

CLASS 9 • CHEMISTRY • CHAPTER 07

ACID BASE CHEMISTRY

80 High-Importance MCQs

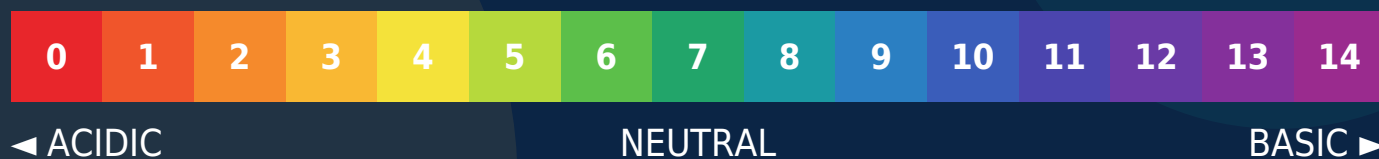
with Detailed Explanations
Complete Annual Exam Preparation

Tick ✓ Answers

Concept Explained

Exam Focused

THE pH SCALE



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Section 1: Introduction, Classification, and Natural Sources

10 MCQs

Q1. Which of the following is the characteristic taste of acids?

A) Bitter

B) Sour



C) Salty

D) Sweet

Correct Answer: B) Sour ✓

Explanation: Acids are universally known for their sour taste. For example, lemons and vinegar taste sour because they contain acids like citric and acetic acid, respectively. Bases, on the other hand, taste bitter.

Q2. What color change occurs when an acid is tested with blue litmus paper?

A) It turns green

B) It turns red



C) It turns yellow

D) It remains blue

Correct Answer: B) It turns red ✓

Explanation: Blue litmus paper is used to test for acids. When it comes into contact with an acidic solution, it changes color from blue to red. Bases change red litmus paper to blue.

Q3. Which acid is naturally found in lemons and oranges?

A) Acetic acid

B) Lactic acid

C) Citric acid



D) Oxalic acid

Correct Answer: C) Citric acid ✓

Explanation: Citrus fruits like lemons and oranges are rich sources of citric acid. Acetic acid is found in vinegar, and lactic acid is found in sour milk.

Q4. The natural source of lactic acid is:

A) Vinegar

B) Sour milk or curd

C) Ant sting

D) Tamarind

Correct Answer: B) Sour milk or curd ✓

Explanation: Lactic acid is produced during the fermentation of lactose in milk, giving sour milk and curd their characteristic sour taste.

Q5. Which acid is responsible for the sting of an ant?**A) Formic acid**

B) Acetic acid

C) Tartaric acid

D) Ascorbic acid

Correct Answer: A) Formic acid ✓

Explanation: When an ant bites, it injects formic acid into the skin, which causes a burning sensation. This is why rubbing a mild base like baking soda on an ant bite helps neutralize the acid.

Q6. Tamarind contains which of the following organic acids?

A) Citric acid

B) Tartaric acid



C) Oxalic acid

D) Lactic acid

Correct Answer: B) Tartaric acid ✓

Explanation: Tamarind is a rich natural source of tartaric acid, which gives it its distinct sour taste.

Q7. Ascorbic acid, also known as Vitamin C, is naturally found in:

A) Tomato

B) Amla and Guava



C) Vinegar

D) Ant sting

Correct Answer: B) Amla and Guava ✓

Explanation: Amla (Indian gooseberry) and guava are excellent sources of ascorbic acid (Vitamin C), which is essential for human health.

Q8. Which of the following is a mineral acid?

A) Acetic acid

B) Citric acid

C) Hydrochloric acid

D) Formic acid

Correct Answer: C) Hydrochloric acid ✓

Explanation: Mineral acids are man-made or derived from minerals, unlike organic acids which come from natural sources. Hydrochloric acid, sulphuric acid, and nitric acid are common mineral acids.

Q9. Acids obtained from natural sources are called:

A) Mineral acids

B) Organic acids

C) Synthetic acids

D) Strong acids

Correct Answer: B) Organic acids ✓

Explanation: Acids that occur naturally in plants and animals are called organic acids or natural acids. Examples include citric acid and lactic acid.

Q10. Which of the following is NOT a mineral acid?

