

CBSE Class 10 Science Solution

Set 3 - 31/4/3

SECTION A

Select and write the most appropriate option out of the four options given for each of the questions no. 1 to 20. There is no negative marking for incorrect responses.

$$20 \times 1 = 20$$

Ques 1 An electric iron of resistance 20Ω draws a current of 5 A. The heat developed in the iron in 30 seconds is:

- (A) 15000 J
- (C) 1500 J
- (B) 6000 J
- (D) 3000 J**

Solution (D) 3000 J

Ques 2. The acid produced in our stomach during digestion and the base used to neutralize the excess acid during indigestion respectively are:

- (A) HCl, Mg(OH)
- (B) HCl, Ca(OH)
- (C) Amino acids, Ca(OH)
- (D) Lactic acid, Mg(OH)₂**

The acid produced in our stomach during digestion is hydrochloric acid (HCl), and the base used to neutralize excess acid during indigestion is magnesium hydroxide (Mg(OH)₂), often found in antacid medications. So, the correct option is (A)

Ques 6. Four solutions, namely glucose, alcohol, hydrochloric acid and sulphuric acid filled in four separate beakers are connected one by one in an electric circuit with a bulb. The solutions in which the bulb will glow when current is passed are:

- (A) Glucose and alcohol
- (B) Alenhel and hydrochloric acid
- (C) Glucose and sulphuric acid
- (D) Hydrochloric acid and sulphuric acid

Solution Glucose and alcohol are both conductive solutions, so the bulb will glow when connected to them in the circuit. Hydrochloric acid and sulfuric acid are strong electrolytes, so they will also allow the bulb to glow. The correct option is (A).

Ques 7. The metals which are found in both free state as well as combined state are:

- (A) Gold and platinum
- (B) Platinum and silver
- (C) Copper and silver
- (D) Gold and silver

Solution Gold and silver are metals that are found both in the free state (as pure metals) and in combined states (as compounds). For example, gold and silver are often found in nature in their metallic form (free state) as well as in various ores (combined states). Therefore, option (D) is correct.

Ques 8. The part of the flower which attracts insects for pollination is/are:

- (A) Stigma and style
- (B) Sepals and petals
- (C) Petals only
- (D) Sepals only

Solution In many flowers, sepals and petals together form the attractive parts of the flower that attract insects for pollination. Sepals and petals often have bright colors and produce nectar, which attracts insects. Thus, option (B) is correct

Ques 10. The number of single and double bonds present in a molecule of benzene C_6H_6 respectively, are

- (A) 6 and 6
- (B) 9 and 3
- (C) 3 and 9
- (D) 9 and 9

Solution Benzene (C_6H_6) is a cyclic hydrocarbon with a ring structure. Each carbon atom in the benzene ring forms a single bond with adjacent carbon atoms and a single bond with a hydrogen atom. There are no double bonds in benzene. Therefore, the correct answer is (A) 6 and 6.

Ques 11. A plant growth inhibitor hormone which causes wilting of leaves is called

- (A) Auxin
- (B) Cytokinin
- (C) Abscisic acid
- (D) Gibberellin

Solution A plant growth inhibitor hormone which causes wilting of leaves is called:

Solution: The plant growth inhibitor hormone that causes wilting of leaves is abscisic acid. Therefore, the correct answer is (C) Abscisic acid.

Ques 12. Some wastes are given below:

Garden waste

- (i) Ballpoint pen refills
- (ii) Empty medicine bottles made of glass
- (iii) Peels of fruits and vegetables
- (iv) Old cotton shirt

The non-biodegradable wastes among these are

- (A) (i) and (ii)
- (B) (ii) and (iii)
- (C) (i), (iv) and (v)
- (D) (i), (iii) and (iv)

Non-biodegradable wastes are those that cannot be broken down or decomposed by natural processes such as bacteria or fungi. Among the given options, ballpoint pen refills and empty medicine bottles made of glass are non-biodegradable. Therefore, the correct answer is (B) (ii) and (iii).

Ques 15. When a beam of white light passes through a region having very fine dust particles, the color of light mainly scattered in that region is

- (A) Red
- (B) Orange
- (C) Blue
- (D) Yellow

Solution When a beam of white light passes through a region having very fine dust particles, the color of light mainly scattered in that region is:

Solution: The color of light scattered by dust particles depends on their size. Fine dust particles tend to scatter shorter wavelengths of light more effectively, which corresponds to the blue end of the spectrum. Therefore, the correct answer is (C) Blue.

