

CBSE Class 10 Science Solutions

(Set 2 - 31/5/2)

SECTION A

Ques 1. Which of the following is not a thermal decomposition reaction?

- (A) $2 \text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$
- (B) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- (C) $2 \text{AgCl} \rightarrow 2 \text{Ag} + \text{Cl}_2$
- (D) $\text{Pb}(\text{NO}_3)_2 \rightarrow 2 \text{PbO} + 4 \text{NO}_2 + \text{O}_2$

Solution: Option (A) is not a thermal decomposition reaction. It is a redox reaction, but not a thermal decomposition reaction.

Ques 2. The process in which transport of soluble products of photosynthesis takes place in plants is known as:

- (A) Transpiration
- (C) Conduction
- (B) Evaporation
- (D) Translocation

Solution: The process in which transport of soluble products of photosynthesis takes place in plants is known as (D) Translocation.

Ques 3. Sense organ in which olfactory receptors are present is:

- (A) Nose
- (B) Skin
- (C) Tongue
- (D) Inner ear

Solution: The sense organ in which olfactory receptors are present is (A) Nose.

Ques 4. The incorrect statement about placenta is:

- (A) It is a disc embedded in the uterine wall.
- (B) It contains villi on the embryo's side of the tissue.
- (C) It has a very small surface area for glucose and oxygen to pass from mother to the embryo.
- (D) The embryo gets nutrition from the mother's blood through it.

Solution: The incorrect statement about placenta is (C) It has a very small surface area for glucose and oxygen to pass from mother to the embryo.

Ques 5. Which of the following is a redox reaction, but not a combination reaction?

- (A) $C + O_2 \rightarrow CO_2$
- (C) $2 Mg + O_2 \rightarrow 2 MgO$
- (B) $2H_2 + O_2 \rightarrow 2 H_2O$
- (D) $Fe_2O_3 + 3 CO \rightarrow 2 Fe + 3 CO_2$

Solution: The redox reaction, but not a combination reaction, is (D) $Fe_2O_3 + 3 CO \rightarrow 2 Fe + 3 CO_2$.

Ques 6. The salt present in tooth enamel is:

- (A) Calcium phosphate
- (C) Sodium phosphate
- (B) Magnesium phosphate
- (D) Aluminium phosphate

Solution: The salt present in tooth enamel is (A) Calcium phosphate.

Ques 7. Identify an involuntary action from the following:

- (A) Riding a bicycle
- (B) Picking up a pencil
- (C) Regular beating of heart

(D) Walking in a straight line

Solution: An involuntary action from the following is (C) Regular beating of the heart.

Ques 8. An aqueous solution of sodium chloride is prepared in distilled water. The pH of this solution is:

- (A) 6
- (C) 7
- (B) 8
- (D) 3

Solution: The pH of an aqueous solution of sodium chloride prepared in distilled water is (C) 7.

Ques 9. A metal 'X' is used in thermite process. When 'X' is heated with oxygen, it gives an oxide 'Y', which is amphoteric in nature. 'X' and 'Y' respectively are:

- (A) Mn, MnO₂
- (C) Fe, Fe₂O₃
- (B) Al, Al₂O₃
- (D) Mg, MgO

Solution: The metal 'X' used in the thermite process, when heated with oxygen, gives an oxide 'Y', which is amphoteric in nature. 'X' and 'Y' respectively are (B) Al, Al₂O₃.

Ques 10. Which one of the following is not a natural ecosystem?

- (A) Pond ecosystem
- (C) Forest ecosystem
- (B) Grassland ecosystem
- (D) Cropland ecosystem

Solution: The option that is not a natural ecosystem is (D) Cropland ecosystem.

Ques 12. The current carrying device which produces a magnetic field similar to that of a bar magnet is:

- (A) A straight conductor
- (B) A circular loop
- (C) A solenoid
- (D) A circular coil

Solution: The current carrying device which produces a magnetic field similar to that of a bar magnet is: (C) A solenoid.

Ques 13. Select from the following the conditions responsible for the rapid spread of bread mold on a slice of bread:

- (i) Formation of large number of spores
 - (ii) Presence of moisture and nutrients in bread
 - (iii) Low temperature
 - (iv) Presence of hyphae
- (A) (i) and (ii)
 - (B) (ii) and (iv)
 - (C) (ii) and (iii)
 - (D) (iii) and (iv)

Solution: The conditions responsible for the rapid spread of bread mold on a slice of bread are: (B) (ii) and (iv) - Presence of moisture and nutrients in bread and Presence of hyphae.

Ques 14. How will the image formed by a convex lens be affected, if the upper half of the lens is wrapped with a black paper?

