9.ACIDS, BASES & SALTS -INDICATORS SOLUTIONS

TEACHING TASK

JEE MAIN LEVEL

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

1) H_3PO_3 2) H_2SO_3 3) HCN 4) $(COOH)_2$

Answer:3

Solution:

$H_3PO_3 \rightarrow$ Actually dibasic $\left(\text{structure H-PHO}(OH)_2, \text{ only two ionizable H}\right)$

$H_2SO_3 \rightarrow Dibasic$

$HCN \rightarrow Monobasic$

$(COOH)_2(OxalicAcid) \rightarrow Dibasic$

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

(FA & SA- 2 Marks)

1) Organic acids 2) Strong acids 3) Inorganic acids 4) Weak acids

Answer:3

Solution:Inorganic acids (mineral acids) come from minerals in earth.

Examples: HCl, H_2SO_4, HNO_3

Organic acids are from plants or animals

3. The colour of litmus paper in acid solution is

1) Blue 2) Red 3) Yellow 4) Colour less

Answer:2

Solution: Litmus in acid turns red.

4. A substance acts as an indicator which has

1) Different colour in acid and base solution

2) Same colour is acid and base solution

3) Do not exhibit any colour 4) None

Answer:1

Solution: A substance acts as an indicator if it has different colours in acid and base.

5. The most common indicator used for testing for acids and bases in the labo-

ratory is.

1)litmus 2)colour 3)salt 4)none

Answer:1

Solution: The most common indicator used for testing acids and bases in the laboratory is litmus.

6. The colour of methyl orange solution is .

1)pink 2)red 3)pale yellow 4)blue

Answer:3

Solution: The methyl orange solution itself (neutral/basic form) is pale yellow

7. The substance whose smell changes in acidic or basic solutions are called.....indicators. (FA & SA- 3 Marks / 4 Marks)

1)phenolpthalein 2)methyl orange 3)Olfactory 4)all the above

Answer:3

Solution: Olfactory indicators are substances whose smell (odour) changes depending on whether they are in an acidic or basic medium.

Examples include onion, vanilla, clove oil.

They are different from visual indicators like phenolphthalein or methyl orange, which change colour.

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

1)inorganic 2)organic 3)citric 4)formic

Answer:2

Solution: Acids from plants and animals are called organic acids.

9. From the following which one is inorganic acid.(FA & SA- 5 Marks / 8 Marks)

A)lactic acid 2)oxalic acid 3)acetic acid 4)phospho-ric acid

Answer:4

Solution: Definition of inorganic acid:

Inorganic acids (mineral acids) are derived from minerals, do not contain carbon–hydrogen (C–H) bonds as part of their acidic protons source, and are usually prepared from inorganic substances.

Checking each option:

Lactic acid ($C_3H_6O_3$): Contains carbon and is obtained from milk; hence it is an

organic acid.

Oxalic acid ($C_2H_2O_4$): Contains carbon and is found in plants; hence it is an organic acid.

Acetic acid (CH_3COOH): Contains carbon and is found in vinegar; hence it is an organic acid.

Phosphoric acid (H_3PO_4): Contains no C–H bond, derived from phosphate minerals; hence it is an inorganic acid.

Conclusion:

Phosphoric acid is the only inorganic acid in the list.

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

1)sulphuric acid **2)hydrochloric acid**

3)nitric acid **4)tartaric acid**

Answer:2

Solution: Acid used for digestion of food in stomach is hydrochloric acid.

JEE ADVANCED LEVEL

Multi Correct Choice Type:

11. Which of the following acid is dibasic acid?

1) H_2SO_4 **2) H_2S** **3) H_2SO_3** **4) HCl**

Answer:1,2,3

Solution:H_2SO_4: Sulfuric acid $\rightarrow$ 2 replaceable H^+ $\rightarrow$ Dibasic

H_2S: Hydrosulfuric acid $\rightarrow$ 2 replaceable H^+ $\rightarrow$ Dibasic

H_2SO_3: Sulfurous acid $\rightarrow$ 2 replaceable H^+ $\rightarrow$ Dibasic

HCl: Hydrochloric acid $\rightarrow$ 1 replaceable H^+ $\rightarrow$ Monobasic

12. Choose the correct statements:

1) Carbonic acid is a tribasic acid. 2) Phosphoric acid is a tribasic acid.

3) Hydrochloric acid is a strong acid 4) Nitric acid is a strong inorganic acid.

Answer:2,3,4

Solution:Carbonic acid (H_2CO_3) is dibasic, not tribasic

Phosphoric acid (H_3PO_4) has 3 replaceable H^+ $\rightarrow$ Tribasic

HCl is a strong acid (fully ionizes)

HNO_3 is a strong inorganic acid

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 — Sulfuric acid (H_2SO_4) is a mineral acid.

Statement II: True — It is obtained from minerals (e.g., sulfur).

Relation: Statement II correctly explains Statement I.

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

Statement-II : Glucose is a mononasic acid

Answer:C

Solution:Statement I: True — Acetic acid (CH_3COOH) is monobasic (one replaceable H^+).