A) Sulphuric acid

B) Nitric acid

C) Acetic acid

✓

D) Hydrochloric acid

Correct Answer: C) Acetic acid ✓

Explanation: Acetic acid is an organic acid found in vinegar. Sulphuric, nitric, and hydrochloric acids are mineral acids prepared from mineral sources.

Section 2: Bases, Alkalis, and Neutralization

8 MCQs

Q11. What is the characteristic taste of bases?

A) Sour

B) Sweet

C) Bitter



D) Salty

Correct Answer: C) Bitter ✓

Explanation: Bases are known for their bitter taste and slippery touch. For example, soap is a base and feels slippery.

Q12. Which of the following is the correct definition of an alkali?

A) A base that is insoluble in water

B) A base that is soluble in water

✓

C) An acid that is soluble in water

D) A salt that is soluble in water

Correct Answer: B) A base that is soluble in water ✓

Explanation: All alkalis are bases, but not all bases are alkalis. An alkali is specifically a base that dissolves completely in water to give hydroxide ions (OH^-).

Q13. Caustic soda is the common name for:

A) Potassium hydroxide

B) Sodium hydroxide

✓

C) Calcium hydroxide

D) Ammonium hydroxide

Correct Answer: B) Sodium hydroxide ✓

Explanation: Sodium hydroxide (NaOH) is commonly known as caustic soda. Potassium hydroxide (KOH) is called caustic potash.

Q14. Which of the following is an example of a weak base?

A) NaOH

B) KOH

C) NH_4OH

✓

D) $\text{Ba}(\text{OH})_2$

Correct Answer: C) NH_4OH ✓

Explanation: Ammonium hydroxide (NH_4OH) only partially ionizes in water, making it a weak base. NaOH, KOH, and $\text{Ba}(\text{OH})_2$ are strong bases that ionize completely.

Q15. The reaction between an acid and a base to form salt and water is called:

A) Oxidation

B) Reduction

C) Neutralization

✓

D) Decomposition

Correct Answer: C) Neutralization ✓

Explanation: Neutralization is a chemical reaction in which an acid and a base react quantitatively with each other to cancel out their properties, producing salt and water.

Q16. Metal oxides are generally:

A) Acidic

B) Basic

✓

C) Neutral

D) Amphoteric

Correct Answer: B) Basic ✓

Explanation: Metal oxides like sodium oxide (Na_2O) and magnesium oxide (MgO) are basic in nature. They react with water to form bases (metal hydroxides).

Q17. Which of the following is the correct equation for the reaction of sodium oxide with water?

A) $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{NaOH}$

✓

B) $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{Na}_2\text{OH}$

C) $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$

D) $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{NaH} + \text{O}_2$

Correct Answer: A) $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{NaOH}$ ✓

Explanation: Sodium oxide is a basic oxide. It reacts vigorously with water to produce sodium hydroxide, a strong alkali.

Q18. Which of the following bases is extremely corrosive and can burn the skin?

A) $\text{Cu}(\text{OH})_2$

B) $\text{Fe}(\text{OH})_3$

C) NaOH

✓

D) $\text{Al}(\text{OH})_3$

Correct Answer: C) NaOH ✓

Explanation: Sodium hydroxide (NaOH) and potassium hydroxide (KOH) are extremely corrosive alkalis and can cause severe chemical burns upon contact with skin.

Section 3: Arrhenius Concept

12 MCQs

Q19. Who proposed the concept that acids give H^+ ions and bases give OH^- ions in water?

A) Bronsted

B) Lowry

C) Svante Arrhenius



D) Lewis

Correct Answer: C) Svante Arrhenius ✓

Explanation: Svante Arrhenius, a Swedish chemist, proposed this foundational theory of acids and bases in terms of their behavior in aqueous solutions.

Q20. According to the Arrhenius concept, an acid is a substance that:

A) Accepts a proton

B) Donates a proton

C) Gives H^+ or H_3O^+ ions in water

✓

D) Gives OH^- ions in water

Correct Answer: C) Gives H^+ or H_3O^+ ions in water ✓

Explanation: Arrhenius defined an acid as a substance that dissociates in water to produce hydrogen ions (H^+) or hydronium ions (H_3O^+).

