

SNS ACADEMY
FULL PORTION SCIENCE

10th Standard

Date : 04-Dec-23
Reg.No. :

Science

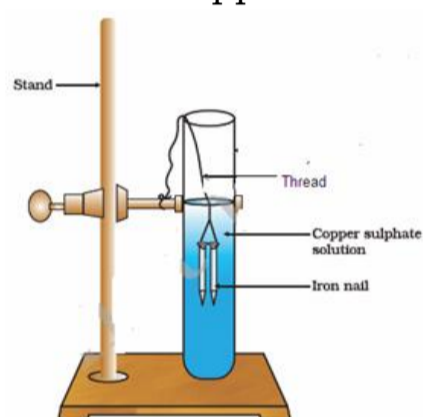
Time : 02:30:00 Hrs

Total Marks : 80

SECTION A1

16 x 1 = 16

- 1) When carbon dioxide is passed through lime water
- (a) calcium hydroxide is formed (b) white precipitate of CaO is formed
(c) lime water turns milky (d) colour of lime water disappears
- 2) As seen in the figure, two nails are carefully dipped in copper sulphate solution with the help of threads. What will happen when the nails are removed after half an hour?



- (a) No change is observed (b) Nails turn blue in colour (c) Nails turn green in colour
(d) Nails turn brown in colour
- 3) An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?
- (a) Baking powder (b) Lime (c) Ammonium hydroxide solution **(d) Hydrochloric acid**
- 4) A sample of soil is mixed with water and allowed to settle. The clear supernatant solution turns the pH paper yellowish-orange. Which of the following would change the colour of this pH paper to greenish-blue?
- (a) Lemon juice (b) Vinegar (c) Common salt **(d) An antacid**
- 5) Which of the following property is generally not shown by metals?
- (a) Electrical conduction (b) Sonorous in nature **(c) Dullness** (d) Ductility
- 6) 2 ml each of concentrated HCl, HNO₃ and a mixture of concentrated HCl and concentrated HNO₃ in the ratio of 3 : 1 were taken in test tubes labelled as A, B and C. A small piece of metal was put in each test tube. No change occurred in test tubes A and B but the metal got dissolved in test tube C respectively. The metal could be
- (a) Al **(b) Au** (c) Cu (d) Zn
- 7) Lymph carries
- (a) Digested food (b) Absorbed food **(c) Digested and absorbed food** (d) Water
- 8) Involuntary actions in the body are controlled by
- (a) Medulla in forebrain (b) Medulla in midbrain **(c) Medulla in hindbrain**
(d) Medulla in spinal cord
- 9) In all the electrical appliances, the switches are put in the

(a) live wire (b) earth wire **(c) neutral wire** (d) none of the above

10) Bromine reacts with saturated hydrocarbon at room temperature in the

(a) absence of sunlight (b) presence of water **(c) presence of sunlight**

(d) presence of hydrochloric acid

11) In this list of organisms given below, those that reproduce by the asexual method are

(i) banana

(ii) dog

(iii) yeast

(iv) amoeba

(a) (ii) and (iv) **(b) (i), (iii) and (iv)** (c) (i) and (iv) (d) (ii), (iii) and (iv)

12) The process where the unfertilised egg is released out of the body with the blood used to nourish the embryo is known as

(a) Menstruation (b) Fertilisation (c) Germination (d) Pollination

13) The theory of evolution of species by natural selection was given by

(a) Mendel **(b) Darwin** (c) Morgan (d) Lamarck

14) Wild cabbage is being cultivated for thousands of years and humans have generated broccoli, cauliflower, kale etc. from it. This is an example of

(a) Natural selection (b) Genetic drift (c) Geographic isolation **(d) Artificial selection**

15) The radius of curvature and focal length of a concave mirror are

(a) positive **(b) negative** (c) both (d) none of these

16) Which of the following is the formula of ozone

(a) O₃ (b) O₂ (c) O₄ (d) O₆

SECTION A2

4 x 1 = 4

17) **Assertion:** Sodium carbonate pentahydrate is also known as washing soda.

Reason: Chief raw materials for the manufacture of washing soda are NH₃, NaCl and CaCO₃.

Codes

(a) Both A and R are true, and R is correct explanation of the assertion.

(b) Both A and R are true, but R is not the correct explanation of the assertion.

(c) A is true, but R is false.

(d) A is false, but R is true.

Answer : (d): Washing soda is sodium carbonate decahydrate, Na₂CO₃ · 10H₂O.

18) **Assertion:** The communication in animals is due to the electrical impulse and chemical communication.

Reason: The communication caused due to chemicals is very slow.

