

2.ACIDS - PREPARATIONS AND PROPERTIES SOLUTIONS

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

1. Which of the following is a weak acid?

A) H_3PO_4 B) H_2CO_3 C) HNO_2 D) All of these

Answer:D

Solutions: H_3PO_4 (Phosphoric acid): Weak acid (partial dissociation, 3 H^+ ions).

H_2CO_3 (Carbonic acid): Weak/unstable (decomposes to $\text{CO}_2 + \text{H}_2\text{O}$).

HNO_2 (Nitrous acid): Weak acid (partial dissociation).

2. $\text{NaHCO}_3 + \text{HCl} \rightarrow \dots\dots\dots + \text{CO}_2 + \text{H}_2\text{O}$.

A) NaOH B) NaO C) NaCl D) Na

Answer:C

Solution:Reaction: Sodium bicarbonate + Hydrochloric acid \rightarrow Sodium chloride + CO_2 + Water.

$\text{NaHCO}_3 + \text{HCl} \rightarrow \text{NaCl} + \text{CO}_2 + \text{H}_2\text{O}$

This is a neutralization reaction producing salt (NaCl), CO_2 gas (effervescence), and water.

3. Which acid do not change into their vapours, even on strong heating also.

A) H_2SO_4 B) HCl C) CH_3COOH D) HNO_3

Answer:A

Solution: H_2SO_4 is non-volatile (high boiling point: $\sim 337^\circ\text{C}$). It decomposes before vaporizing.

Other acids:

HCl (B): Volatile (forms vapors easily).

CH_3COOH (C): Volatile (acetic acid vapors).

HNO_3 (D): Volatile (decomposes to $\text{NO}_2 + \text{O}_2$ on heating).

4. $\text{Al}(\text{OH})_3 + \text{H}_2\text{SO}_4 \rightarrow$.

A) AlH , H_2O B) AlSO_4 , SO_2 C) $\text{Al}_2(\text{SO}_4)_3$, H_2O D) none

Answer:C

Solution: $2\text{Al}(\text{OH})_3 + 3\text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + 6\text{H}_2\text{O}$.

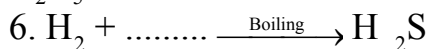
5. Nitrogen pentoxide + water \rightarrow

A) Nitric acid B) Nitrous acid C) Sulphurous acid D) Swaphuric acid

Answer:A

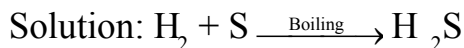
Solution:Reaction: ~~$\text{N}_2\text{O}_5 + \text{H}_2\text{O} \rightarrow$~~ HNO_3 2

N_2O_5 is the anhydride of nitric acid.



- A) Cl B) SO_4 C) SO_3 D) S

Answer:D



Hydrogen sulfide (H_2S) forms when hydrogen gas (H_2) reacts with sulfur (S).

7. Metals displace hydrogen from the acids. They release.

- A) H_2 Gas B) O_2 Gas C) SO_2 Gas D) CO_2 Gas

Answer:A

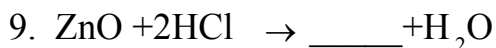
Solution: Metal + Acid \rightarrow Salt + Water

8. H_3BO_3 is in

- A) Solid state B) Liquid state C) Gaseous state D) None

Answer:A

Solution: Boric acid exists as white crystalline solid at room temperature.



- A) ZnCl_2 B) ZnO C) Zn D) ZnCl

Answer:A



Zinc oxide reacts with HCl to form zinc chloride and water.

10. Which of the following acid is present in soft drinks ?

- A) H_2SO_4 B) H_2NO_3 C) H_2CO_3 D) HNO_3

Answer:C

Solution: CO_2 dissolved in water forms carbonic acid, giving fizz to soft drinks

JEE ADVANCED LEVEL QUESTIONS

Multi Correct Choice Type:

11. Which of the following is true about acids ?

- A) Acids are corrosive B) Acids taste sour C) Soluble in water D) Turn Red to Blue

Answer:A,B,C

Solution: A) Acids can corrode metals and damage skin .

B) Acids taste sour (e.g., citric acid in lemons).

C) Most acids dissolve in water to form H^+ ions

D) False: Acids turn blue litmus \rightarrow red, not red to blue (bases do that).

12. Which of the following acids are volatile ?

- A) H_2SO_4 B) HCl C) HNO_3 D) H_2SO_3

Answer:B,C,D

Solution: Volatile acids vaporize easily at room temperature:

HCl : Forms pungent fumes.

HNO_3 : Releases yellow-brown NO_2 vapors on heating.

H_2SO_3 : Decomposes into SO_2 gas (volatile).

