

1. ACIDS, BASES & SALTS -INDICATORS, INTRODUCTION TO ACIDS SOLUTIONS

TEACHING TASK

JEE MAIN LEVEL QUESTIONS

1. Which of the following is/are a monobasic acid?

A) H_3PO_3 B) H_2SO_3 C) HCN D) $(\text{COOH})_2$

Answer:C

Solution: C) HCN (Hydrocyanic acid)

Monobasic acids donate 1 H^+ ion per molecule.

$\text{HCN} \rightarrow \text{H}^+ + \text{CN}^-$ (only 1 proton released).

Others:

A) H_3PO_3 (Phosphorous acid) \rightarrow Dibasic (2H^+)

B) H_2SO_3 (Sulfurous acid) \rightarrow Dibasic (2H^+)

D) $(\text{COOH})_2$ (Oxalic acid) \rightarrow Dibasic (2H^+).

2. The acids which are obtained from the minerals present in earth, are called:

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

Answer:C

Solution: Inorganic acids also called mineral acids.

3. The colour of litmus paper in acid solution is

A) Blue B) Red C) Yellow D) Colour less

Answer:B

Solution: Acid ($\text{pH} < 7$) \rightarrow Red

4. A substance acts as an indicator which has

A) Different colour in acid and base solution

B) Same colour is acid and base solution

C) Do not exhibit any colour D) None

Answer:A

Solution: Indicators change color with pH (e.g., phenolphthalein is colorless in acid, pink in base).

5. The most common indicator used for testing for acids and bases in the laboratory is.

A) litmus B) colour C) salt D) none

Answer:A

Solution: Litmus is Widely used due to its clear color change (red/blue).

6. The colour of methyl orange solution is .

A)pink B)red C)pale yellow D)blue

Answer:C

Solution:In a neutral solution, methyl orange appears yellow. It is also yellow in basic (alkaline) solutions and turns red in acidic solutions.

7. The substance whose smell changes in acidic or basic solutions are calledindicators.

A)phenolphthalein B)methyl orange C)Olfactory D)all the above

Answer:C

Solution:Substances whose smell changes in acidic/basic solutions are called Olfactory indicators

Examples: Onion, vanilla, clove oil.

8. The acids obtained from the plants and animals is called..... acids.

A)inorganic B)organic C)citric D)formic

Answer:B

Solution:.. Acids from plants/animals are called Organic acids

Examples: Citric acid (lemons), formic acid (ants).

9. From the following which one is inorganic acid.

A)lactic acid B)oxalic acid C)acetic acid D)phosphoric acid

Answer:D

Solution: Phosphoric acid (H_3PO_4) is Derived from minerals.

10. Which acid will be used for digestion of food in your stomach.

A)sulphuric acid B)hydrochloric acid

C)nitric acid D)tartaric acid

Answer:B

Solution:Hydrochloric acid (HCl) is Secreted by gastric glands (pH ~1.5–3.5).

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:

11. Which of the following acid is dibasic acid?

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

Answer:A,C

Solution:Dibasic acids release 2 H^+ ions per molecule in aqueous solutions.



Why others are incorrect?

B) H_2S Weak acid, releases 1 H^+ (monobasic).

D) HCl \rightarrow Releases 1 H^+ (monobasic).

12. Choose the correct statements:

- A) Carbonic acid is a tribasic acid. B) Phosphoric acid is a tribasic acid.
C) Hydrochloric acid is a strong acid D) Nitric acid is a strong inorganic acid.

Answer: B, C, D

Solution: B) H_3PO_4 (Phosphoric acid) \rightarrow Releases 3 H^+ ions (tribasic).

C) $\text{HCl} \rightarrow$ Fully dissociates in water (strong acid).

D) $\text{HNO}_3 \rightarrow$ Strong mineral (inorganic) acid.

Why A is incorrect?

Carbonic acid (H_2CO_3) is dibasic (releases 2 H^+), not tribasic.

Statement Type:

13. Statement-I : Sulphuric acid is a mineral acid

Statement-II : Sulphuric acid is obtained from minerals

Answer: A

Solution: Statement-I (True): Sulphuric acid (H_2SO_4) is classified as a mineral acid (inorganic acid derived from non-living sources).

Statement-II (True): It is industrially produced from minerals like sulfur (via the Contact Process). Thus, it directly explains why H_2SO_4 is a mineral acid.

14. Statement-I : Acetic acid is a monobasic acid

Statement-II : Glucose is a monobasic acid

Answer: C

Solution: Statement-I (True): Acetic acid (CH_3COOH) is monobasic — it donates only 1 H^+ ion per molecule (COOH group).

Statement-II (False): Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) is not an acid at all (it's a carbohydrate). It lacks acidic protons (no —COOH or ionizable H).

Comprehension Type:

15. Sulphuric acid is:

- A) Monobasic acid B) Dibasic acid C) Tribasic acid D) Tetrabasic acid

Answer: B

Solution: Basicity = Number of replaceable H^+ ions per acid molecule.

