NCERT Class 10 Science - Chapter 2: Acids, Bases And Salts
Complete Exercise Solutions

Q1. A solution turns red litmus blue, its pH is likely to be
(a) 1
(b) 4
(c) 5
(d) 10

Answer: (d) 10
Explanation: Solutions that turn red litmus blue are basic in nature. Basic solutions have a pH value greater than 7.

Q2. 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
Explanation: Eggshells contain calcium carbonate ($CaCO_3$). It reacts with an acid like hydrochloric acid (HCl) to release carbon dioxide gas (CO_2), which turns lime-water milky.

Q3. 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

Answer: (d) 16 mL
Explanation: Since the volume of NaOH is doubled (from 10 mL to 20 mL), the volume of HCl needed to neutralise it will also double (8 mL x 2 = 16 mL).

Q4. Which one of the following types of medicines is used for treating indigestion?
(a) Antibiotic
(b) Analgesic
(c) Antacid
(d) Antiseptic

Answer: (c) Antacid
Explanation: Indigestion is caused by excess acid in the stomach. Antacids are mild bases that neutralise this excess acid.

Q5. 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.

Answer:
(a) Word: Zinc + Dilute sulphuric acid -> Zinc sulphate + Hydrogen
Balanced: $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$

(b) Word: Magnesium + Dilute hydrochloric acid -> Magnesium chloride + Hydrogen
Balanced: Mg(s) + 2HCl(aq) -> MgCl2(aq) + H2(g)

(c) Word: Aluminium + Dilute sulphuric acid -> Aluminium sulphate + Hydrogen
Balanced: 2Al(s) + 3H2SO4(aq) -> Al2(SO4)3(aq) + 3H2(g)

(d) Word: Iron + Dilute hydrochloric acid -> Iron chloride + Hydrogen
Balanced: Fe(s) + 2HCl(aq) -> FeCl2(aq) + H2(g)

Q6. Compounds such as alcohols and glucose also contain hydrogen but are not categorised as acids. Describe an Activity to prove it.

Answer:
Activity/Experiment:
1. Fix two iron nails on a rubber cork and place it in a 100 mL beaker.
2. Connect the nails to the terminals of a 6-volt battery through a bulb and a switch.
3. Pour dilute glucose solution into the beaker and turn on the current. Observe if the bulb glows.
4. Repeat the experiment separately with an alcohol solution, and then with a dilute HCl solution.

Observation: The bulb glows brightly with the HCl solution, but does not glow at all with glucose or alcohol solutions.
Conclusion: HCl dissociates into H+ ions in water which conduct electricity. Glucose and alcohol do not separate into ions in water, proving they do not behave as acids despite containing hydrogen.

Q7. Why does distilled water not conduct electricity, whereas rain water does?

Answer: Distilled water is pure and contains no dissolved mineral salts or impurities, meaning it cannot form free ions to conduct electricity. Rainwater absorbs gases like carbon dioxide and sulphur dioxide from the atmosphere, forming weak acids that break down into free ions, allowing electric current to flow.

Q8. Why do acids not show acidic behaviour in the absence of water?

Answer: Acids cannot separate into hydrogen ions (H+) without water molecules.
The acidic behavior of a substance depends entirely on the presence of these hydronium/hydrogen ions, which are only generated when the acid dissolves in water.

Q9. 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) Neutral: Solution D (pH 7)
- (b) Strongly alkaline: Solution C (pH 11)
- (c) Strongly acidic: Solution B (pH 1)
- (d) Weakly acidic: Solution A (pH 4)
- (e) Weakly alkaline: Solution E (pH 9)

Increasing order of hydrogen-ion concentration (lowest concentration to highest):
pH 11 < pH 9 < pH 7 < pH 4 < pH 1 (Solution C < E < D < A < B)

Q10. 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?

Answer: Fizzing will occur much more vigorously in test tube A. Hydrochloric acid is a strong acid that ionises completely in water, producing a high concentration of H+ ions. Acetic acid is a weak acid that only partially ionises. The higher ion concentration in test tube A causes a much faster reaction with magnesium, releasing hydrogen gas rapidly.

Q11. Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd? Explain your answer.

Answer: The pH will decrease below 6. When milk turns into curd, bacteria convert lactose sugar into lactic acid. The production of this acid increases the hydrogen ion concentration, making the mixture more acidic and lowering its pH value.

Q12. 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) He makes the milk slightly alkaline to stop it from spoiling quickly. The baking soda delays the milk from turning sour by neutralising any lactic acid produced naturally over time.

(b) This milk takes longer to set into curd because the lactic acid produced by bacteria must first neutralise the added alkaline baking soda before it can lower the pH enough to coagulate the milk into curd.

Q13. Plaster of Paris should be stored in a moisture-proof container. Explain why.

Answer: Plaster of Paris (Calcium sulphate hemihydrate) absorbs atmospheric moisture very quickly. When it reacts with water, it sets into a hard, solid mass called gypsum, making the plaster completely useless.
Equation: CaSO4.1/2H2O + 1_1/2H2O -> CaSO4.2H2O

Q14. What is a neutralisation reaction? Give two examples.

Answer: A neutralisation reaction occurs when an acid and a base react together
to produce salt and water.
- Example 1: NaOH(aq) + HCl(aq) -> NaCl(aq) + H2O(l)
- Example 2: Ca(OH)2(aq) + H2SO4(aq) -> CaSO4(aq) + 2H2O(l)

Q15. Give two important uses each of washing soda and baking soda.

Answer:
Uses of Washing Soda (Sodium carbonate):
1. Used in glass, soap, and paper manufacturing industries.
2. Used to permanently remove hardness from water supplies.

Uses of Baking Soda (Sodium hydrogen carbonate):
1. Used as an ingredient in baking powder to make bread and cakes rise.

2. Used as an active component in soda-acid fire extinguishers.

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