A) H_2SO_4 (Sulfuric acid): Non-volatile (high boiling point, decomposes before vaporizing).

Statement Type:

13. Statement-I : Phosphorous acid is a weak acid

Statement-II : They produces less concentration of H^+ ions in water.

Answer:A

Solution:Statement-I (True): H_3PO_3 is weak (partial dissociation in water).

Statement-II (True): Weak acids like H_3PO_3 produce low H^+ concentration due to incomplete dissociation.

Link: Low H^+ yield defines weakness (Statement II explains Statement I).

14. Statement-I : HNO_3 is a strong acid

Statement-II : H_2CO_3 is a strong acid

Answer:C

Solution:Statement-I (True): HNO_3 (Nitric acid) is strong (fully dissociates in water: $\text{HNO}_3 \rightarrow \text{H}^+ + \text{NO}_3^-$).

Statement-II (False): H_2CO_3 (Carbonic acid) is weak (partially dissociates: $\text{H}_2\text{CO}_3 \rightarrow \text{H}^+ + \text{HCO}_3^-$).

Comprehension type

15. Which of the following acid is Hydro acid

A) HCN B) HNO_2 C) H_2SO_4 D) H_2CO_3

Answer:A

Solution:Hydroacids are acids composed of hydrogen + a non-metal (excluding oxygen).

HCN : Contains hydrogen (H) and carbon (C), a non-metal, with no oxygen.

Other options:

B) HNO_2 (Nitrous acid): Contains oxygen (O) \rightarrow Oxyacid.

C) H_2SO_4 (Sulfuric acid): Contains oxygen \rightarrow Oxyacid.

D) H_2CO_3 (Carbonic acid): Contains oxygen \rightarrow Oxyacid.

16. An acid which contain hydrogen and non-metalic element other than oxygen

A) Volatile acid B) Non volatile acid C) Hydro acid D) Oxy acid

Answer:C

Solution:Definition match: The question directly describes a hydroacid

Integer Type :

17. Volatile acids easily charges into their vapours either at room temperature or heating below

Answer:Boiling point(100oC)

Solution: Volatile acids (e.g., HCl, HNO₃) vaporize below their boiling points or at room temperature.

18. Hydro acids contain type of elements.

Answer:2

Solution: Hydroacids are binary compounds with:

Hydrogen (H), One non-metal (excluding oxygen) (e.g., HCl, HBr, H₂S).

19. Hydrochloric acid, Nitric acid, Sulphuric acid, Phosphoric acid - How many are used for fertilizers?

Answer:3

Solution: Nitric acid (HNO₃): Production of ammonium nitrate (NH₄NO₃).

Sulphuric acid (H₂SO₄): Used to make superphosphates (e.g., Ca(H₂PO₄)₂).

Phosphoric acid (H₃PO₄): Directly used in phosphate fertilizers.

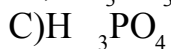
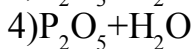
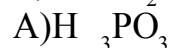
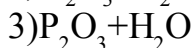
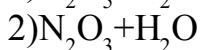
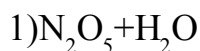
Hydrochloric acid (HCl): Not used in fertilizers.

Matrix Matching Type :

20.

Answer:1-B,2-D,3-A,4-C

Solution:



LEARNER'S TASK

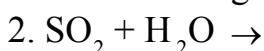
CONCEPTUAL UNDERSTANDING QUESTIONS

1. The acid which kills most of the germs then we swallow with food.

A) H₂SO₄ B) HCl C) HNO₃ D) H₂CO₃

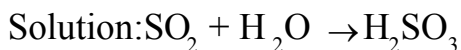
Answer:B

Solution: HCl (Hydrochloric acid) Secreted in the stomach (pH ~1.5–3.5) to sterilize food and aid digestion.



A) H₂SO₄ B) H₂SO₃ C) HSO₃ D) None

Answer:B



3. H₂SO₄ is example for

A) strong acid B) Dibasic acid C) Non-volatile acid D) All the above

Answer:D

Solution: Strong acid: Fully dissociates in water.

Dibasic acid: Releases 2 H^+ ions.

Non-volatile: High boiling point ($\sim 337^\circ\text{C}$).

4. The acids in which more than 30% of the molecules of it ionise in water to furnish H^+ ions, are called _____.

A) Weak acids B) Strong acids C) Neutral acids D) Inorganic acids

Answer:B

Solution: Acids with $>30\%$ ionization in water are called Strong acids

Examples: HCl , HNO_3 , H_2SO_4 (near 100% dissociation).