Codes

(a) If both assertion and reason are true and the reason is correct explanation of assertion.

(b) If both assertion and reason are true but reason is not a correct explanation of assertion.

(c) If assertion is true and reason is false.

(d) If both assertion and reason are false.

Answer : (b) If both assertion and reason are true but reason is not a correct explanation of assertion.

19) **Assertion:** If mother has two dominant alleles for black hair and father has two recessive alleles for blonde hair then their child will inherit one dominant allele from mother and one recessive allele from father and will have black hair.

Reason: Progeny inherits one gene for each trait from its parents but the trait shown by progeny depends on inherited alleles.

Codes:

(a) Both A and R are true and R is correct explanation of the assertion

- (b) Both A and R are true but R is not the correct explanation of the assertion
- (c) A is true but R is false
- (d) A is false but R is true.

Answer : (a): Both A and R are true and R is correct explanation of the assertion

20) **Assertion:** The scattered light makes path of light visible.

Reason: Scattering of light is the result of Tyndall effect.

Codes

- (a) Both A and R are true, and R is correct explanation of the assertion.
- (b) Both A and R are true, but R is not the correct explanation of the assertion.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

Answer : (b) Both A and R are true, but R is not the correct explanation of the assertion.

SECTION B

6 x 2 = 12

21) You might have seen lemon or tamarind juice being used to clean tarnished surface of copper vessels. Explain why these sour substances are effective in cleaning the vessels?

Answer : Lemon juice contains citric acid and tamarind contains tartaric acid. These acids react with a basic layer of copper carbonate on the surface to form soluble salts which are easily removed and surface shines.

22) Name the correct substrates for the following enzymes

- (a) Trypsin (b) Amylase
- (c) Pepsin (d) Lipase

Answer : (a) Protein

- (b) Starch
- (c) Protein
- (d) Fats

23) What is an impulse?

Information passes through our nerves in the form of electro-chemical signals. These signals are called impulse.

24) What is the difference between AC generator and DC generator?

AC generator produces current which changes its direction after equal intervals of time and DC generator produces current which is unidirectional.

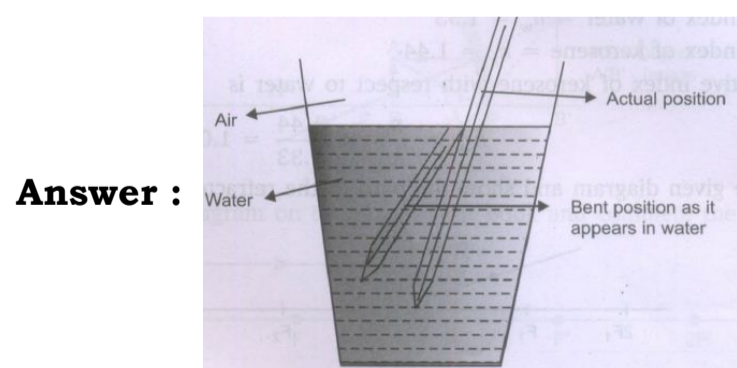
25) List the function of human female reproductive system.

Two functions of ovary:

To produce female gamete ovum

To secrete female hormones estrogen and progesterone.

26) With the help of a ray diagram show how a pencil appears when dipped in water.



A ray of light (as we see pencil in air passing into water) travels from rarer to denser medium i.e., from air to water, it bends towards the normal, hence the pencil appears to be bent in water as shown in the diagram.

SECTION C

7 x 3 = 21

27) Blue crystals of copper sulphate on heating in a dry test tube become colourless. Give reasons.

Answer : The blue colour of copper sulphate is due to its crystalline nature which holds 5 water molecules (water of crystallization). On heating, the water molecules disappear and anhydrous copper sulphate (white in colour) is left back.

- 28) (a) Show on a diagram the transfer of electrons between the atoms in the formation of MgO.
(b) Name the solvent in which ionic compounds are generally soluble.
(c) Why are aqueous solutions of ionic compounds able to conduct electricity?



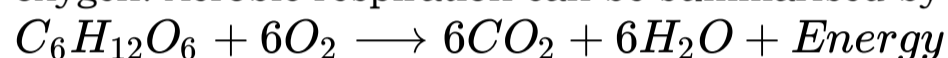
(b) Ionic compounds are soluble in water.

(c) The aqueous solutions of ionic compounds consists of ions which can move freely and conduct electricity.

- 29) How 'respiration' different from 'breathing'? Explain the processes of 'aerobic' respiration and 'anaerobic' respiration.