- (A) The size of the image formed will be one-half of the size of the image due to the complete lens.
- (B) The image of the upper half of the object will not be formed.
- (C) The brightness of the image will reduce.
- (D) The lower half of the inverted image will not be formed.

Solution: How the image formed by a convex lens will be affected if the upper half of the lens is wrapped with black paper: (C) The brightness of the image will reduce.

Ques 15. The phenomena of light involved in the formation of rainbow are:

- (A) Refraction, reflection and dispersion
- (B) Refraction, dispersion and internal reflection
- (C) Reflection, dispersion and internal reflection
- (D) Refraction, dispersion, scattering and total internal reflection

Solution: The phenomena of light involved in the formation of a rainbow are: (A) Refraction, reflection, and dispersion.

Ques 16. The color of light for which the refractive index of glass is minimum, is:

- (A) Red
- (C) Green
- (B) Yellow
- (D) Violet

Solution: The color of light for which the refractive index of glass is minimum, is: (D) Violet.

Ques 17. Assertion (A): Ozone layer protects the surface of the Earth from harmful UV radiations.

Reason (R): Chlorofluorocarbons (CFCs) are responsible for depletion of the ozone layer.

Solution: Assertion (A) is true. The ozone layer, located in the Earth's stratosphere, absorbs the majority of the Sun's harmful ultraviolet (UV) radiation, thus protecting life on Earth from its harmful effects.

Reason (R) is also true. Chlorofluorocarbons (CFCs), which were commonly used in refrigerants, aerosol propellants, and solvents, are responsible for the depletion of the ozone layer. When released into the

atmosphere, CFCs break down ozone molecules, leading to a reduction in the ozone layer's thickness.

The relationship between the assertion and reason is that CFCs, due to their chemical properties, can reach the upper atmosphere where they release chlorine atoms upon exposure to UV radiation. These chlorine atoms then catalyze the breakdown of ozone molecules, leading to ozone depletion.

Ques 18. Assertion (A): Some vegetable oils are healthy.

Reason (R): Vegetable oils generally have long unsaturated carbon chains.

Solution: Both assertion (A) and reason (R) are correct, and reason (R) explains assertion (A) correctly. Vegetable oils, such as olive oil and avocado oil, contain unsaturated fats, which are considered healthier than saturated fats. The long unsaturated carbon chains in these oils contribute to their health benefits.

Ques 19. Assertion (A): Sex of the children will be determined by what they inherit from their mother.

Reason (R): Women have XX sex chromosomes.

Solution: Assertion (A) is incorrect, but reason (R) is correct. The sex of the children is determined by the combination of sex chromosomes inherited from both parents. While it's true that women typically have XX sex chromosomes, the sex of the child is determined by the combination of chromosomes from both parents, with the father contributing either an X or a Y chromosome.

Ques 20. Assertion (A): Electrons move from lower potential to higher potential in a conductor.

Reason (R): A dry cell maintains electric potential difference across the ends of a conductor.

Solution: Assertion (A) is incorrect, but reason (R) is correct. Electrons move from higher potential to lower potential in a conductor, not the other way around. A dry cell does indeed maintain an electric potential difference across the ends of a conductor, which facilitates the flow of electrons from higher potential to lower potential.

SECTION B

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

Ques 21.

(a) Sometimes while running, the athletes suffer from muscle cramps. Why? How is the respiration in this case different from aerobic respiration?

Solution: Athletes may suffer from muscle cramps while running due to the accumulation of lactic acid in their muscles during anaerobic respiration. This type of respiration occurs when the body cannot supply enough oxygen to the muscles for aerobic respiration to take place. Anaerobic respiration produces lactic acid as a byproduct, leading to muscle fatigue and cramps.

OR

(b) Write the other name given to lymph. State its two functions.

Solution: Lymph is also known as tissue fluid. Its functions include transporting fats and fat-soluble vitamins absorbed from the digestive system, and aiding in the removal of waste products and pathogens from tissues through lymphatic vessels.

Ques 23. (a) Copper powder is taken in a china dish and heated over a burner. Name the product formed and state its color. Write the chemical equation for the reaction involved.

Solution: When copper powder is heated over a burner, it undergoes oxidation to form copper oxide (CuO), which is black in color. The chemical equation for the reaction involved is:

Ques 25. Define power of a lens. Find power of a lens whose focal length is 50 cm.

Solution: $P = 2D$

Ques 26. An electric source can supply a charge of 750 coulomb. If the current drawn by a device is 15 mA, find the time in which the electric source will be discharged completely.