Q21. What is the chemical formula of the hydronium ion?

A) H^+

B) OH^-

C) H_3O^+

✓

D) H_2O

Correct Answer: C) H_3O^+ ✓

Explanation: When a proton (H^+) attaches to a water molecule (H_2O), it forms a hydronium ion (H_3O^+). This is because protons cannot exist freely in water.

Q22. According to Arrhenius, a base is a substance that dissociates in water to give:

A) H^+ ions

B) OH^- ions

✓

C) O^{2-} ions

D) H_3O^+ ions

Correct Answer: B) OH^- ions ✓

Explanation: Arrhenius bases are substances that produce hydroxide ions (OH^-) when dissolved in water. Examples include NaOH and KOH.

Q23. How many water molecules typically surround a proton in an aqueous solution?

A) One

B) Two

C) Up to four

✓

D) Ten

Correct Answer: C) Up to four ✓

Explanation: Due to the high charge density of a proton, it strongly attracts water molecules. Reports suggest that up to four water molecules surround a single proton in an aqueous solution.

Q24. What is formed when hydronium ions and hydroxyl ions react?

A) Salt and hydrogen gas

B) Water and heat



C) Salt and water

D) Hydrogen and oxygen

Correct Answer: B) Water and heat ✓

Explanation: The reaction between H_3O^+ and OH^- is highly exothermic, producing water ($2\text{H}_2\text{O}$) and releasing heat. This is the core of a neutralization reaction.

Q25. In an aqueous solution of sodium chloride, how does the salt exist?

A) As solid crystals

B) As hydrated sodium and chloride ions



C) As undissociated NaCl molecules

D) As a precipitate

Correct Answer: B) As hydrated sodium and chloride ions ✓

Explanation: Sodium chloride does not exist as solid crystals in water. It completely dissociates into hydrated spectator ions (Na^+ and Cl^-) surrounded by water molecules.

Q26. Which of the following is a strong acid that ionizes completely in water?

A) Acetic acid

B) Formic acid

C) Hydrochloric acid

✓

D) Carbonic acid

Correct Answer: C) Hydrochloric acid ✓

Explanation: Mineral acids like HCl are generally very strong acids. HCl ionizes completely in water, releasing a large amount of hydronium ions.

Q27. Sulphuric acid (H_2SO_4) is called a diprotic acid because:

A) It contains two hydrogen atoms

B) It ionizes in two steps

✓

C) It has two sulphur atoms

D) It produces two hydroxide ions

Correct Answer: B) It ionizes in two steps ✓

Explanation: A diprotic acid has two ionizable hydrogen atoms. H_2SO_4 ionizes in two distinct steps: first to HSO_4^- and then to SO_4^{2-} .

Q28. What is the percentage ionization of glacial acetic acid?

A) 1.06%

B) 0.132%



C) 100%

D) 50%

Correct Answer: B) 0.132% ✓

Explanation: Glacial acetic acid is a weak organic acid. It only ionizes to a very limited extent, with a percent ionization of just 0.132%, meaning most molecules remain undissociated.

Q29. Out of 1000 molecules of formic acid (1.50M), how many remain undissociated?

A) 13

B) 987



C) 1000

D) 106

Correct Answer: B) 987 ✓

Explanation: The percent ionization of 1.50M formic acid is 1.06%. This means 1.06% of 1000 molecules (which is roughly 10.6, so 13 molecules ionize) dissociate. The remaining 987 molecules remain undissociated.

Q30. Which of the following is a limitation of the Arrhenius concept?

A) It cannot explain the acidic nature of HCl

B) It cannot explain the basic nature of NH_3

✓

C) It cannot explain neutralization

D) It cannot explain the conductivity of acids

Correct Answer: B) It cannot explain the basic nature of NH_3 ✓

Explanation: Arrhenius concept requires a substance to contain an OH group to act as a base. However, compounds like NH_3 , Na_2CO_3 , and K_2CO_3 act as bases in water but do not contain an OH group, which Arrhenius could not explain.

