

CBSE Class 10 Science Solution

Set 3 - 31/4/2

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 response

Ques 1. A chemical reaction in which exchange of ions occurs between the reactants, is known as:

- (A) Endothermic Reaction
- (B) Exothermic Reaction
- (C) Double Displacement Reaction
- (D) Displacement Reaction

Solution Double Displacement Reaction: In this type of chemical reaction, ions exchange between reactants to form new compounds. It's characterized by the swapping of ions between two compounds.

Ques 2. A zygote is formed by the fusion of a male gamete and a female gamete. The number of chromosomes in the zygote of a human is:

- (A) 23
- (C) 46
- (B) 44
- (D) 92

Solution Double Displacement Reaction: In this type of chemical reaction, ions exchange between reactants to form new compounds. It's characterized by the swapping of ions between two compounds.

Ques 3. The part of seed which is a source of food during germination of seed is

- (A) Cotyledon
- (B) Radicle
- (C) Plumule
- (D) Embryo

Solution Cotyledon: This is the part of the seed that serves as a source of food during germination. It's the embryonic leaf in the seed embryo.

Ques 4 The plants that can be raised by the method of vegetative propagation

- (A) Sugarсале, говня, гаров
- (B) Sugarcane, mustard, potato
- (C) Banana, orange, mustard
- (D) Papaya, mustard, potato

Solution Banana, orange, mustard: These are plants that can be raised by vegetative propagation, a method where new plants are grown from parts of existing plants like stems, leaves, or roots.

Ques 5. A plant growth inhibitor hormone which causes wilting of leaves is called:

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

Solution Abscisic Acid: It's a plant growth inhibitor hormone responsible for causing wilting of leaves by promoting closure of stomata and inhibiting cell elongation

Ques 6. An aqueous solution of a salt turns blue litmus to red. The salt could be the one obtained by the reaction of

- (A) HNO₃ and NaOH
- (B) H₂SO₄ and KOH

- (C) CH_3COOH and NaOH
(D) HCl and NH_4OH

Solution HNO_3 and NaOH : A salt formed by the reaction of nitric acid (HNO_3) and sodium hydroxide (NaOH) will turn blue litmus to red, indicating an acidic nature.

Ques 7. Four solutions, namely glucose, alcohol, hydrochloric acid and sulphuric acid filled in four separate headers 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) Alcohol and hydrochloric acid
(C) Glucose and sulphuric acid
(D) Hydrochloric acid and sulphuric acid

Solution Alcohol and hydrochloric acid: These solutions will allow the bulb to glow when current is passed through them, indicating the presence of ions that can conduct electricity.

Ques 8. The metals which are found in both free state as well as combined state

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

Solution Gold and silver: These metals are found in both free state (as native metals) and combined state (in various minerals or ores).

Ques 9. 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) 3 and 3

Solution 3 and 3: A molecule of benzene (C_6H_6) contains 3 single bonds and 3 double bonds, forming a hexagonal ring structure.

Ques 10. In human beings, when the process of digestion is completed, the (1) proteins, (ii) carbohydrates, and (ii) fats are respectively finally converted into:

- (A)(i) Amino acids, (ii) glucose and (iii) fatty acids
- (B)(i) Amino acids, (ii) glucose, (ii) fatty acids and glycerol
- (C) (1) Glucose, (1) fatty acids and glycerol, (iii) amino acids
- (D) (1) Sugars, (ii) amino acids, (iii) fatty acids and glycerol

Solution (i) Amino acids, (ii) glucose, (iii) fatty acids and glycerol: After digestion in human beings, proteins are broken down into amino acids, carbohydrates into glucose, and fats into fatty acids and glycerol.

Ques 11. Some wastes are given below:

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

The non-biodegradable wastes among these are:

- (A) (1) and (u)
- (B) (ii) and (iii)
- (C) (i), (iv) and (v)
- (D) (i), (iii) and (iv)

Solution ii) and (iii): Ballpoint pen refills and empty medicine bottles made of glass are non-biodegradable wastes, meaning they cannot be broken down by natural processes.

Ques 14. 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 Blue: When white light passes through a region with fine dust particles, shorter wavelengths of light, such as blue, are scattered more than longer wavelengths, resulting in a predominantly blue color scattered in that region.

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 used in cellular respiration to produce energy. The reason is also true. Free oxygen atoms (O) in the upper atmosphere combine with molecular oxygen (O_2) to form ozone (O_3), which plays a crucial role in absorbing harmful ultraviolet (UV) radiation from the sun, thus protecting life on Earth. Therefore, both the assertion and reason are correct, and the reason explains why the assertion is true.

Ques 18. Assertion A. Most of the plants close their stomata at night.
The closing of stomata helps to conserve water as a large amount of water evaporates from the leaves.