Solution: $t = 50000 \text{ sec}$

SECTION C

Ques 27

(b) What is dispersion of white light? State its cause. Draw a diagram to show dispersion of a beam of white light by a glass prism.

Solution: Definition: Dispersion of white light refers to the splitting of white light into its component colors when it passes through a medium like a prism. This occurs because different colors of light travel at different speeds through the medium, causing them to bend by different amounts and thus separate.

Cause: The main cause of dispersion is the variation of the refractive index of the medium with wavelength. Different colors of light have different wavelengths, and since the refractive index of a medium depends on the wavelength of light, each color of light bends by a different angle as it passes through the prism, resulting in separation.

Ques 28. Suggest an activity to differentiate between the chemical properties (acidic or basic character) of the product obtained on burning a metal (magnesium) and a nonmetal (sulfur).

Solution: Activity to Differentiate between the Chemical Properties of Magnesium and Sulphur:

One simple activity to differentiate between the chemical properties of magnesium (a metal) and sulfur (a non-metal) is:

Take small pieces of magnesium ribbon and sulfur.

Heat both of them separately using a Bunsen burner flame.

Observe the changes that occur during heating.

Observations:

Magnesium burns with a bright white flame, producing magnesium oxide (MgO), which is a white ash.

Sulphur burns with a blue flame, producing sulfur dioxide gas (SO₂), which has a pungent smell and turns moist blue litmus paper red.

Conclusion:

Magnesium reacts with oxygen to form an oxide, showing typical metallic behavior.

Sulphur reacts with oxygen to form a dioxide, showing typical non-metallic behavior.

Ques 30. A plant with violet flowers (VV) was crossed with a plant with white flowers (vv).

(a) What color of flowers was obtained in the plants of F₁ generation and why?

(b) Write the percentage of plants with white flowers in F₂ generation plants, if F₁ plants were self-pollinated. Give reason why this trait was not expressed in F₁ generation.

(c) In what ratio did we get the plants with (VV) and (Vv) gene combinations in the F₂ generation?

Solution: (a) F₁ Generation: All plants in the F₁ generation would have violet flowers because the allele for violet flowers (V) is dominant over the allele for white flowers (v). Therefore, the genotype of all F₁ plants would be Vv, resulting in the phenotype of violet flowers.

(b) Percentage of White Flowers in F₂ Generation: If the F₁ plants were self-pollinated, according to Mendel's law of segregation, the genotype ratio in the F₂ generation would be 1 VV : 2 Vv : 1 vv. Therefore, 25% of the plants would have white flowers (vv genotype) in the F₂ generation.

(c) Ratio of (VV) and (Vv) Gene Combination in F₂ Generation: In the F₂ generation, the ratio of plants with the (VV) gene combination to those with the (Vv) gene combination would be 1:2. This is because both VV and Vv genotypes would result in the phenotype of violet flowers, so they cannot be distinguished phenotypically. However, statistically, the ratio would be 1 VV : 2 Vv.

Ques 31. Taking the example of any two animal hormones along with their gland of secretion, explain how these hormones help (i) in growth and development and (ii) regulate metabolism in the body.

P.T

Solution: Example 1: Insulin

Gland of Secretion: Pancreas

Function in Growth and Development:

Insulin plays a crucial role in facilitating the uptake of glucose by cells, providing energy necessary for growth and development.

It promotes the synthesis of proteins, which are essential for tissue repair and growth.

Function in Metabolism Regulation:

Insulin regulates carbohydrate metabolism by promoting the storage of glucose in the liver and muscles in the form of glycogen.

It also regulates lipid metabolism by inhibiting the breakdown of fats and promoting their storage, preventing excessive levels of fatty acids in the bloodstream.

Example 2: Thyroxine (T₄)

Gland of Secretion: Thyroid

Function in Growth and Development:

Thyroxine regulates the metabolic rate and influences growth and development by promoting protein synthesis and stimulating tissue differentiation.

It is essential for the normal development of the central nervous system in fetuses and infants.

Function in Metabolism Regulation:

Thyroxine regulates basal metabolic rate by increasing oxygen consumption and heat production in cells, thus controlling energy expenditure.

It also affects carbohydrate, lipid, and protein metabolism by influencing the activity of enzymes involved in these processes.

Ques 32. "Earth wire is a safety measure in domestic electric circuits." Justify this statement explaining its role in case of accidental leakage of electric appliances.

Solution: Role of Earth Wire in Domestic Electric Circuits:

The earth wire, also known as the grounding wire, is a safety measure in domestic electric circuits.

In case of accidental leakage of electric appliances or short circuits, the earth wire provides a low-resistance path for the current to flow to the ground.