Section 4: Bronsted-Lowry Concept

8 MCQs

Q31. According to the Bronsted-Lowry theory, an acid is a:

A) Proton acceptor

B) Proton donor



C) Electron pair acceptor

D) Electron pair donor

Correct Answer: B) Proton donor ✓

Explanation: The Bronsted-Lowry definition is broader than Arrhenius. It defines an acid as any species that can donate a proton (H^+) to another species.

Q32. According to the Bronsted-Lowry theory, a base is a:

A) Proton donor

B) Proton acceptor

✓

C) Hydroxide donor

D) Hydroxide acceptor

Correct Answer: B) Proton acceptor ✓

Explanation: A Bronsted-Lowry base is defined as a substance that accepts a proton (H^+) from an acid.

Q33. In the reaction $\text{HCl(g)} + \text{H}_2\text{O(l)} \rightarrow \text{H}_3\text{O}^+(\text{aq}) + \text{Cl}^-(\text{aq})$, which species acts as a base?

A) HCl

B) H_2O

✓

C) H_3O^+

D) Cl^-

Correct Answer: B) H_2O ✓

Explanation: In this reaction, HCl donates a proton (H^+) to water. Since water accepts the proton, it acts as a Bronsted-Lowry base.

Q34. In the reaction $\text{NH}_3(\text{g}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{NH}_4^+(\text{aq}) + \text{OH}^-(\text{aq})$, which species acts as an acid?

A) NH_3

B) H_2O

✓

C) NH_4^+

D) OH^-

Correct Answer: B) H_2O ✓

Explanation: Water donates a proton (H^+) to ammonia. Since water is the proton donor in this forward reaction, it acts as a Bronsted-Lowry acid.

Q35. A compound that can behave both as an acid and a base is called:

A) Neutral

B) Amphoteric

✓

C) Acidic

D) Basic

Correct Answer: B) Amphoteric ✓

Explanation: Water is a classic example of an amphoteric compound. It can donate a proton (acting as an acid) or accept a proton (acting as a base) depending on the other reactant.

Q36. In the reaction $\text{HCN(aq)} + \text{H}_2\text{O(l)} \rightarrow \text{H}_3\text{O}^+(\text{aq}) + \text{CN}^-(\text{aq})$, what is CN^- ?

A) Conjugate acid

B) Conjugate base

✓

C) Acid

D) Base

Correct Answer: B) Conjugate base ✓

Explanation: When HCN donates a proton, it forms CN^- . According to Bronsted-Lowry, the species formed after the acid loses a proton is called the conjugate base.

Q37. Which of the following is a Bronsted-Lowry base but NOT an Arrhenius base?

A) NaOH

B) KOH

C) NH_3

✓

D) Ca(OH)_2

Correct Answer: C) NH_3 ✓

Explanation: NH_3 accepts a proton (Bronsted-Lowry base) but does not contain an OH group to release OH^- ions directly in water, meaning it is not an Arrhenius base.

Q38. In the reverse reaction $\text{NH}_4^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{NH}_3(\text{g}) + \text{H}_2\text{O}(\text{l})$, what acts as the acid?

A) NH_4^+

✓

B) OH^-

C) NH_3

D) H_2O

Correct Answer: A) NH_4^+ ✓

Explanation: In the reverse reaction, NH_4^+ donates a proton (H^+) to OH^- . Since NH_4^+ is the proton donor, it acts as the Bronsted-Lowry acid.

Section 5: Properties of Acids and Bases

7 MCQs

Q39. Acids react with active metals like Mg and Zn to produce:

A) Oxygen gas

B) Hydrogen gas

✓

C) Carbon dioxide gas

D) Ammonia gas

Correct Answer: B) Hydrogen gas ✓

Explanation: When acids react with reactive metals, they form a salt and evolve hydrogen gas. For example, $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$.

Q40. Which of the following metals will NOT evolve hydrogen gas when reacted with an acid?

A) Magnesium

B) Zinc

C) Copper



D) Aluminium

Correct Answer: C) Copper ✓

Explanation: Less reactive metals like Copper (Cu), Silver (Ag), Gold (Au), and Platinum (Pt) do not react with acids to displace hydrogen gas.