H_2SO_4 dissociates in water as: $\text{H}_2\text{SO}_4 \rightarrow 2\text{H}^+ + \text{SO}_4^{2-}$

Releases 2 H^+ ions \rightarrow Dibasic.

16. H_3PO_3 is a

- A) Mono basic acid B) dibasic acid C) Tri basic acid D) Organic acid

Answer: B

Solution: Despite having 3 H atoms, H_3PO_3 is dibasic because only 2 H^+ ions are replaceable: $\text{HPO}_3\text{H} + \text{H}_2\text{O} \rightarrow \text{H}_2\text{PO}_3^- + \text{H}_3\text{O}^+$

The third H is bonded to P (not acidic) and doesn't dissociate

Integer type:

17. H_2CO_3 on ionisation produces no. of Hydrogens

Answer:2

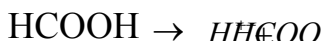
Solution: H_2CO_3 (Carbonic Acid) is a dibasic acid (2 replaceable H^+ ions).

18. HCOOH on ionisation produces Number of Hydrogens

Answer:1

Solution: HCOOH (Formic Acid) is a monobasic acid (only 1 replaceable H^+ ion).

Ionization reaction:

**Matrix Matching Type:**

19. **Answer:A-C,B-D,C-B,D-A**

Solution:

Source Name of the acid

- | | |
|---------------|------------------|
| A) Lemon | C) Citric acid |
| B) Grapes | D) Tartaric acid |
| C) Vinegar | B) Acetic acid |
| D) Brown ants | A) Formic acid |

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS

1. The natural indicator is .

- A) methyl orange B) phenolphthalein C) turmeric D) none

Answer:C

Solution:Turmeric changes color in basic solutions (yellow to red-brown).

Others: Methyl orange and phenolphthalein are synthetic indicators.

2. Litmus solution is extracted from a type of plant called .

- A) jasmine B) rose C) lotus D) lichen

Answer:D

Solution:Litmus is derived from lichens (fungi-algae symbionts).

3. Acids produce ions on dissolving in water.

- A) H^+ ions B) O^{2-} ions C) N^{3-} ion D) none

Answer:A

Solution:Acids dissociate to release hydrogen ions (H^+) in water (Arrhenius theory).

4. The acid present in Grape and unripe apples

- A) oxalic acid B) Tartaric acid C) Maleic acid D) citric acid

Answer:B

Solution:Grapes: Tartaric acid.

Unripe apples: Malic acid (but tartaric acid is the closest option here).

5. Lactic acid present in

A) Curd and sour milk B) Grapes C) Citrus fruits D) None

Answer:A

Solution:Produced by bacterial fermentation (e.g., Lactobacillus).

6. A substance which gives out hydrogen ions (H^+) when dissolved in water is called

A) Base B) Acid C) Salt D) None

Answer:B

Solution: A substance that releases H^+ ions in water is called Acid

7. The Number of H^+ Ions furnished by one molecule of an acid is called

A) acidity B) molecularity C) Basicity D) None

Answer:C

Solution:The number of H^+ ions furnished by one acid molecule is called Basicity

8. CH_3COOH is an example for

A) Dibasic acid B) Strong acid C) Monobasic acid D) Tribasic acid

Answer:C

Solution:Releases 1 H^+ ion per molecule:



9. The term acid means

A) sour B) unsipe C) spicy D) alkali

Answer:A

Solution:From Latin acidus (sour). Example: Lemon (citric acid) tastes sour.

10. Ascorbic acid is a

A) Vitamin C B) Vitamin A C) Vitamin B D) Vitamin D

Answer:A

Solution: Ascorbic acid is:Vitamin C

Essential for immunity and collagen synthesis.

JEE MAIN LEVEL QUESTIONS

1. Acetic acid is present in

A) Vinegar B) Coffee C) Apple D) Lemon

Answer:A

Solution:Vinegar contains 5-8% acetic acid (CH_3COOH).

2. Turmeric is a

A) Acid B) Base C) Indicator D) None

Answer:C

Solution:Turmeric is a natural indicator that turns red-brown in basic solutions.

3. Lemon is a

A) Acid B) Base C) Salt D) Indicator

Answer:A

Solution:Lemon contains citric acid, making it acidic (pH ~2-3).

4. Formic Acid is present in

A) Amla B) Lemon C) Grapes D) Ant's Sting

Answer:D

Solution:Ants secrete formic acid (HCOOH) as a defense mechanism.

5. The acid present in our stomach

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

Answer:A

Solution:Gastric juice contains hydrochloric acid (HCl) for digestion (pH ~1.5-3.5).

6. Methyl orange solution in acidic solution

A) Pink B) Colorless C) Blue D) Red

Answer:D

Solution:Methyl orange turns:Red (acidic),Yellow (basic).