For Questions number 17 to 20, two statements are given one labeled as Assertion (A) and the other labeled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A)

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true

Ques 17. Assertion (A): Oxygen is essential for all aerobic forms of life.
Reason (R) Free oxygen atoms combine with molecular oxygen to form ozone.

Solution: The assertion is true. Oxygen is indeed essential for all aerobic forms of life as it is required for cellular respiration, which is the process by which organisms produce energy. However, the reason is incorrect. While oxygen atoms do combine with molecular oxygen (O_2) to form ozone (O_3) in the upper atmosphere, this process is not directly related to the essentiality of oxygen for aerobic life forms.

Ques 18. Assertion (A) Magnetic field lines never intersect each other.
Reason (R): If they intersect, then at the point of intersection, the compass needle would point towards two directions, which is not possible.

Solution The assertion is true. Magnetic field lines do not intersect each other. The reason provided also supports the assertion, as the intersection of magnetic field lines would result in a contradictory behavior of compass needles, pointing towards two different directions at the same point, which is not possible according to the principles of magnetism

Ques 19. Assertion (A). The extraction of metals from their ores cannot take place without raising of the

Reason(R) Roasting converts sulfide ores directly into metal

Solution.The assertion is false. While roasting is indeed a step in the extraction of some metals from their sulfide ores, it does not directly convert sulfide ores into metals. Roasting is typically done to convert metal sulfides into metal oxides, which can then be further processed to extract the metal. Therefore, the reason provided is also incorrect.

Ques 20. Assertion (A) In the human heart ventricles have thicker muscular walls than atria

Reason(R) Ventricles have to pump the blood into various organs

Solution: The assertion is true. The ventricles of the heart do have thicker muscular walls compared to the atria. This is because the ventricles are responsible for pumping blood to the rest of the body, whereas the atria primarily receive blood from the veins. Therefore, the increased muscle mass in the ventricles allows for more forceful contractions to pump blood to various organs. The reason provided supports this assertion, explaining the functional difference between the atria and ventricles.

SECTION B

Question no. 21 to 26 are very short answer type questions

Ques 21. (a) We need to water the soil in plants on a regular basis. But it ultimately reaches the leaves of the plant. Explain how this takes place.

(b) Name the type of nutrition exhibited by Amoeba. Explain how food is taken in and digested by this organism.

Solution

(a) Water reaches the leaves of plants through a process called transpiration. Transpiration is the movement of water vapor from the roots of plants to the leaves and then evaporating into the atmosphere through small openings called stomata on the surface of the leaves. This process is driven by factors such as temperature, humidity, and the concentration of water in the soil.

(b) Amoeba exhibits holozoic nutrition. In this type of nutrition, solid food particles are ingested by the organism through a process called phagocytosis. Amoeba extends its pseudopodia (temporary projections of its cell membrane) around the food particle, engulfing it to form a food vacuole. The food vacuole then fuses with lysosomes, which contain digestive enzymes. These enzymes break down the food particle into simpler substances, which are then absorbed by the cell for energy and other metabolic processes.

Ques 22. When a soap is dissolved in water, the soap molecules form structures. What are these structures called Draw a labeled diagram of these structures

Solution When soap molecules dissolve in water, they form structures called micelles. Micelles are spherical aggregates of soap molecules, with the hydrophilic (water-attracting) heads oriented towards the outer surface of the sphere and the hydrophobic (water-repelling) tails oriented towards the center. This arrangement allows the soap molecules to form a stable colloid in water, trapping the hydrophobic dirt and grease molecules within the interior of the micelle.

Ques 23.(a) (I) 1 gram of solid sodium chloride was taken in a clean and dry test tube and concentrated sulphuric acid was added to it Name the gas evolved in the reaction.

(II) What will be observed when this gas is tested with (I) dry, and (II) wet blue litmus paper? Write your conclusion about the nature (acidic/basic) of this gas.

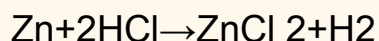
(b) Some metals react with acids to produce salt and hydrogen gas. Illustrate it with an example. How will you test the presence of this gas?

Solution (a)

(I) The gas evolved in the reaction is hydrogen gas (H₂).

(II) When the gas is tested with dry blue litmus paper, there will be no change in color, indicating that the gas is neutral. However, when tested with wet blue litmus paper, the paper will turn red, indicating that the gas is acidic.