Q41. Acids decompose metal carbonates to liberate:

A) Hydrogen gas

B) Oxygen gas

C) Carbon dioxide gas



D) Nitrogen gas

Correct Answer: C) Carbon dioxide gas ✓

Explanation: Acids react with metal carbonates and bicarbonates to produce salt, water, and carbon dioxide gas. This is why acids fizz when added to carbonates.

Q42. Which gas is evolved when dilute H_2SO_4 is added to zinc granules?

A) CO_2

B) SO_2

C) H_2

✓

D) O_2

Correct Answer: C) H_2 ✓

Explanation: Zinc is a reactive metal. When it reacts with dilute sulphuric acid, it displaces hydrogen from the acid, releasing hydrogen gas (H_2).

Q43. Bases react with ammonium salts to liberate which gas?

A) Hydrogen

B) Oxygen

C) Ammonia

✓

D) Carbon dioxide

Correct Answer: C) Ammonia ✓

Explanation: Alkalis react with ammonium salts to produce salt, water, and ammonia gas (NH_3). For example, $\text{NaOH} + \text{NH}_4\text{Cl} \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{NH}_3$.

Q44. Which of the following bases is sparingly soluble in water?

A) NaOH

B) KOH

C) Ca(OH)_2

✓

D) NH_4OH

Correct Answer: C) Ca(OH)_2 ✓

Explanation: Calcium hydroxide (Ca(OH)_2) is sparingly soluble in water (limewater). NaOH and KOH are highly soluble, while Cu(OH)_2 is practically insoluble.

Q45. The reaction of an acid with a metal oxide produces:

A) Salt and hydrogen

B) Salt and water

✓

C) Salt and carbon dioxide

D) Only salt

Correct Answer: B) Salt and water ✓

Explanation: Metal oxides act as bases. When they react with acids, they undergo neutralization to form salt and water. For example, $\text{CaO} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$.

Section 6: Acid Rain and its Effects

6 MCQs

Q46. What is the typical pH range of acid rain?

A) 5.6 - 6.5

B) 7.0 - 7.5

C) 4.2 - 4.4



D) 1.0 - 2.0

Correct Answer: C) 4.2 - 4.4 ✓

Explanation: Normal rain has a pH of around 5.6 due to dissolved CO_2 . Acid rain is defined as rain with a pH between 4.2 and 4.4.

Q47. Which two primary gases are responsible for causing acid rain?

A) CO_2 and O_2

B) SO_2 and NO_2

✓

C) H_2 and N_2

D) CH_4 and CO

Correct Answer: B) SO_2 and NO_2 ✓

Explanation: The burning of fossil fuels releases sulphur dioxide (SO_2) and nitrogen dioxide (NO_2). These gases react with moisture in the air to form acids.

Q48. SO_2 released from burning fossil fuels reacts with moisture to form:

A) Nitric acid

B) Sulphuric acid

✓

C) Carbonic acid

D) Hydrochloric acid

Correct Answer: B) Sulphuric acid ✓

Explanation: Sulphur dioxide (SO_2) oxidizes to sulphur trioxide (SO_3), which then reacts with water (H_2O) in the atmosphere to form sulphuric acid (H_2SO_4).

Q49. Acid rain causes the soil to become:

A) More alkaline

B) More acidic

✓

C) Neutral

D) Salty

Correct Answer: B) More acidic ✓

Explanation: Acid rain lowers the pH of the soil, making it more acidic. This dissolves and washes away essential nutrients needed for plant growth.

Q50. How does acid rain affect aquatic life?

A) It makes water bodies too alkaline

B) It makes water bodies too acidic, killing fish

✓

C) It provides nutrients to fish

D) It has no effect on aquatic life

Correct Answer: B) It makes water bodies too acidic, killing fish ✓

Explanation: When acid rain falls into lakes and rivers, it increases the acidity of the water. This acidic environment is toxic to many aquatic organisms, including fish.

Q51. Acid rain damages buildings and statues made of stone because:

A) It freezes on the surface

B) The acid reacts with the stone/metal

✓

C) It washes away the paint

D) It forms a protective layer

Correct Answer: B) The acid reacts with the stone/metal ✓

Explanation: Acids in acid rain chemically react with the calcium carbonate in marble and limestone, and with metals, causing corrosion and degradation of buildings, statues, and automobiles.