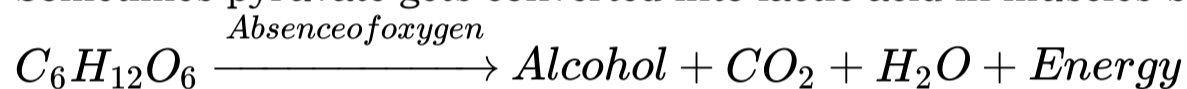
Answer : Breathing is the process by which oxygen is taken in (inhalation) and carbon dioxide is released out (exhalation). Respiration involves the oxidation of the food we eat to release energy. Carbon dioxide produced as a result of this is released out during exhalation.

Aerobic respiration: During aerobic respiration, the oxidation of food takes place in the presence of oxygen. Aerobic respiration can be summarised by the given equation:



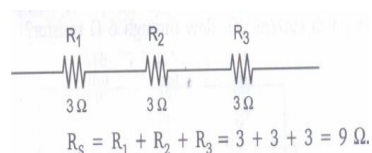
Anaerobic respiration: During anaerobic respiration, food is broken down in the absence of oxygen. It is also known as fermentation and is more common in microorganisms such as yeast.

Sometimes pyruvate gets converted into lactic acid in muscles by the process of anaerobic respiration.

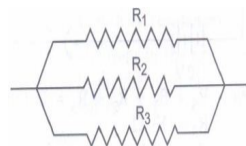


- 30) You are given 3 resistors each of 3 ohm and you are asked to get all possible values of resistance when you connect them in different combinations. How many values of resistance can you get?

Answer : (i) When connected in series



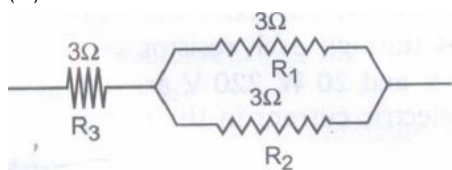
(ii) When connected in parallel



$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3} = 1\Omega$$

$$R_p = 1\Omega$$

(iii)



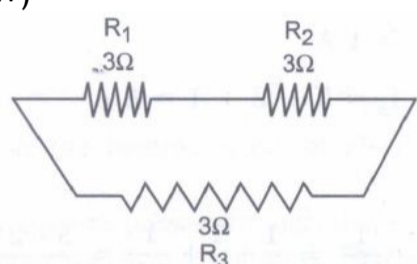
$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R_p} = \frac{1}{3} + \frac{1}{3} = \frac{2}{3}$$

$$\therefore R_p = \frac{3}{2} = 1.5\Omega$$

$$R = R_p + R_3 = 1.5 + 3 = 4.5\Omega$$

(iv)



$$R_s = R_1 + R_2 = 3 + 3 = 6\Omega$$

$$\frac{1}{R_p} = \frac{1}{R_s} + \frac{1}{R_3} = \frac{1}{6} + \frac{1}{3} = \frac{1+2}{6} = \frac{3}{6} = \frac{1}{2}$$

$$\therefore R_p = 2\Omega$$

31) Name the materials used to make atelectromagnet. Explain how you can make one in the lab.

Answer : To make a electromagnet one can use steel or iron as a core.

The making of electromagnet in the lab needs following material, the source for current, battery, metals wire with no insulation and hand gloves. Make a loop.

Like a solenoid, wrap the soft steel core or iron and connect its terminals to the terminals of the battery. Allow the current to pass through it and the core inside now .behaves like a magnet and can attract the magnetic materials.

32) Explain the following:

(a) Speciation (b) Natural Selection

Answer : Speciation: It is the process of evolution of a new species from pre-existing species.

Occurring due to accumulation of variations. The processes like genetic drift/geographical barriers like mountains, rivers, etc., lead to incapability to reproduce amongst themselves in the population.

Natural selection: Change in frequency of some genes in a population gives survival advantage to a species from elimination.

Example: In a population of beetles, a new variation (green colour) gets survival benefit/advantage to green beetles whereas other (red) perishes.

33) If the speed of light in water is 2.25×10^8 m/s and the speed in vacuum is 3×10^8 m/s. Calculate the refractive index of water.

Answer : Refractive index of water = $\frac{\text{Speed of light in 1 medium (air)}}{\text{Speed of light in 2 medium (water)}}$

$$n_w = \frac{c}{v}$$

$$n_w = \frac{3 \times 10^8}{2.25 \times 10^8}$$

$$n_w = 1.33$$

∴ The refractive index of water = 1.33.

SECTION D

3 x 4 = 12

34) A compound, X of sodium forms a white powder. It is a constituent of baking powder and is used in some antacids. When heated it gives a compound, Y which is anhydrous and absorbs water to become a hydrated salt. When this salt is kept in open air, it loses water molecules in a process called efflorescence. When dissolved in water it forms a strong base and a weak acid, Z.