(b) An example of a metal reacting with an acid to produce salt and hydrogen gas is the reaction between zinc and hydrochloric acid:



To test for the presence of hydrogen gas, one can hold a lit splint near the reaction vessel. If the gas produced is hydrogen, it will ignite with a pop sound.

Ques 24. Explain how equal genetic contribution of male and female parents ensured in the progeny

Solution The equal genetic contribution of male and female parents in the progeny is ensured through sexual reproduction. During sexual reproduction, genetic material from both the male and female parents combines to form offspring. Each parent contributes half of the genetic material (chromosomes) to the offspring through their gametes (sperm and egg). This ensures that the progeny inherits genetic characteristics from both parents, resulting in a balanced genetic contribution from each.

Ques 25. What would have been the color of the sky, if the Earth had no atmosphere Give reason to justify your answer

Solution If the Earth had no atmosphere, the color of the sky would appear black. This is because the scattering of sunlight by atmospheric gasses, particularly nitrogen and oxygen, is what causes the sky to appear blue. In the absence of an atmosphere, there would be no scattering of light, and the sky would simply appear dark, similar to how outer space appears from the perspective of astronauts.

Ques 26. Calculate the resistance of a copper wire of length 1000 m and area of cross-section 2 mm^2 . The Resistance of copper is $1.6 \times 10^{-8} \text{ m}$.

Solution Resistance = $8 \times 10^{-6} \Omega$

SECTION C

Questions no. 27 to 33 are short answer type questions

Ques 27. Define the term power of accommodation of the human eye. What happens to the image distance in the eye when we increase the distance of an object from the eye Name and explain the role of the part of the human eye responsible for it in this case.

Solution Power of accommodation of the human eye: The power of accommodation refers to the ability of the eye to focus on objects at various distances by adjusting the curvature of the lens. This adjustment allows the eye to form a clear image of objects at different distances on the retina. When we increase the distance of an object from the eye, the image distance in the eye also increases. This is because the ciliary muscles surrounding the lens relax, causing the lens to become thinner and less

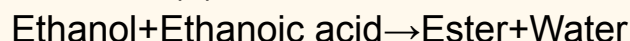
curved. As a result, the focal length of the lens increases, allowing it to focus on objects that are farther away.

The part of the human eye responsible for this adjustment is the ciliary body, which controls the shape of the lens. When the ciliary muscles contract, they increase the curvature of the lens for near vision. When they relax, the lens becomes flatter for distant vision.

Ques 28. Write chemical equations for the following reactions, giving the conditions for the reaction in each case:

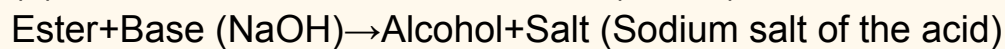
- (a) Reaction of ethanol with ethanoic acid
- (b) Reaction of an ester with a base (NaOH)
- (c) Formation of ethene from ethanol

Solution (a) Reaction of ethanol with ethanoic acid:



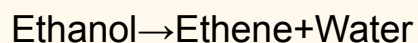
Condition: Catalytic amount of concentrated sulfuric acid is used as a catalyst.

(b) Reaction of an ester with a base (NaOH):



Condition: Usually performed in the presence of heat.

(c) Formation of ethene from ethanol:



Condition: Dehydration reaction, typically carried out at elevated temperatures with the presence of a catalyst such as concentrated sulfuric acid.

Ques 29. A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the center of it. He sprinkles some iron filings

uniformly around the bar magnet. Then he taps the drawing board gently and observes that the iron filings arrange themselves in a particular pattern.

(a) Why do iron filings arrange in a particular pattern?

(b) What does the crowding of iron filings at the ends of the magnet indicate?

(c) What do the lines, along which the iron filings align, represent?

(d) If the student places a cardboard horizontally in a current carrying solenoid and repeats the above activity, in what pattern would the iron filings arrange? State the conclusion drawn about the magnetic field based on the observed pattern of the lines.

Solution (a) Iron filings arrange in a particular pattern due to the magnetic field produced by the bar magnet. They align along the magnetic field lines.

(b) The crowding of iron filings at the ends of the magnet indicates the presence of strong magnetic field lines emanating from the poles of the magnet.

(c) The lines along which the iron filings align represent the magnetic field lines produced by the bar magnet.

(d) If the student places a cardboard horizontally in a current-carrying solenoid, the iron filings would arrange in concentric circles around the solenoid's axis. This pattern indicates the presence of a magnetic field around the solenoid, with the magnetic field lines forming closed loops around the current-carrying conductor.