Solution The assertion is true. Most plants do close their stomata at night to prevent excessive water loss through transpiration when photosynthesis is not occurring. The reason also correctly explains why stomata closure helps to conserve water, as a large amount of water evaporates from the leaves during the day. Therefore, both the assertion and reason are correct, and the reason provides a valid explanation for the assertion.

Ques 19. Assertion (A) The extraction of metals from their sulfide ores cannot take place without roasting of the ore
Reason (R) Roasting converts sulfide ores directly into metals

Solution The assertion is true. Roasting is often a necessary step in the extraction of metals from their sulfide ores as it helps to convert the metal sulfides into oxides, which are then reduced to the metal in subsequent steps of the extraction process. However, the reason is incorrect. Roasting does not directly convert sulfide ores into metals; rather, it converts sulfide ores into oxides. Therefore, the assertion is true, but the reason is false.

Ques 20. 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; instead, they always form closed loops. The reason is also true. If magnetic field lines were to intersect, it would imply that the compass needle at the point of intersection would point towards two different directions, which contradicts the behavior of magnetic compass needles. Therefore, both the assertion and reason are correct, and the reason provides a valid explanation for the assertion.

SECTION B

Questions 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.

Solution (a) Water reaches the leaves of plants through a process called transpiration. Water is absorbed by the roots from the soil and transported upwards through the plant's vascular system (xylem). As water evaporates from the leaves' stomata, it creates a negative pressure or tension, which pulls more water up from the roots, leading to a continuous flow of water from the roots to the leaves.

OR

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

Solution (b) Amoeba exhibits holozoic nutrition. It engulfs food particles, such as bacteria or algae, by forming pseudopodia around them to create a food vacuole. Digestive enzymes are then secreted into the food vacuole, where digestion occurs. Nutrients are absorbed through the cell membrane into the cytoplasm for further use by the organism.

Ques 22. A spatula full of sodium carbonate is taken in a test tube and 2 ml of dilute ethanoic acid is added to it

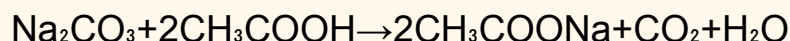
(a) Write a chemical equation for the reaction

(b) Suggest a method of testing the gas liberated in the reaction.

Solution

(a) Chemical equation for the reaction:

Sodium carbonate + Ethanoic acid → Sodium ethanoate + Carbon dioxide + Water



Ques 23.

a) 1 gram of solid sodium chloride was taken in a clean and dry test tube and concentrated sulphuric acid was added to it

(i) Name the gas evolved in the reaction

(ii) What will be observed when this gas is tested with (1) dry, and (2) wet blue litmus paper. Write your conclusion about the nature (acidic/basic) of this gas

Solution (a) (i) Gas evolved in the reaction: Hydrogen gas (H_2).

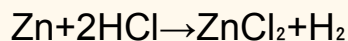
(ii) Observations with litmus paper:

Dry blue litmus paper remains blue, indicating that hydrogen gas is neutral. Wet blue litmus paper turns red, indicating that hydrogen gas is acidic.

OR

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

Solution Metals react with acids to produce salt and hydrogen gas. For example, when zinc reacts with hydrochloric acid, it produces zinc chloride and hydrogen gas:



To test the presence of hydrogen gas, a burning splint can be brought near the mouth of the test tube containing the reaction mixture. If a popping sound is heard, it confirms the presence of hydrogen gas.

Ques 24. Mendel crossed pea plants with two pairs of contrasting characters.

RRYY
Round Yellow

X

rryy
Wrinkled, Green

He observed 4 types of combinations in F₂ generation. Which of the combinations were new? Write the conclusion drawn by this experiment.

Solution Mendel crossed pea plants with two pairs of contrasting characters: RRYY (Round, Yellow) and rryy (Wrinkled, Green). In the F₁ generation, he observed four types of combinations, including Round Yellow, Wrinkled Yellow, Round Green, and Wrinkled Green. Among these combinations, the new combinations were Round Green and Wrinkled Yellow. The conclusion drawn from this experiment is that traits segregate independently of each other during gamete formation, which is known as Mendel's Law of Independent Assortment.

Ques 25. Name the phenomenon of light responsible for the Tyndall effect. Write an event where this phenomenon can be served

Solution The phenomenon of light responsible for the Tyndall effect is called scattering. The Tyndall effect occurs when light is scattered by particles in a colloidal dispersion or suspension. An event where this phenomenon can be observed is when sunlight passes through a dusty room, making the dust particles visible as they scatter the light, causing the sunlight to appear as a beam of light.

Ques 26. State Joule's law of heating. How is this effect useful in electric circuits Where fuse is used as a safety device?