(i) What is the compound, X?

(a) NaHCO₃ (b) Na₂CO₃ (c) NaOH (d) NaCl

(ii) The compound, Y is

(a) NaHCO₃ (b) Na₂CO₃ (c) Na₂CO₃ 10H₂O (d) NaCl

(iii) What is the nature of the solution formed by dissolving Y in water?

(a) Alkaline (b) Acidic (c) Neutral (d) It remains insoluble

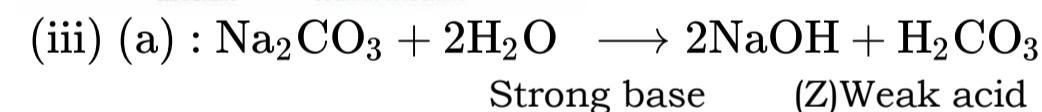
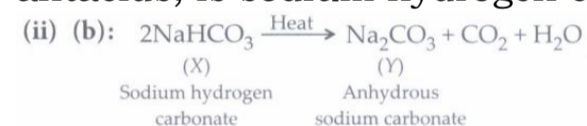
(iv) Identify the compound, Z.

(a) CO₂ (b) H₂CO₃ (c) NaOH (d) H₂O

(v) Sodium carbonate is a basic compound because it is a salt of a

**(a) strong acid and strong base (b) weak acid and weak base
(c) strong acid and weak base (d) weak acid and strong base**

Answer : (i) **(a):** The compound of sodium that is a constituent of baking powder and is used in antacids, is sodium hydrogen carbonate (NaHCO₃).



NaOH ionises completely to give a large amount of OH⁻ ions whereas H₂CO₃ ionises partially to give a small amount of H⁺ ions. Hence, the solution is overall alkaline.

(iv) **(b):** Z is carbonic acid, a weak acid formed when Na₂CO₃ is dissolved in water.

(v) **(d)**

35) The rate of flow of charge is called electric current. The SI unit of electric current is Ampere (A). The direction of flow of current is always opposite to the direction of flow of electrons in the current.

The electric potential is defined as the amount of work done in bringing a unit positive test charge from infinity to a point in the electric field. The amount of work done in bringing a unit positive test charge from one point to another point in an electric field is defined as potential difference.

$$V_{AB} = V_B - V_A = \frac{W_{BA}}{q}$$

The SI unit of potential and potential difference is volt.

(i) The 2 C of charge is flowing through a conductor in 100 rns, the current in the circuit is

**(a) 20 A (b) 2 A
(c) 0.2 A (d) 0.02 A**

(ii) Which of the following is true?

(a) Current flows from positive terminal of the cell to the negative terminal of the cell outside the cell.

(b) The negative charge moves from lower potential to higher potential.

(c) The direction of flow of current in same as the direction of flow of positive charge.

(d) All of these

(iii) The potential difference between the two terminals of a battery, if 100 joules of work is required to transfer 20 coulombs of charge from one terminal of the battery to other is

- (a) 50 V (b) -5 V
(c) 0.5 V (d) 500 V

(iv) The number of electrons flowing per second in a conductor if 1A current is passing through it

- (a) 6.25×10^{20} (b) 6.25×10^{19}
(c) 6.25×10^{18} (d) 6.25×10^{-19}

(v) The voltage can be written as

- (a) **Work done x** (b) $\frac{\text{Work done}}{\text{Current} \times \text{time}}$
charge x time
(c) $\frac{\text{Work done} \times \text{time}}{\text{Current}}$ (d) **Work done**
x charge

Answer : (i) (a): $q = 2 \text{ C}$, $t = 100 \text{ ms} = 0.1 \text{ s}$

$$I = \frac{q}{t} = \frac{2}{0.1} = 20 \text{ A} .$$

(ii) (d)

(iii) (b): $W = 100 \text{ J}$, $q = 20 \text{ C}$

$$V = \frac{W}{q} = \frac{100}{20} = 5 \text{ V}$$

(iv) (c): $I = 1 \text{ A}$, $t = 1 \text{ s}$

$$q = It = 1 \times 1 = 1 \text{ C}$$

$$n = \frac{q}{e} = \frac{1}{1.6 \times 10^{-19}} = 6.25 \times 10^{18}$$

$$\text{(v) (c): } V = \frac{W}{q} = \frac{W}{It}$$

36) An ecosystem may be defined as a structural and functional unit of the biosphere comprising living organisms and their non-living environment which interact by means of food chains and biogeochemical cycles resulting in energy-flow, biotic diversity and material cycling to form a stable, self-supporting system.