Section 7: Advanced Concepts and Key Points

29 MCQs

Q52. Which of the following is the simplest organic diprotic acid?

A) Acetic acid

B) Oxalic acid



C) Formic acid

D) Sulphuric acid

Correct Answer: B) Oxalic acid ✓

Explanation: Oxalic acid ($\text{H}_2\text{C}_2\text{O}_4$) is the simplest organic diprotic acid. It is commercially used for bleaching straw, leather, and removing rust/ink stains.

Q53. Which of the following is an example of a strong base?

A) NH_4OH

B) $\text{Al}(\text{OH})_3$

C) KOH



D) $\text{Cu}(\text{OH})_2$

Correct Answer: C) KOH ✓

Explanation: Potassium hydroxide (KOH) is a strong base because it completely ionizes in water to give K^+ and OH^- ions. NH_4OH and $\text{Al}(\text{OH})_3$ are weak bases.

Q54. Stomach acidity is caused by the production of excess:

A) Sulphuric acid

B) Hydrochloric acid



C) Nitric acid

D) Acetic acid

Correct Answer: B) Hydrochloric acid ✓

Explanation: The stomach produces hydrochloric acid (HCl) to digest food. When excess HCl is produced, it causes stomach acidity or hyperacidity.

Q55. Which of the following is used as an antacid to neutralize stomach acid?

A) Strong bases like NaOH

B) Weak bases like $\text{Mg}(\text{OH})_2$

✓

C) Strong acids like HCl

D) Neutral salts

Correct Answer: B) Weak bases like $\text{Mg}(\text{OH})_2$ ✓

Explanation: Antacids are mild bases like magnesium hydroxide ($\text{Mg}(\text{OH})_2$) or calcium hydroxide. They neutralize excess stomach acid without harming the throat or stomach lining.

Q56. Which of the following is NOT a characteristic of bases?

A) Bitter taste

B) Slippery touch

C) Turns blue litmus paper red

✓

D) Turns red litmus paper blue

Correct Answer: C) Turns blue litmus paper red ✓

Explanation: Bases turn red litmus paper blue. Turning blue litmus paper red is a characteristic property of acids, not bases.

Q57. In the reaction between an acid and a base, what is the spectator ion in the formation of NaCl from HCl and NaOH?

A) H^+

B) OH^-

C) Na^+ and Cl^-

✓

D) H_2O

Correct Answer: C) Na^+ and Cl^- ✓

Explanation: Na^+ and Cl^- do not participate in the actual neutralization reaction ($\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$). They remain in the solution as spectator ions.

Q58. What is the conjugate base of H_2O ?

A) H_3O^+

B) OH^-

✓

C) O^{2-}

D) H_2O_2

Correct Answer: B) OH^- ✓

Explanation: When water acts as an acid and donates a proton (H^+), it leaves behind OH^- . Therefore, OH^- is the conjugate base of water.

Q59. Which of the following statements about weak acids is correct?

A) They ionize completely in water

B) They have a high concentration of H_3O^+ ions

C) They ionize partially in water

✓

D) They are stronger than mineral acids

Correct Answer: C) They ionize partially in water ✓

Explanation: Weak acids (like acetic acid) only partially ionize in water, meaning the solution contains a mixture of ions and undissociated acid molecules, resulting in fewer H_3O^+ ions.

Q60. Which of the following is a property of alkalis?

A) They are insoluble bases

B) They are soluble bases

✓

C) They do not react with acids

D) They turn blue litmus red

Correct Answer: B) They are soluble bases ✓

Explanation: Alkalis are simply bases that are soluble in water (e.g., NaOH, KOH). They react with acids to form salt and water.

Q61. What is the product when zinc reacts with dilute sulphuric acid?

A) Zinc sulphate and water

B) Zinc sulphate and hydrogen gas

✓

C) Zinc oxide and hydrogen gas

D) Zinc sulphide and oxygen

Correct Answer: B) Zinc sulphate and hydrogen gas ✓

Explanation: $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$. Zinc displaces hydrogen from the acid because it is more reactive than hydrogen.

Q62. Which of the following is an example of a basic oxide?