Solution Joule's law of heating states that the heat produced in a conductor is directly proportional to the square of the current passing through it, the resistance of the conductor, and the time for which the current flows. Mathematically, it can be expressed as $H=I^2Rt$, where H is the heat produced, I is the current, R is the resistance, and t is the time.

This effect is useful in electric circuits as it helps in determining the amount of heat generated by a given current passing through a resistor, which is crucial for various applications such as electric heating, cooking appliances, etc. Fuses are used as safety devices in electric circuits because they contain a thin wire that melts when the current exceeds a

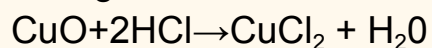
certain limit, thus breaking the circuit and preventing overheating or damage to the circuit components.

SECTION.C

Ques 27 to 33 are short answer type question

Ques 27. A small amount of copper oxide was taken in a beaker and dilute hydrochloric acid was added with continuous stirring of the solution. Name the compound formed and state the color of its solution. Write a balanced chemical equation for the reaction that occurs. Based on the reaction, state the nature (acidiobasic) of copper oxide

Solution When a small amount of copper oxide reacts with dilute hydrochloric acid, copper chloride (CuCl_2) is formed, and the solution turns blue-green in color. The balanced chemical equation for the reaction is:



Based on the reaction, copper oxide shows basic nature as it reacts with an acid (hydrochloric acid) to form a salt (copper chloride) and water.

Ques 28. 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 The power of accommodation of the human eye refers to its ability to adjust its focus in order to see objects clearly at different distances. When we increase the distance of an object from the eye, the image distance in the eye also increases. This happens because the ciliary muscles surrounding the lens contract, causing the lens to become thinner. This reduces its refractive power, allowing it to focus on distant objects. The part of the human eye responsible for this adjustment is the ciliary body, which controls the shape of the lens through the tension on the suspensory ligaments.

Ques 30. How is the sex of a newborn individual determined in different species of animals? Give three examples to support your answer.

Solution The sex of a newborn individual is determined in different species of animals by the combination of sex chromosomes inherited from their parents. Three examples are:

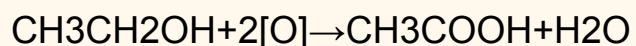
1. In humans, females have two X chromosomes (XX) and males have one X and one Y chromosome (XY).

2. In birds, females have a ZW chromosome combination, while males have ZZ chromosomes.

3. In some reptiles, such as crocodiles, the temperature during egg incubation determines the sex of the offspring, with higher temperatures producing males and lower temperatures producing females.

Ques 31. Why is the conversion of ethanol to ethanoic acid an oxidation reaction? Name the oxidizing agent used in this conversion. Write a chemical equation for this oxidation reaction. How is this reaction different from the reaction in which ethanol burns in the presence of oxygen?

Solution The conversion of ethanol to ethanoic acid is an oxidation reaction because ethanol loses hydrogen atoms and gains oxygen atoms during the process. The oxidizing agent used in this conversion is potassium dichromate. The chemical equation for this oxidation reaction is:



This reaction is different from the reaction in which ethanol burns in the presence of oxygen because in combustion, ethanol reacts with oxygen to produce carbon dioxide and water without any change in oxidation state, while in oxidation, ethanol undergoes a change in oxidation state.

Ques 32.

- (a) How is a solenoid prepared? Differentiate between a circular coil and a solenoid
- (b) Draw the pattern of the magnetic field lines inside a current carrying solenoid. What does this pattern indicate?

Solution (a) A solenoid is prepared by winding a wire into a cylindrical coil with many turns. A circular coil is a simple loop of wire, while a solenoid is a coil of wire wound in the form of a helix. The main difference is that a solenoid has multiple turns of wire, resulting in a stronger magnetic field compared to a single loop.

(b) The pattern of magnetic field lines inside a current-carrying solenoid resembles that of a bar magnet, with the field lines running parallel to the axis of the solenoid from one end to the other. This pattern indicates that a solenoid behaves like a magnet, with a north pole at one end and a south pole at the other, when current flows through it.

Ques 33. (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.

Solution In Hydra, a freshwater organism, reproduction primarily occurs through a process called budding. Here's how it works

Process Explanation:

A bud, which develops as an outgrowth on the body wall of the parent Hydra, gradually grows in size.

As the bud matures, it forms tentacles and acquires its own mouth and digestive cavity.

Eventually, the bud detaches from the parent Hydra, becoming an independent organism.

The parent Hydra can continue to produce more buds, allowing for asexual reproduction to occur rapidly.

Cells Involved in Reproduction:

The cells responsible for reproduction in this process are the interstitial cells, also known as the interstitial or germ cells. These cells are located in the body wall of Hydra and give rise to both somatic cells (for growth and maintenance) and germ cells (for reproduction).