7. Oxalic acid present in

A) Tomato B) Tamarind C) Grape D) Curd

Answer:A

Solution:Oxalic acid is a naturally occurring acid found in various plants, including tomatoes

8. H_2SO_3 is a

A) Mono basic B) Dibasic C) Tribasic D) Basic

Answer:B

Solution:Sulfurous acid (H_2SO_3) releases 2 H^+ ions

9. HNO_3 is

A) Organic acid B) Inorganic acid C) Mineral acid D) Both 2 and 3

Answer:D

Solution:Nitric acid (HNO_3) is a strong inorganic/mineral acid.

10. Sour milk contains

A) Oxalic acid B) Lactic acid C) Formic acid D) Uric acid

Answer:B

Solution:Produced by bacterial fermentation (Lactobacillus).

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:

11. Identify inorganic acid from the following.

A) Hydrochloric acid B) Nitric acid C) Tartaric acid D) Lactic acid

Answer:A,B

Solution:Inorganic acids (Mineral acids) are derived from minerals and lack carbon.

Examples:

Hydrochloric acid (HCl) – Found in gastric juice.

Nitric acid (HNO₃) – Used in fertilizers.

Organic acids contain carbon and are from plants/animals:

C) Tartaric acid (grapes)

D) Lactic acid (sour milk).

12. The acids obtained from the plants or the animals are called organic acids.

Which of the following is/are organic acids?

A) Stearic acid B) Lactic acid C) Oleic acid D) Palmitic acid

Answer:A,B,C,D

Solution:All are organic acids (contain carbon and are naturally occurring):

Stearic acid – Found in animal fats.

Lactic acid – Produced in muscles and sour milk.

Oleic acid – Present in olive oil.

Palmitic acid – Common in palm oil and dairy.

Statement Type:

13. Statement -I : Lactic acid is found in curd and sour milk.

Statement -II : Ascorbic acid is commonly called vitamin C which is present in citrus fruits.

Answer:B

Solution:Statement-I (True): Lactic acid is produced by bacterial fermentation in curd and sour milk.

Statement-II (True): Ascorbic acid (vitamin C) is found in citrus fruits, but this is unrelated to lactic acid.

No logical connection between the two statements.

14. Statement -I : Hydrocyanic acid is monobasic acid.

Statement -II : One hydrogen ion furnished by one molecule of an acid on dissolving in water is called mono basic acid.

Answer:A

Solution:Statement-I (True): HCN releases 1 H⁺ ion (monobasic):



Statement-II (True): Definition of monobasic acid (1 replaceable H per molecule).

Statement II directly justifies why HCN is monobasic.

Comprehension Type:

15. Acids turns Phenolphthalein solution

A) Pink B) Orange C) colorless D) Blue

Answer:C

Solution:Phenolphthalein is a pH indicator with the following behavior:

Acidic/Neutral (pH < 8.3): Colorless

Basic (pH = 8.3): Pink

Since acids have $\text{pH} < 7$, phenolphthalein remains colorless in acidic solutions.

16. litmus paper in acidic solution is

A) Pink B) Orange C) colorless D) Red

Answer:D

Solution:Litmus (natural indicator extracted from lichens):

Acidic solution ($\text{pH} < 7$): Red

Basic solution ($\text{pH} > 7$): Blue

Neutral ($\text{pH} = 7$): Purple (mixed color).

Integer type:

17. Acids classified into types based on origin.

Answer:2

Solution:Acids are categorized into two types based on their origin:

Organic acids: Derived from plants/animals (e.g., citric acid, lactic acid).

Inorganic acids (Mineral acids): Derived from minerals (e.g., HCl , H_2SO_4).

18. Basicity is a number of hydrogen ions furnished by molecule of an acid.

Answer:1

Solution:Basicity refers to the number of replaceable H^+ ions donated by one molecule of an acid in aqueous solution.

Matrix Matching Type:

19. **Answer:a-A,b-C,c-B,d-A**

Solution:

Column-I (Indicator)

a) Methyl orange

b) Phenolphthalein

c) Turmeric

d) Red litmus paper turns

Column-II(Acidic Solution)

A) Red

C) colourless

B) Yellow

A) Red

KEY

TEACHING TASK									
JEE MAIN LEVEL QUESTIONS									
1	2	3	4	5	6	7	8	9	10
C	C	B	A	A	C	C	B	D	B
JEE ADVANCED LEVEL QUESTIONS									
11	12	13	14	15	16	17	18	19	
A,C	B,C,D	A	C	B	B	2	1	A-C,B-D,C-B,D-A	
LEARNERS TASK									
CONCEPTUAL UNDERSTANDING QUESTIONS									
1	2	3	4	5	6	7	8	9	10
C	D	A	B	A	B	C	C	A	A
JEE MAIN LEVEL QUESTIONS									
1	2	3	4	5	6	7	8	9	10
A	C	A	D	A	D	A	B	D	B
11	12	13	14	15	16	17	18	19	
A,B	A,B,C,D	B	A	C	D	2	1	a-A,b-C,c-B,d-A	