5. Which of the following is a Hydro acid

A) HCl B) HNO_3 C) H_2SO_4 D) H_2CO_3

Answer:A

Solution: Hydro acid (hydrogen + non-metal, no oxygen): A) HCl (Hydrochloric acid)

Others contain oxygen (Oxyacids).

6. The acids which easily charges into their vapours is called

A) Volatile acids B) Non volatile acids C) Strong acids D) Weak acids

Answer:A

Solution: Acids that easily vaporize are called Volatile acids

7. Color of HCl is

A) Colourless B) Brown C) Red D) Pink

Answer:A

Solution: Gaseous HCl is colorless; solutions are clear.

8. $\text{H}_2 + \text{Cl}_2 \xrightarrow{\quad?} 2\text{HCl}$

A) Heat B) Sunlight C) Catalyst D) None

Answer:B

Solution: Photochemical reaction (forms explosive mix in direct sunlight)

9. $\text{SO}_3 + \text{H}_2\text{O} \rightarrow$

A) H_2SO_3 B) H_2SO_4 C) H_2S D) H_2CO_3

Answer:B

Solution: $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$

10. Which of the following acid is heavier than water ?

A) Sulphuric acid B) Hydrochloric acid C) Sulphurous acid D) Carbonic acid

Answer:A

Solution: A) Sulphuric acid (H_2SO_4)

Density: $\sim 1.84 \text{ g/cm}^3$ (water = 1 g/cm^3).

JEE MAINS LEVEL QUESTIONS

1. $\text{Ca(OH)}_2 + \text{H}_2\text{SO}_4 \rightarrow$

- A) CaSO_4 B) H_2O C) Both 1 and 2 D) CaO

Answer: C

Solution: Balanced Reaction: $\text{Ca(OH)}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O}$

Neutralization reaction producing calcium sulfate (gypsum) and water.

2. Acid which is Brown due to impurities

- A) H_2SO_4 B) HCl C) H_2CO_3 D) HNO_3

Answer: D

Solution: Concentrated HNO_3 turns yellow-brown due to dissolved NO_2 gas (decomposition product).

3. Hydrogen gas is not evolved when is mixed with Zinc.

- A) Dil HNO_3 B) Conc HNO_3 C) Dil H_2SO_4 D) Conc H_2SO_4

Answer: A

Solution: HNO_3 (even dilute) is an oxidizing acid. With Zn, it produces $\text{NO}/\text{N}_2\text{O}/\text{NO}_2$ instead of H_2 : $4\text{Zn} + 10\text{HNO}_3 \rightarrow 4\text{Zn(NO}_3)_2 + \text{N}_2\text{O} + 5\text{H}_2\text{O}$

4. The acids which undergoes complete ionisation when dissolved in water and furnish large conc of H^+ ions are called.

- A) Strong acids B) weak acids C) Volatile acids D) Non - Volatile acids

Answer: A

Solution: Acids with complete ionization in water (high H^+ concentration): Strong acids

5. Hydro chloric acid is also known as

- A) muriatic acid B) Organic acid C) Non volatilve acid D) Weak acid

Answer: A

Solution: Hydrochloric acid is also known as Muriatic acid

Common name used in industrial/cleaning contexts.

6. Chloric acid is a

- A) Strong acid B) weak acid C) Non volatile acid D) Organic acid

Answer: A

Solution: Chloric acid (HClO_3) is a Strong acid

Fully dissociates in water: $\text{HClO}_3 \rightarrow \text{H}^+ + \text{ClO}_3^-$

7. Which of the following acid is a Hygroscopic in nature ?

- A) H_2SO_4 B) HCl C) HNO_3 D) H_2CO_3

Answer: A

Solution: Hygroscopic acid (absorbs moisture from air): H_2SO_4 (Sulfuric acid)

Used as a drying agent due to its strong affinity for water.

8. Which of the following highly corrosive mineral acid ?

- A) H_2SO_4 B) HCl C) HNO_3 D) H_2CO_3

Answer:A

Solution: H_2SO_4 causes severe tissue damage (charring).

9. Another name of formic acid is

A) Ethanoic acid B) Methanoic acid C) Nitrous acid D) Oxalic acid

Answer:B

Solution: Another name for formic acid is Methanoic acid (HCOOH)

10. A metals will not react with dilute acids ?

A) Copper B) Silver C) Both 1 and 2 D) Zinc

Answer:C

Solution: Cu and Ag lie below hydrogen in the reactivity series. They cannot displace H^+ from acids.

Exception: They react with oxidizing acids (e.g., HNO_3).

JEE ADVANCED LEVEL QUESTIONS

Multi Correct Answer Type

11. Which of the following are strong acids ?

A) Chloric acid B) Per chloric acid C) Hydronic acid D) Hydro iodic acid

Answer:A,B,D

Solution: Strong acids fully dissociate in water:

HClO_3 (Chloric acid): $\text{HClO}_3 \rightarrow \text{H}^+ + \text{ClO}_3^-$

HClO_4 (Perchloric acid): One of the strongest known acids.