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

(i) Roles of Seminal Vesicles and Prostate Gland:

Seminal Vesicles:

Secrete a fluid rich in fructose and other nutrients, providing energy to sperm.

Contribute to the majority of the seminal fluid volume, enhancing sperm motility and viability.

Prostate Gland:

Secretes an alkaline fluid that helps neutralize the acidity of the male urethra and female reproductive tract, enhancing sperm survival.

Produces enzymes that aid in the liquefaction of semen after ejaculation, facilitating sperm movement.

(ii) Role of Oviduct:

Facilitates Fertilization:

Picks up the released egg (ovum) from the ovary and provides a site for fertilization by sperm.

Provides a conducive environment for fertilization to occur, including appropriate pH, nutrients, and supportive cells.

Transportation of Fertilized Egg:

Transports the fertilized egg (zygote) from the site of fertilization in the fallopian tube to the uterus for implantation and further development.

Provides nourishment to the developing embryo during its journey to the uterus.

(iii) Role of Testis:

Sperm Production:

Testes produce sperm through a process called spermatogenesis, which occurs in the seminiferous tubules.

Sperm production is essential for male fertility and reproduction.

Hormone Secretion:

Testes secrete testosterone, the primary male sex hormone, which regulates various aspects of male reproductive function, including sperm production, secondary sexual characteristics, and libido.

Ques 38. Three metal samples of magnesium, aluminum and iron were taken and rubbed with sand paper. These samples were then put separately in test tubes containing dilute hydrochloric acid. Thermometers were also suspended in each test tube so that their bulbs dipped in the acid. The rate of formation of bubbles was observed. 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 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

(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) The rate of formation of bubbles was fastest and the thermometer showed the highest temperature in the test tube containing magnesium. This indicates that magnesium reacts most vigorously with dilute hydrochloric acid among the three metals.

(b) Aluminium did not react with dilute hydrochloric acid. This is because aluminum forms a protective oxide layer on its surface upon exposure to air, which prevents further reaction with acids.

(c) (i) Hydrogen gas is not evolved when a metal reacts with dilute nitric acid because nitric acid is a strong oxidizing agent and oxidizes the hydrogen gas formed to water and nitrogen oxides. The ultimate products formed in the reaction are metal nitrates and water.

OR

(c) (ii) The type of reaction on the basis of which reactivity of metals is decided is displacement or single replacement reaction. To decide which metal is more reactive than the other, a more reactive metal will displace a less reactive metal from its compound in a single displacement reaction. Therefore, if metal X displaces metal Y from its compound, then metal X is more reactive than metal Y.

Ques 39. Kidneys are vital organs for survival. Several factors like infections, injury or restricted blood flow to kidneys reduce the activity of kidneys. This leads to accumulation of poisonous wastes in the body, which can even lead to death. In case of kidney failure, an artificial kidney can be used. An artificial kidney is a device to remove waste products from the blood through dialysis.

(a)

(i) Name the artery that brings oxygenated blood to the kidney

(ii) Name the cluster the thin walled blood capillaries present in the Bowman's capsule

(b) In the human excretory system, name the organ which stores urine. Is this organ under hormonal control or nervous control?

(c)

(i) List two major steps involved in the formation of urine and state in brief their functions.

OR

(ii) In which part of the nephron does selective reabsorption take place ? List the factors which the amount of water reabsorbed depends on

Solution

(a)

(i) The artery that brings oxygenated blood to the kidney is called the renal artery.

(ii) The cluster of thin-walled blood capillaries present in the Bowman's capsule is called the glomerulus.

(b) In the human excretory system, the organ which stores urine is the urinary bladder. This organ is under nervous control.

(c)

(i) Two major steps involved in the formation of urine are:

Filtration: Filtration occurs in the renal corpuscle, where blood pressure forces fluid and small solutes out of the glomerular capillaries and into the Bowman's capsule. The function of filtration is to separate waste products, ions, and excess substances from the blood.

Reabsorption: Reabsorption takes place in the renal tubules and collecting ducts, where useful substances such as glucose, amino acids, and water are reabsorbed back into the bloodstream. The function of reabsorption is to reclaim essential nutrients and maintain the body's water balance.

OR

(ii) Selective reabsorption takes place in the renal tubules, particularly in the proximal convoluted tubule and the loop of Henle. The amount of water reabsorbed depends on several factors including:

Concentration gradient: The concentration gradient between the filtrate in the tubules and the interstitial fluid of the renal medulla drives the reabsorption of water.

Permeability of tubules: The permeability of the tubules to water is regulated by hormones such as antidiuretic hormone (ADH) and aldosterone, which control the expression of aquaporin channels.

Blood pressure: Changes in blood pressure affect the filtration rate in the glomerulus, which indirectly influences the reabsorption of water in the tubules.