A) CO_2

B) SO_2

C) MgO

✓

D) NO_2

Correct Answer: C) MgO ✓

Explanation: Magnesium oxide (MgO) is a metal oxide and is basic in nature. Non-metal oxides like CO_2 , SO_2 , and NO_2 are acidic.

Q63. In the Bronsted-Lowry reaction $\text{HCN} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{CN}^-$, the conjugate acid-base pair is:

A) HCN and CN^-

✓

B) H_2O and H_3O^+

C) HCN and H_3O^+

D) H_2O and CN^-

Correct Answer: A) HCN and CN^- ✓

Explanation: A conjugate acid-base pair differs by a single proton (H^+). HCN (acid) loses a proton to become CN^- (conjugate base). Thus, HCN and CN^- form a conjugate pair.

Q64. Which gas is produced when calcium carbonate reacts with hydrochloric acid?

A) Hydrogen

B) Oxygen

C) Carbon dioxide

✓

D) Ammonia

Correct Answer: C) Carbon dioxide ✓

Explanation: $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$. Acids react with metal carbonates to release carbon dioxide gas, which is observed as effervescence.

Q65. What is the pH of normal rain water?

A) 7.0

B) 5.6



C) 4.2

D) 8.0

Correct Answer: B) 5.6 ✓

Explanation: Normal rain water is slightly acidic with a pH of around 5.6. This is because atmospheric carbon dioxide dissolves in rainwater to form weak carbonic acid.

Q66. The reaction of a base with an ammonium salt produces:

A) Salt, water, and hydrogen

B) Salt, water, and ammonia



C) Salt and carbon dioxide

D) Only salt

Correct Answer: B) Salt, water, and ammonia ✓

Explanation: Alkalis displace ammonia gas from ammonium salts upon heating. For example, $2\text{NH}_4\text{Cl} + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O} + 2\text{NH}_3$.

Q67. Which of the following is true about the ionization of nitric acid (HNO_3)?

A) It ionizes in two steps

B) It ionizes in a single step

✓

C) It does not ionize in water

D) It is a weak acid

Correct Answer: B) It ionizes in a single step ✓

Explanation: Nitric acid (HNO_3) is a monoprotic strong acid. It ionizes completely in a single step to give one H_3O^+ ion and one NO_3^- ion.

Q68. Which of the following compounds is amphoteric?

A) HCl

B) NaOH

C) H_2O

✓

D) NaCl

Correct Answer: C) H_2O ✓

Explanation: Water is amphoteric because it can act as an acid (donating a proton to NH_3) or as a base (accepting a proton from HCl).

Q69. Identify the conjugate acid in the reaction: $\text{HI} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{I}^-$

A) HI

B) H_2O

C) H_3O^+

✓

D) I^-

Correct Answer: C) H_3O^+ ✓

Explanation: When the base (H_2O) accepts a proton from the acid (HI), it forms its conjugate acid, which is H_3O^+ .

Q70. What is the commercial use of oxalic acid?

A) As an antacid

B) Bleaching straw and removing rust

✓

C) Production of soap

D) Fertilizer

Correct Answer: B) Bleaching straw and removing rust ✓

Explanation: Oxalic acid is widely used commercially for bleaching straw and leather, as well as for removing rust and ink stains from fabrics.

Q71. Which of the following is NOT a strong base?

A) NaOH

B) KOH

C) $\text{Ba}(\text{OH})_2$

D) NH_4OH

✓

Correct Answer: D) NH_4OH ✓

Explanation: NH_4OH is a weak base because it only partially ionizes in water. NaOH, KOH, and $\text{Ba}(\text{OH})_2$ are strong bases that undergo complete ionization.

Q72. According to the Arrhenius concept, acids produce which ions in water?

A) Hydroxide ions

B) Hydronium ions

✓

C) Oxide ions

D) Chloride ions

Correct Answer: B) Hydronium ions ✓

Explanation: Arrhenius acids dissociate in water to increase the concentration of hydrogen ions (H^+), which immediately combine with water to form hydronium ions (H_3O^+).

