime (calcium hydroxide) or chalk (calcium carbonate).

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Question 1:-What is the common name of the compound CaOCl_2 ?

Answer:

Bleaching powder.

Question 2:-Name the substance which on treatment with chlorine yields bleaching powder.

Answer:

Slaked lime $\text{Ca}(\text{OH})_2$.

Question 3:-Name the sodium compound which is used for softening hard water.

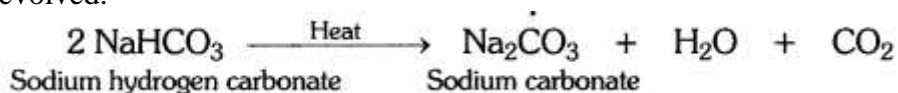
Answer:

Sodium carbonate.

Question 4:-What will happen if a solution of sodium hydrogen carbonate is heated. Give the equation of the reaction involved?

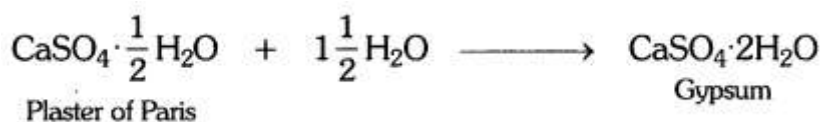
Answer:

Solution of sodium hydrogen carbonate on heating gives sodium carbonate and carbon dioxide gas is evolved.



Question 5:-Write an equation to show the reaction between plaster of Paris and water.

Answer:



NCERT Solutions for Class 10 Science

Chapter 2

Textbook Chapter End Questions

Question 1:-A solution turns red litmus blue, its pH is likely to be

- (a) 1
- (b) 4
- (c) 5
- (d) 10

Answer:

- (d) 10

Answer is 10 because litmus paper turns blue when reacts with basic solution (PH more than 7). Hence 10 is the answer.

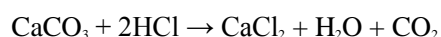
Question 2:-A solution reacts with crushed-egg shells to give a gas that turns lime water milky. The solution contains

- (a) NaCl
- (b) HCl
- (c) LiCl
- (d) KCl

Answer:

- (b) HCl

Egg shells contains calcium carbonate, which on reaction with HCl liberates CO_2 gas which turn lime water to milky.



Question 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 of 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

Answer:

- (d) 16 mL

Since 10 ml of NaOH requires 8 mL of HCL, 20 ml of NaOH require $8 \times 2 = 16\text{mL}$ of HCl. Hence the answer is option d 16mL.

Question 4:-Which one of the following types of medicines is used for treating indigestion?

- (a) Antibiotic
- (b) Analgesic
- (c) Antacid

(d) Antiseptic

Answer:

(c) Antacid

Indigestion is due to excess production of acid in the stomach. Medicines used to treat indigestion is called as Antacid.

Question 5:-Write word equations and then balanced equations for the reaction taking place when

(a) dilute sulphuric acid reacts with zinc granules

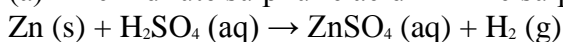
(b) dilute hydrochloric acid reacts with magnesium ribbon

(c) dilute sulphuric acid reacts with aluminium powder

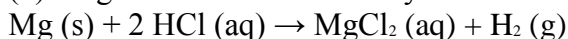
(d) dilute hydrochloric acid reacts with iron filing

Answer:

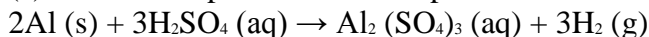
(a) Zinc + dilute sulphuric acid → Zinc sulphate + Hydrogen



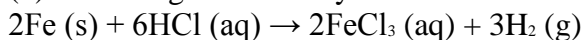
(b) Magnesium ribbon + dil. Hydrochloric acid → Magnesium chloride + Hydrogen



(c) Aluminium powder + dil. Sulphuric acid > Aluminium sulphate + Hydrogen



(d) Iron filings + Dilute hydrochloric acid > Ferric chloride + Hydrogen



Question 6:-Compounds such as alcohol and glucose also contain hydrogen but are not categorised as acids. Describe an activity to prove it.

Answer:

Though compounds like alcohol and glucose contain hydrogen but they do not ionise in the solution to produce H^+ ions on passing current through them.

(i) Take solutions of alcohols and glucose.

(ii) Fix two nails on a cork, and place the cork in 100 mL beaker.