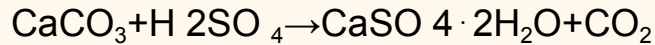
Ques 30. Write the common name and the chemical name of the compound $\text{CaSO}_4 \cdot \text{H}_2\text{O}$. Write the method of its preparation Give chemical equation for the reaction, when water reacts with CaSO_4 , H_2O

Solution

Common name: Gypsum

Chemical name: Calcium sulfate dihydrate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)

Method of preparation: Gypsum is obtained as a natural mineral or can be synthesized by the reaction between calcium carbonate (limestone) and sulfuric acid:



Ques 32.(A) Explain with the help of a labeled diagram, the process of reproduction in Hydra by budding Name the cells used for reproduction in this process

OR

(b) List two roles of each of the following in human reproductive System:

- (i) Seminal vesicles and prostate gland
- (ii) Oviduct
- (iii) Testis

Solution (a) Reproduction in Hydra by budding: In Hydra, a small bud forms on the body wall of the parent organism. This bud grows and develops into a miniature Hydra, eventually detaching from the parent to become an independent organism. The cells used for reproduction in this process are the interstitial cells, located within the body wall of Hydra.

OR

(b)

(i) Seminal vesicles and prostate gland: Seminal vesicles produce a significant portion of the seminal fluid, which provides nourishment and protection to sperm. The prostate gland secretes a milky fluid that enhances the motility and viability of sperm.

(ii) Oviduct: The oviduct, also known as the fallopian tube, is responsible for transporting the egg from the ovary to the uterus. It is the site where fertilization typically occurs.

(iii) Testis: The testes produce sperm and testosterone hormone. Sperm production occurs within structures called seminiferous tubules, while testosterone is produced by Leydig cells within the testes.

Ques 33.

Differentiate between biodegradable and non-biodegradable wastes. We generate a lot of non-biodegradable wastes in our daily life. Write any two harmful effects caused by these wastes if not disposed of properly.

Solution Biodegradable wastes: These are wastes that can be broken down naturally by living organisms over time, such as food scraps, paper, and certain types of plastics.

Non-biodegradable wastes: These are wastes that do not decompose or take an extremely long time to decompose naturally, such as plastic bags, glass, and certain synthetic materials.

Two harmful effects of non-biodegradable wastes if not disposed of properly are:

Environmental pollution: Non-biodegradable wastes can accumulate in the environment, leading to pollution of land, water bodies, and air. This pollution can harm ecosystems, wildlife, and human health.

Habitat destruction: Improper disposal of non-biodegradable wastes can lead to the destruction of natural habitats and ecosystems. Accumulation of waste in natural areas can disrupt the balance of ecosystems and threaten biodiversity.

SECTION D

Ques 34.

(a)

(i) Define reflexes and why have reflexes evolved in animals? Give one example of such a reflex.

(ii) Name the part of the nervous system which helps in communication between the central nervous system and other parts of the body. What are the two components of this system?

OR

(b)

(i) Leaves of Mimosa pudica plant begin to fold up and droop in response to a stimulus. Name the stimulus and write the cause for such a rapid movement. Is there any growth involved in the movement?

(ii) Define geotropism in plants. What is meant by positive and negative geotropism? Give one example of each type.

Solution

(a)

(i) Reflex Action: A reflex action is an involuntary and rapid response to a stimulus without conscious thought. Reflexes have evolved in animals to ensure quick responses to potential threats or dangers in the environment. They help in survival by enabling immediate actions to protect the organism from harm. For example, when you suddenly touch a hot object, the reflex action of pulling your hand away occurs involuntarily and quickly, minimizing the risk of injury.

(ii) The part of the nervous system that helps in communication between the central nervous system (CNS) and other parts of the body is the peripheral nervous system (PNS). The two main components of the peripheral nervous system are the somatic nervous system and the autonomic nervous system. The somatic nervous system controls voluntary

movements and carries sensory information from sensory organs to the CNS. The autonomic nervous system regulates involuntary functions such as heartbeat, digestion, and breathing.

OR

(b)

(i) The stimulus causing the leaves of the chui-mui plant to fold up and droop is likely a response to water loss or dehydration. This rapid movement is caused by changes in turgor pressure within the cells of the plant, leading to wilting. There is no growth involved in this movement; it is purely a response to environmental conditions.

(ii) Geotropism in plants refers to the growth response of plants to gravity. In positive geotropism, the plant grows towards the direction of gravity, while in negative geotropism, the plant grows away from the direction of gravity. An example of positive geotropism is the downward growth of roots into the soil, while an example of negative geotropism is the upward growth of shoots towards sunlight.