Q73. The reaction between an acid and a base is called neutralization because:

- A) The acid becomes stronger
- B) The base becomes stronger
- C) The properties of both are canceled out** ✓
- D) A gas is always produced

Correct Answer: C) The properties of both are canceled out ✓

Explanation: In a neutralization reaction, the acidic properties (H^+) and basic properties (OH^-) cancel each other out, resulting in the formation of neutral salt and water.

Q74. Which of the following is a monoprotic acid?

- A) H_2SO_4
- B) $\text{H}_2\text{C}_2\text{O}_4$
- C) HCl** ✓
- D) H_2CO_3

Correct Answer: C) HCl ✓

Explanation: A monoprotic acid has only one ionizable hydrogen atom per molecule. HCl donates only one H^+ ion, making it monoprotic.

Q75. Acid rain makes water bodies toxic to fish because:

A) It increases the oxygen content

B) It lowers the pH of the water

✓

C) It adds nutrients to the water

D) It raises the temperature of the water

Correct Answer: B) It lowers the pH of the water ✓

Explanation: Acid rain lowers the pH of lakes and rivers (making them more acidic). This acidic environment disrupts the physiological functions of aquatic animals, often leading to their death.

Q76. Which of the following pairs is a conjugate acid-base pair?

A) H_3O^+ and OH^-

B) H_2O and H_3O^+

✓

C) HCl and NaOH

D) NH_3 and NH_4^+

Correct Answer: B) H_2O and H_3O^+ ✓

Explanation: H_2O and H_3O^+ differ by one proton (H^+). H_2O accepts a proton to become H_3O^+ . Therefore, they are a conjugate acid-base pair (H_2O is the base, H_3O^+ is the conjugate acid).

Q77. Which of the following is a weak acid?

A) HCl

B) HNO_3

C) CH_3COOH

✓

D) H_2SO_4

Correct Answer: C) CH_3COOH ✓

Explanation: CH_3COOH (acetic acid) is an organic acid and is weak because it only partially ionizes in water. The others are strong mineral acids.

Q78. The main cause of acid rain is:

A) Deforestation

B) Burning of fossil fuels

✓

C) Volcanic eruptions

D) Use of fertilizers

Correct Answer: B) Burning of fossil fuels ✓

Explanation: While volcanic eruptions can release SO_2 , the primary cause of acid rain is human activity, specifically the burning of fossil fuels (coal, oil, gas) which releases large amounts of SO_2 and NO_2 .

Q79. When red litmus paper is dipped into a soap solution, it turns:

A) Red

B) Blue

✓

C) Green

D) Colorless

Correct Answer: B) Blue ✓

Explanation: Soap solution is basic in nature. Bases turn red litmus paper blue.

Q80. What is formed when a strong acid and a strong base completely dissociate and react in water?

A) Only H_2 gas

B) Only O_2 gas

C) Salt and water

✓

D) A weak acid and weak base

Correct Answer: C) Salt and water ✓

Explanation: Strong acids and bases completely dissociate into ions. The H^+ from the acid and OH^- from the base react to form water, while the remaining ions form a salt.

Quick Answer Key

1 B	15 C	29 B	43 C	57 C	71 D
2 B	16 B	30 B	44 C	58 B	72 B
3 C	17 A	31 B	45 B	59 C	73 C
4 B	18 C	32 B	46 C	60 B	74 C
5 A	19 C	33 B	47 B	61 B	75 B
6 B	20 C	34 B	48 B	62 C	76 B
7 B	21 C	35 B	49 B	63 A	77 C
8 C	22 B	36 B	50 B	64 C	78 B
9 B	23 C	37 C	51 B	65 B	79 B
10 C	24 B	38 A	52 B	66 B	80 C
11 C	25 B	39 B	53 C	67 B	
12 B	26 C	40 C	54 B	68 C	
13 B	27 B	41 C	55 B	69 C	
14 C	28 B	42 C	56 C	70 B	

CHAPTER 07 • ACID BASE CHEMISTRY

All the Best!

for Your Annual Exams

Remember the Key Ideas

- Acids: sour, turn blue litmus red
- Bases: bitter, turn red litmus blue
- Arrhenius: acid gives H^+ , base gives OH^-
- Bronsted-Lowry: acid donates, base accepts a proton
- Acid rain: pH 4.2 - 4.4 (SO_2 and NO_2)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

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