(iii) Connect the nails to the two terminals of a 6 volt battery through a bulb and a switch, as shown in the given Figure.



(iv) Now pour alcohol in the beaker and switch on the current.

(v) The bulb does not glow.

(vi) Repeat the experiment with glucose. The bulb does not glow in this case also.

(vii) This means no ions or H^+ ions are present in the solution.

This shows that alcohols and glucose are not acids.

Question 7:-Why does distilled water not conduct electricity, whereas rainwater does?

Answer:

Distilled water does not conduct electricity because it does not contain any ionic compound (like acids, bases or salts) dissolved in it.

Rainwater, while falling to the earth through the atmosphere, dissolves an acidic gas carbon dioxide from the air and forms carbonic acid (H_2CO_3). Carbonic acid provides hydrogen ions, H^+ (aq) and carbonate ions, CO_3^{2-} to rainwater. Hence, due to the presence of carbonic acid which provides ions to rainwater, the rainwater conducts electricity.

Question 8:-Why do acids not show acidic behavior in the absence of water?

Answer:

The acidic behavior of acids is due to the presence of hydrogen ions, [H^+ (aq) ions], in them. The acid produces hydrogen ions only in the presence of water. So in the absence of water, an acid will not form hydrogen ions and hence will not show its acidic behavior.

Question 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.

Answer:

(a) D

(b) C

(c) B

(d) A

(e) E

Increasing order of hydrogen ion concentration

$11 < 9 < 7 < 4 < 1$

i. e., $C < E < D < A < B$

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

$pH\ 11$ – Strongly alkaline

$pH\ 9$ – weakly alkaline

$pH\ 7$ – Neutral

$pH\ 4$ – Weakly acidic

$pH\ 1$ – Strongly acidic

Question 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 (CH_3COOH) is added to test tube B. In which test tube will the fizzing occur more vigorously

and why?

Answer:

Fizzing will occur more vigorously in test tube A. Hydrochloric acid (HCl) is a strong acid whereas acetic acid (CH₃COOH) is a weak acid. Being strong acid, the hydrochloric acid solution contains a much greater amount of hydrogen ions in it due to which the fizzing will occur more vigorously in test tube A (containing hydrochloric acid). The fizzing is due to the evolution of hydrogen gas which is formed by the action of acid on the magnesium metal of magnesium ribbon.

Question 11:-Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd? Explain your answer.

Answer:

pH of milk falls below 6 as it turns into curd due to the formation of lactic acid during this process. Lactic acid present in it reduces its pH value.

Question 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?

Answer:

(a) Milk is made slightly alkaline so that it may not get sour easily due to the formation of lactic acid in it.

(b) The alkaline milk takes a longer time to set into curd because the lactic acid being formed has to first neutralise the alkali present in it.

Question 13:-Plaster of Paris should be stored in a moisture proof container.

Explain why?

Answer:

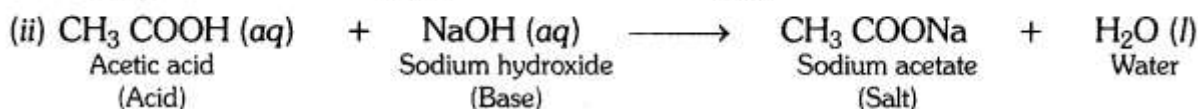
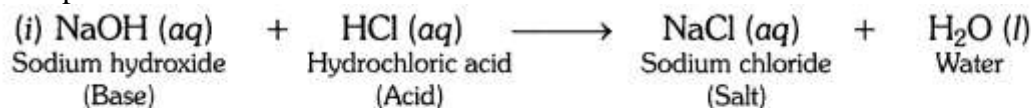
Plaster of Paris should be stored in a moisture proof container because the presence of moisture can cause slow setting of plaster of Paris by bringing about its hydration. This will make the plaster of Paris useless after sometime.

Question 14:-What is a neutralisation reaction ? Give two examples.

Answer:

The reaction between an acid and a base to form salt and water is called a neutralisation reaction.

Examples:



Question 15:-Give two important uses of washing soda and baking soda.

Answer:

Uses of washing soda :

(i) Washing soda is used in glass, soap and paper industries.

(ii) It is used for removing permanent hardness of water.

Uses of baking soda :

- (i) Baking soda is used as an antacid in medicines to remove acidity of the stomach.
- (ii) Baking soda is used for making baking powder (used in making cakes, bread, etc.).