Statement II: False — Glucose is not an acid; it does not furnish H^+ ions in water.

Relation: Statement I is true, Statement II is false.

Comprehension type

The number of hydrogen ions (H^+) furnished by one molecule of an acid, on dissolving on water, is called basicity of an acid.

15. Sulphuric acid is:

1) Monobasic acid 2) Dibasic acid 3) Tribasic acid 4) Tetrabadic acid

Answer:2

Solution:Sulfuric acid (H_2SO_4) is Dibasic acid. It can donate 2 H^+ ions.

16. H_3PO_3 is a

1) Mono basic acid 2) dibasic acid 3) Tri basic acid 4) Organic acid

Answer:2

Solution: . H_3PO_3 (phosphorous acid) is dibasic acid

(Structure: H–$PHO(OH)_2$, only two ionizable H atoms bonded to oxygen.)

INTEGER TYPE :

17. H_2CO_3 on ionisation produces ..... no. of Hydrogens

Answer:2

Solution:H_2CO_3 (carbonic acid) on ionization produces 2 hydrogens (H^+ ions) $\rightarrow$ Dibasic acid.

18. HCOOH on ionisation produces ..... Number of Hydrogens

Answer:1

Solution:HCOOH (formic acid) on ionization produces 1 hydrogen(H^+ ions) $\rightarrow$ Monobasic acid.

Matrix Matching Type :

19.

Source	**Name of the acid**
A) Lemon	**1) Formic acid**
B) Grapes	**2) Acetic acid**
C) Vinegar	**3) Citric acid**
D) Brown ants	**4) Tartaric acid**

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

Solution:

A) Lemon	3) Citric acid
B) Grapes	4) Tartaric acid
C) Vinegar	2) Acetic acid
D) Brown ants	1) Formic acid

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS

1. The natural indicator is .

1) methyl orange 2)phenolpthalein 3)turmeric 4)none

Answer:3

Solution:Turmeric is a natural pH indicator; it changes color in the presence of base (turns reddish-brown in alkalis).

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

1)jasmine 2)rose 3)lotous 4)lichen

Answer:4

Solution: Litmus is obtained from lichen plants, which produce the blue/red dye used as an indicator

3. Acids produce ..... ions on dissolving in water.

1) H^+ **ions** **2)** $O^{-2} ions$ **3)** $N^{-3} ions$ **4)none**

Answer:1

Solution: Acids ionize in water to produce hydrogen ions (H^+)

4. The acid present in Grape and unriped apples

1) oxalic acid 2) Tartaric acid 3) Maleic acid 4) citric acid

Answer:3

Solution: Maleic acid: Grapes and unriped apples.

5. Lactic acid present in

1) Curd and sour milk 2) Grapes 3) Citrus fruits 4) None

Answer:1

Solution:Lactic acid is formed due to fermentation by lactic acid bacteria in milk.

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

1) Base 2) Acid 3) Salt 4) None

Answer:2

Solution:A substance which gives out hydrogen ions (H^+) in water is Acid

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

1) acidity 2) molecularity 3) Basicity 4) None

Answer:3

Solution: Number of H^+ furnished by one molecule of acid is Basicity

8. CH_3COOH is an example for

1) Dibasic acid 2) Strong acid 3) Monobasic acid 4) Tribasic acid

Answer:3

Solution:CH_3COOH is an example of Monobasic acid

Explanation: CH_3COOH has only one replaceable H^+ ion

9. The term acid means

1) sour **2) unsipe** **3) spicy** **4) alkali**

Answer:1

Solution: The term acid means sour

10. Ascorbic acid is a

1) Vitamin C **2) Vitamin A** **3) Vitamin B** **4) Vitamin D**

Answer:1

Solution:Ascorbic acid is Vitamin C

JEE MAIN LEVEL QUESTIONS

1. Acetic acid is present in

1) Vinegar **2) Coffee** **3) Apple** **4) Lemon**

Answer:1

Solution:Vinegar contains CH_3COOH (acetic acid), giving it a sour tast

2. Turmeric is a

1) Acid **2) Base** **3) Indicator** **4) None**

Answer:3

Solution: Turmeric acts as a natural pH indicator, turning reddish-brown in a basic solution.

3. Lemon is a

1) Acid **2) Base** **3) Salt** **4) Indicator**

Answer:1

Solution: Lemon contains citric acid, giving it a sour taste.

4. Formic Acid is present in **(FA & SA- 2 Marks)**

1) Amla **2) Lemon** **3) Grapes** **4) Ant's Sting**

Answer:4

Solution:Formic acid (HCOOH) is found in ant and bee stings.

5. The acid present in our stomach

1) HCl **2) H_2SO_4** **3) H_2CO_3** **4) HNO_3**

Answer:1

Solution: Hydrochloric acid in gastric juice helps kill germs and digest food.

6. Methyl orange solution in acidic solution

1) Orange 2) Colorless 3) Blue 4) Red

Answer:4

Solution: Methyl orange is red in acidic solution and yellow in basic solution

7. Oxalic acid present in

1) Tomato 2) Tamarind 3) Grape 4) Curd

Answer:1

Solution:Tomato: Contains oxalic acid, along with citric and malic acids.