(i) The two basic processes involved in an ecosystem are

- (a) **cycling of materials** (b) **energy flow and self-sustainability**
(c) **carbon cycle and biotic diversity** (d) **cycling of materials and flow of energy.**

(ii) Which among the following is not an artificial ecosystem?

- a) **Orchard** (b) **Lake** (c) **Aquarium** (d) **Cropland**

(iii) The role of fungi and bacteria in an ecosystem is to

- (a) **increase the supply of nutrients** (b) **increase the supply of energy**
(c) **release nutrients from dead organic matter** (d) **increase the amount of CO₂ in the atmosphere.**

(iv) What would one of the likely result if all decomposers in a particular ecosystem were wiped out?

- (a) **The atmospheric reservoir of carbon dioxide would decline.**
(b) **More food would be available for other consumers in the ecosystem.**
(c) **The other organisms in the ecosystem would experience lower death rates.**
(d) **There would be no significant impact, as dead organic matters would spontaneously decompose.**

(v) Which of the following holds true for an ecosystem?

- (a) **Primary consumers are least dependent upon producers.**
(b) **Primary consumers most of the time out number producers.**
(c) **Organic substances such as carbon, nitrogen and oxygen constitute the main abiotic components.**
(d) **Permanent ecosystems are self-supporting natural ecosystems that maintain themselves for relatively long duration.**

Answer : (i) (d)

(ii) (b): Artificial ecosystems are maintained by man and hence are also termed as man-made or man engineered ecosystems. In these ecosystems, man maintains/ disturbs the natural balance by the addition of energy and planned manipulations. Common examples of artificial ecosystems are croplands, orchards, gardens, aquarium, etc.

(iii) (c): Fungi and bacteria are decomposers which serve to convert carbon locked up in dead organic matter into carbon dioxide, which can then be utilised by plants during photosynthesis. A Band D are incorrect since decomposers do not increases the amount of nutrients, energy and carbon dioxide in the ecosystem. They merely allow cycling of nutrients, including carbon, to occur.

(iv) (a)

(v) (d): Primary or first-order consumers include the animals which eat plants or plant products. They are called herbivores. As the herbivores feed on plants/plant products and convert them into animal matter, they are often called key industry animals. Inorganic substances, e.g., carbon, nitrogen, oxygen, calcium, phosphorus, etc. and their compounds (water, carbon dioxide, etc.) constitute the main abiotic components. These occur either in the form of compounds dissolved in water, in the soil or in free state in the air.

SECTION E (EITHER OR TYPE) CHE 1,2 BIO 3,5 PHY 4,6

6 x 5 = 30

37) (i) Explain why is hydrochloric acid a strong acid and acetic acid, a weak acid. How can it be verified?

(ii) Explain why aqueous solution of an acid conducts electricity.

(iii) You have four solutions A, B, C and D. The pH of solution A is 6, B is 9, C is 12 and D is 7.

(a) Identify the most acidic and most basic solutions.

(b) Arrange the above four solutions in the increasing order of H^+ ion concentration.

(c) State the change in colour of pH paper on dipping in solution C and D.

Answer : (i) HCl is completely ionised in aqueous solution whereas acetic acid is partially ionised in aqueous solution. HCl gives dark red colour with pH paper whereas CH_3COOH gives orange colour.

(ii) It is because acid ionises in aqueous solution and these ions conduct electricity.

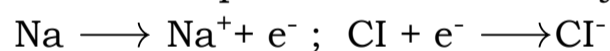
(iii) 'A' is most acidic and 'C' is most basic.

(b) $C(10^{-12}) < B(10^{-9}) < D(10^{-7}) < A(10^{-6})$

(c) pH paper will become blue in 'C' and green in 'D'.

38) With the help of a suitable example, explain how ionic compounds are formed. State any three general properties of ionic compounds.

Answer : Ionic compounds are formed by transfer of electrons from metal to non-metals, e.g



General Properties:

(i) They are the solids having high melting point.

(ii) They are soluble in water.

(iii) They conduct electricity in molten state as well as in aqueous solution

39) What is phototropism? How does it occur in plants? Describe an activity to demonstrate phototropism

Answer : Phototropism: The movement of plant towards the light is called phototropism.

Occurrence: The plants at its root tip consists of auxin which helps in the growth of a plant and the plant moves towards the light.

40) (a) Explain why there are two separate circuits one for high power rating appliances and other for low power rating appliances.

(b) A domestic circuit has SA fuse. How many bulbs of rating 100 W, 220 V can be safely used in this circuit? Justify your answer.