HI (Hydroiodic acid): Fully ionizes in water.

C) Hydronic acid: Not a standard acid (likely a distractor).

12. Which of the following are weak acids ?

A) Oxalic acid B) Formic acid C) Benzoic acid D) Hydroic acid

Answer:A,B,C

Solution: Weak acids partially dissociate in water: Oxalic acid, Formic acid, Benzoic acid.

Statement Type:

13. Statement -I : $2\text{HCl} + \text{CuCO}_3 \rightarrow \text{CuCl}_2 + \text{H}_2\text{O} + \text{CO}_2$

Statement -II : Green solid dissolves with efferve scence to form blue solution.

Answer:A

Solution: The reaction between hydrochloric acid (HCl) and copper carbonate (CuCO_3) produces:

Copper chloride (CuCl_2 , blue solution)

Water (H_2O)

Carbon dioxide (CO_2 , effervescence)

Balanced equation: $2\text{HCl} + \text{CuCO}_3 \rightarrow \text{CuCl}_2 + \text{H}_2\text{O} + \text{CO}_2$

Statement-II (True & Explanatory)

Green solid (CuCO_3) dissolves in HCl .

Effervescence (CO_2 gas bubbles) occurs.

Blue solution (CuCl_2) forms.

This matches the products described in Statement-I.

14. Statement -I : Acids reacts with bases to form salts and water.

Statement -II : When Hydrochloric acid reacts with Iron (III) oxide forms Reddish - Brown Crystals.

Answer:B

Solution:Statement-I (True):Neutralization reaction:

Acid+Base \rightarrow Salt+ H_2O

Statement-II (True but Irrelevant):

Specific reaction: $6\text{HCl}+\text{Fe}_2\text{O}_3\rightarrow 2\text{FeCl}_3+3\text{H}_2\text{O}$

Reddish-brown crystals: Iron (III) chloride (FeCl_3).

Comprehension type

15. Which of the following acid is oxy acid ?

A) HCN B) HI C) HF D) HCOOH

Answer:D

Solution:Oxyacids contain hydrogen (H) + oxygen (O) + another element (usually a non-metal).

HCOOH : Structure is $\text{H}-\text{C}(=\text{O})-\text{OH}$ (contains C, H, and O).

Other options:

A) HCN (Hydrocyanic acid): No oxygen \rightarrow Hydroacid.

B) HI (Hydroiodic acid): No oxygen \rightarrow Hydroacid.

C) HF (Hydrofluoric acid): No oxygen \rightarrow Hydroacid.

16. Oxalic acid is a

A) Oxy acid B) Solid state acid C) Volatile acid D) All of the above

Answer:A,B

Solution:A) Oxyacid: Contains C, H, and O (structure: $\text{HOOC}-\text{COOH}$).

B) Solid state: Exists as white crystalline solid at room temperature.

C) Volatile acid: Incorrect. Oxalic acid is non-volatile (high melting point).

D) All of the above: False (since it's not volatile).

Integer Type :

17. Acid solutions have a P_H value

Answer:<7

Solution:he pH scale ranges from 0 to 14:

Acidic solutions: $\text{pH} < 7$ (e.g., HCl $\text{pH} \sim 1$, vinegar $\text{pH} \sim 3$).

Neutral solutions: $\text{pH} = 7$ (pure water).

Basic solutions: $\text{pH} > 7$ (e.g., NaOH $\text{pH} \sim 14$).

Note: Since the question expects an integer, the answer is any whole number =6 (e.g., 1, 2, 3...).

			TEACHING TASK						
			JEE MAINS LEVEL QUESTIONS						
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D	C	A	C	A	D	A	A	A	C
			JEE ADVANCED LEVEL QUESTIONS						
11	12	13	14	15	16	17	18	19	
A,B,C	B,C,D	A	C	A	C	100	2	3	
20	20		LEARNER'S TASK						
1-B,2-D,3-A,4-C			CONCEPTUAL UNDERSTANDING QUESTIONS						
1	2	3	4	5	6	7	8	9	10
B	B	D	B	A	A	A	B	B	A
			JEE MAINS LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
C	D	A	A	A	A	A	A	B	C
			JEE ADVANCED LEVEL QUESTIONS						
11	12	13	14	15	16	17	18	19	
A,B,D	A,B,C	A	B	D	A,B	<7	1	P-C,Q-A,R-B,S-D	
20	20								
P-D,Q-C,R-A,S-B									