8. H_2SO_3 is a **(FA & SA- 5 Marks / 8 Marks)**

1) Mono basic 2) Dibasic 3) Tribasic 4) Basic

Answer:2

Solution:Definition of Basicity:

Basicity of an acid is the number of replaceable hydrogen atoms (H^+ ions) present in one molecule of the acid when dissolved in water.

Structure of H_2SO_3 (Sulfurous acid):

Sulfurous acid has the formula H_2SO_3. Its structure can be represented as $O=S(OH)_2$, where two hydrogen atoms are bonded to oxygen atoms. These hydrogens are ionizable in aqueous solution.

Ionization Steps:

First ionization: $H_2SO_3 \rightarrow H^+ + HSO_3^-$

Second ionization: $HSO_3^- \rightarrow H^+ + SO_3^{2-}$

Conclusion:

Since H_2SO_3 can furnish two H^+ ions per molecule in aqueous solution, it is classified as a dibasic acid.

9. HNO_3 is **(FA & SA- 3 Marks / 4 Marks)**

1) Organic acid 2) Inorganic acid 3) Mineral acid 4) Both 2 and 3

Answer:4

Solution:

Inorganic Acid:

HNO_3 (Nitric acid) does not contain carbon-hydrogen (C–H) bonds and is derived

from inorganic sources, so it is an inorganic acid.

Mineral Acid:It is obtained from minerals (like saltpetre — KNO3) and is prepared industrially from inorganic raw materials, so it is also called a mineral acid.

Thus, HNO_3 is both an inorganic acid and a mineral acid.

10. Sour milk contains

1) Oxalic acid 2) Lactic acid 3) Formic acid 4) Uric acid

Answer:2

Solution:Sour milk forms due to lactic acid produced by fermentation of lactose by lactic acid bacteria

ADVANCED LEVEL QUESTIONS

Multi Correct Answer Type

11. Identify inorganic acid from the following.

1) Hydrochloric acid 2) Nitric acid 3) Tartaric acid 4) Lactic acid

Answer:1,2

Solution:Hydrochloric acid (HCl) and Nitric acid (HNO_3) are derived from minerals and contain no carbon, so they are inorganic acids.

Tartaric acid and Lactic acid contain carbon and are obtained from plants/ animals, so they are organic acids.

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

Which of the following is/are organic acids?

1) Stearic acid 2) Lactic acid 3) Oleic acid 4) Palmitic acid

Answer:1,2,3,4

Solution: All are organic acids:

Stearic acid: Found in fats (animal/plant sources)

Lactic acid: Found in sour milk

Oleic acid: Found in oils

Palmitic acid: Found in palm oil and animal fats

All contain carbon and come from plants or animals.

Statement Type :

A) Both the statements ar **TRUE** and **Statement -II** is the correct explanation of **STATEMENT -** I

B) Both the statements are **TRUE** and **Statement -II** is not the correct explantion of Statement -I

C) Statement -I is **TRUE** and Statement -II is **FALSE**

D) Statement -Iis **FALSE** and Statement -II is **TRUE**

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

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

Answer:B

Solution:Statement I: True — Lactic acid is indeed found in curd and sour milk.

Statement II: True — Ascorbic acid is vitamin C, present in citrus fruits.

Relation: Both are true, but Statement II does not explain Statement I.

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 — Hydrocyanic acid (HCN) is monobasic (furnishes one H^+).

Statement II: True — Definition of monobasic acid is correct.

Relation: Statement II correctly explains why HCN is monobasic

Comprehension Type

For identifying a substance as an acid or a base we make use of certain natural chemical substances which show a change in colour when placed in acid medium, base medium. These chemical substances are called indicators.

15. Acids turns Phenolphthalein solution:

1) Pink **2) Orange** **3) colorless** **4) Blue**

Answer:3

Solution:Phenolphthalein is pink in basic solution and colorless in acidic solution.

16. Litmus paper in acidic solution is

1) Pink **2) Orange** **3) colorless** **4) Red**

Answer:4

Solution: Blue litmus turns red in acid.

Integer Type :

17. Acids classified into ..... types based on origin.

Answer:2

Solution:Acids classified into 2 types based on origin.They are Organic acids and Inorganic acids.

18. Basicity is a number of hydrogen ions furnished by ..... molecule of an acid. Answer:1

Solution: Basicity is a number of hydrogen ions furnished by one molecule of an acid.

Matrix Matching Type :

19.

Column-I (Indicator)			**Column-I(Acidic Solution)**
a) Methyl orange	**(**	**)**	**A) Red**
b) Phenolpthalein	**(**	**)**	**B) Yellow**
c) Turmeric	**(**	**)**	**C) colourless**
d) Red litmus paper turns	**(**	**)**	**D)No Change**

Answer:a-A ,b-C,c-B,d-D

Solution:

a) Methyl orange	A) Red
b) Phenolpthalein	C) colourless
c) Turmeric	B) Yellow
d) Red litmus paper turns	D)No Change

KEY

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