Ques 35

(a) What is a chemical reaction? Describe one activity each to show that a chemical change has occurred in which (i) change of color, and (ii) change in temperature has taken place

Solution (a)

Chemical Reaction: A chemical reaction is a process in which one or more substances (reactants) are converted into one or more different substances (products) with new chemical properties. Two activities to demonstrate chemical changes:

Change of color: Mixing potassium iodide solution with lead nitrate solution results in the formation of a yellow precipitate of lead iodide, indicating a chemical change.

Change in temperature: Combining baking soda (sodium bicarbonate) with vinegar (acetic acid) results in an endothermic reaction, causing a decrease in temperature due to the absorption of heat.

Ques 36

(i) State laws of reflection of light

(ii) An object of height 5.0 cm is placed at 15 cm in front of a concave mirror of focal length 10 cm. At what distance from the mirror should a screen be placed, that a focussed image is obtained on it? Find the height of the image.

OR

State laws of refraction of light.

Draw a ray diagram to show refraction of a ray of light through a rectangular glass slab. How is the emergent ray related to the incident ray? Mark lateral displacement in the diagram.

Solution

(i) Laws of Reflection of Light:

The angle of incidence is equal to the angle of reflection.

The incident ray, the reflected ray, and the normal to the surface at the point of incidence lie in the same plane.

(ii) Ray Diagram for Concave Mirror:

the image distance is -30 cm, and the height of the image is 10.0 cm

OR

Laws of Refraction of Light:

The incident ray, the refracted ray, and the normal to the surface at the point of incidence all lie in the same plane.

The ratio of the sine of the angle of incidence to the sine of the angle of refraction is a constant, known as the refractive index of the medium.

Refraction through a Rectangular Glass Slab:

When a ray of light passes through a rectangular glass slab, it undergoes refraction twice: once when entering the slab and once when leaving it. The emergent ray is parallel to the incident ray but laterally displaced. The lateral displacement depends on the thickness of the glass slab and the angle of incidence.

Ques 38. Three metal samples of magnesium and iron were rubbed with sandpaper. Those samples were then put separately to tubes containing dilute hydrochloric acid and Thermometer suspended on each test tube so that their bulb dipped in the acid. The rate of formation of bubbles was served. The above activity was repeated with dilute nitric acid and the observations were recorded.

Answer the following questions

- (a) When activity was done with dilute hydrochloric acid, then in which one of the test tubes was the rate of formation of bubbles the fastest and the thermometer showed the highest temperature?
- (b) Which metal did not react with dilute hydrochloric acid? Give a reason.
- (c) (i) Why is hydrogen gas not evolved when a metal reacts with dilute nitric acid? Name the ultimate products formed in the reaction.

OR

- (c) (ii) Name the type of reaction on the basis of which reactivity of metals is decided. You have two metals X and Y. How would you decide which is more reactive than the other?

Solution

(a) In the activity with dilute hydrochloric acid, the test tube containing magnesium would likely show the fastest rate of formation of bubbles and the highest temperature on the thermometer. This is because magnesium is more reactive than iron and can readily react with hydrochloric acid to produce hydrogen gas at a faster rate, accompanied by an exothermic reaction, which generates heat.

(b) Iron did not react with dilute hydrochloric acid. The reason for this is that iron is less reactive than magnesium. When iron is rubbed with sandpaper, it forms a protective layer of iron oxide on its surface, which prevents it from reacting with the hydrochloric acid. Magnesium, on the other hand, reacts vigorously with hydrochloric acid due to its higher reactivity.

(c)

(i) Hydrogen gas is not evolved when a metal reacts with dilute nitric acid because nitric acid is a strong oxidizing agent. Instead of producing hydrogen gas, nitric acid oxidizes the metal and itself gets reduced. The ultimate products formed in the reaction depend on the concentration of the nitric acid and the reactivity of the metal. For example, with magnesium, magnesium nitrate and nitrogen oxide gases may be formed.

OR

(ii) The reactivity of metals is decided based on their ability to displace hydrogen from dilute acids. This is known as a single displacement reaction or metal displacement reaction. In this type of reaction, a more reactive metal can displace a less reactive metal from its compound. To determine which metal, X or Y, is more reactive, one could perform displacement reactions with dilute acids. If metal X displaces metal Y from its compound, then metal X is more reactive than metal Y.