This prevents the buildup of excessive voltage in the circuit and reduces the risk of electric shock to humans and damage to appliances.

The earth wire effectively diverts the excess current away from the circuit, ensuring safety and protecting both life and property.

Ques 33. Differentiate between food chain and food web. In a food chain consisting of deer, grass and tiger, if the population of deer decreases, what will happen to the population of organisms belonging to the first and third trophic levels?

Solution: Food Chain: A food chain is a linear sequence of organisms where each organism serves as a source of food for the next organism in the chain. It represents a single pathway of energy and nutrient transfer in an ecosystem.

Food Web: A food web is a more complex network of interconnected food chains that depicts multiple feeding relationships in an ecosystem. It includes various organisms and their interactions, illustrating the complexity of energy flow and nutrient cycling.

Effect of Deer Population Decrease:

If the population of deer decreases in the food chain consisting of deer, grass, and tiger, it would lead to:

Decreased predation pressure on the grass population (first trophic level), potentially resulting in an increase in the grass population due to reduced grazing.

Increased competition among tigers (third trophic level) for food, as their primary prey species (deer) becomes scarcer, potentially affecting the tiger population depending on the availability of alternative prey species.

SECTION D

Questions no. 34 to 36 are long answer type questions.

Ques 34.

(a)

Explain chlor-alkali process and write balanced chemical equations for the reactions that occur. Name the gasses obtained at the anode and cathode respectively. Mention two uses each of the two gasses obtained in the above process.

Solution:

OR

(b) Common salt is a very important raw material as many compounds of industrial use can be prepared from it. Explain, giving chemical equations, the method of preparation of washing soda from sodium chloride. List four industrial/domestic uses of washing soda.

Ques 35.

(a)

(i) The potential difference across the two ends of a circuit component is decreased to one-third of its initial value, while its resistance remains constant. What change will be observed in the current flowing through it? Name and state the law which helps us to answer this question.

Solution: (a) (i) Change in Current Flow:

- According to Ohm's Law, $V=IR$

$V=IR$, where

V is the voltage,

I is the current, and

R is the resistance.

If the potential difference (V) across the component is decreased to one-third of its initial value while the resistance (R) remains constant, then the current (I) flowing through the component will also decrease to one-third of its initial value.

- This decrease in potential difference results in a proportional decrease in the current flowing through the component.

SECTION E

Ques 39. Pollination is an important process in sexual reproduction of plants. It is an essential process that facilitates fertilization in plants. Pollinating agents can be wind, water, insects and birds. Several changes take place in the flower after the fertilization has taken place.

(a) Write the main difference between self-pollination and cross-pollination.

(b) Name the part of the flower which attracts insects for pollination. What happens to this part after fertilization?

(c)

(i) Define fertilization. What is the fate of ovules and the ovary in a flower after fertilization?

OR

(c)

(ii) In a germinating seed, which parts are known as future shoot and future root? Mention the function of cotyledon.

Solution: (a) The main difference between self-pollination and cross-pollination lies in the source of pollen used for fertilization:

Self-pollination: In self-pollination, pollen grains from the anther of a flower are transferred to the stigma of the same flower or another flower on the

same plant. This can occur through various mechanisms such as wind, gravity, or insect activity.

Cross-pollination: In cross-pollination, pollen grains from the anther of one flower are transferred to the stigma of a flower on a different plant of the same species. This usually involves the assistance of external agents like insects, birds, wind, or water.

(b) The part of the flower that attracts insects for pollination is usually the floral structures containing nectar and/or strong fragrances, such as the petals and the nectaries. After fertilization, these parts may undergo various changes depending on the plant species. In some cases, they may wither and fall off, while in others, they may persist to aid in the development of seeds and fruits.

(c)

(i) Fertilization is the process of fusion of male and female gametes (sperm and egg) to form a zygote. In flowers, fertilization occurs when a pollen grain lands on the stigma and forms a pollen tube, which grows down through the style and enters the ovary. Inside the ovary, the pollen tube releases sperm cells, which fertilize the egg cell within the ovule, leading to the formation of a zygote. After fertilization, the ovules develop into seeds, and the ovary matures into a fruit, enclosing the seeds for dispersal.

OR

(ii) In a germinating seed, the future shoot is known as the plumule, while the future root is called the radicle. The plumule gives rise to the shoot system, which includes the stem, leaves, and eventually flowers and fruits. The radicle develops into the primary root, which anchors the plant and absorbs water and nutrients from the soil. The cotyledon, which is the seed's primary storage tissue, provides nourishment to the developing embryo and acts as a nutrient reserve until the seedling can produce its own food through photosynthesis.