CBSE EXAMINATION PAPER-2024

SCIENCE

(Solved)

Time allowed : 3 hours | Maximum Marks : 90

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **45 questions.** All questions are **compulsory.**

ii. This question paper is divided into **5 sections.**

iii. **Section A** – questions number **1 to 3** are case based questions

iv. **Section B** – questions number **4 to 23** are multiple choice questions

v. **Section C** – questions number **24 to 31** are very short answer

vi. **Section D** – questions number **32 to 39** are short answer

vii. **Section E** – questions number **40 to 45** are long answer

viii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

ix. Use of calculator is NOT allowed.

Section A

Question 1. Carbon is a versatile element that forms the basis of all living organisms and many of the things we use. A large variety of compounds is formed because of its tetravalency. Compounds of carbon are formed with oxygen, hydrogen, nitrogen, sulphur, chlorine and many other elements.

(1) What are hydrocarbons?

[1 Marks]

(2) List two properties by virtue of which carbon can form a large number of compounds.

[1 Marks]

(3) Write the formula of the functional group present in (1) aldehydes, and (2) ketones. Write a chemical equation for the reaction that occurs between ethanoic acid and ethanol in the presence of a catalyst.

[2 Marks]

(4)

What are structural isomers? Write the structures of two

isomers of butane (C_4H_{10})

[2 Marks]

Question 2. Pollination is an important process in sexual reproduction of plants. It is an essential process that facilitates fertilisation in plants. Pollinating agents can be wind, water, insects and birds. Several changes take place in the flower after the fertilization has taken place.

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

[1 Marks]

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

[1 Marks]

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

[2 Marks]

(4)

In a germinating seed, which parts are known as future

shoot and future root ? Mention the function of cotyledon.

[2 Marks]

Question 3.

A highly polished surface such as a mirror reflects most of the light falling on it. In our daily life we use two types of mirrors plane and spherical. The reflecting surface of a spherical mirrors may be curved inwards or outwards. In concave mirrors, reflection takes place from the inner surface, while in convex mirrors reflection takes place from the outer surface.

(1) A ray of light is incident on a concave mirror, parallel to its principal axis. If this ray after reflection from the mirror passes through the principal axis from a point at a distance of 10 cm from the pole of the mirror, find the radius of curvature of the mirror.

[1 Marks]

(2) Define the principal axis of a concave mirror.

[1 Marks]

(3) An object is placed at a distance of 10 cm from the pole of a convex mirror of focal length 15 cm. Find the position of the image.

[2 Marks]

(4)

A mirror forms a virtual, erect and diminished image of an

object. Identify the type of this mirror. Draw a ray diagram

to show the image formation in this case.

[2 Marks]

Section B

Question 4.

To balance the following chemical equation, the values of the coefficients x, y, and z must be respectively:

[1 Marks]

$$x\ Zn(NO_3)_2 \xrightarrow{\Delta} y\ ZnO + z\ NO_2 + O_2$$

(A) 4, 4, 2

(B) 4, 2, 2

(C) 2, 4, 2

(D) 2, 2, 4

Question 5.

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

[1 Marks]

(A) $Fe_2O_3 + 3\ CO \rightarrow 2\ Fe + 3\ CO_2$

(B) $2\ Mg + O_2 \rightarrow 2\ MgO$

(C) $2\ H_2 + O_2 \rightarrow 2\ H_2O$

(D) $C + O_2 \rightarrow CO_2$

Question 6. The salt present in tooth enamel is:

[1 Marks]

(A) Calcium phosphate

(B) Sodium phosphate

(C) Aluminium phosphate

(D) Magnesium phosphate

Question 7. An aqueous solution of sodium chloride is prepared in distilled water. The pH of this solution is:

[1 Marks]

(A) 7

(B) 8

(C) 3

(D) 6

Question 8.

Select from the following the conditions responsible for the rapid spread of bread mould 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

[1 Marks]

(A) (iii) and (iv)

(B) (ii) and (iii)

(C) (ii) and (iv)

(D) (i) and (ii)

Question 9. The process in which transport of soluble products of photosynthesis takes place in plants is known as:

[1 Marks]

(A) Transpiration

(B) Evaporation

(C) Translocation

(D) Conduction

Question 10. Sense organ in which olfactory receptors are present is:

[1 Marks]

(A) Nose

(B) Skin

(C) Tongue

(D) Inner ear

Question 11. The incorrect statement about placenta is:

[1 Marks]

(A) It is a disc embedded in the uterine wall.

(B) It has a very small surface area for glucose and oxygen to pass from mother to the embryo.

(C) The embryo gets nutrition from the mother.

(D) It is formed only during pregnancy.

Question 12.

The correct sequence of events when someone's hand touches a hot object unconsciously:

[1 Marks]

(A) Receptors in skin →Motor neuron → Relay neuron → Sensory neuron → Effector muscle in arm

(B) Receptors in skin → Sensory neuron → Relay neuron →Motor neuron → Effector muscle in arm

(C) Receptors in skin → Relay neuron → Sensory neuron → Motor neuron → Effector muscle in arm

(D) Receptors in skin → Sensory neuron → Effector muscle in arm → Motor neuron → Relay neuron

Question 13. How will the image formed by a convex lens be affected, if the upper half of the lens is wrapped with a black paper?

[1 Marks]

(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.

Question 14.

The phenomena of light involved in the formation of rainbow are:

[1 Marks]

(A) Refraction, reflection and dispersion

(B) Refraction, dispersion, scattering and total internal reflection

(C) Refraction, dispersion and internal reflection

(D) Reflection, dispersion and internal reflection

Question 15. The colour of light for which the refractive index of glass is minimum, is:

[1 Marks]

(A) Yellow

(B) Red

(C) Green

(D) Violet

Question 16. The current-carrying device which produces a magnetic field similar to that of a bar magnet is:

[1 Marks]

(A) A straight conductor

(B) A circular loop

(C) A circular coil

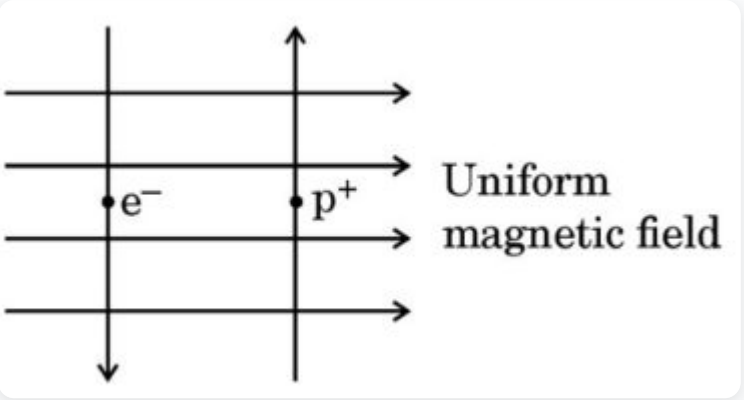
(D) A solenoid

Question 17.

A uniform magnetic field exists in the plane of paper as shown in the diagram. In this field, an electron

(e^-) and a positron (p^+) enter and shown. The electron and positron experience forces:

[1 Marks]



(A) both pointing into the plane of the paper.

(B) both pointing out of the plane of the paper.

(C) pointing into the plane of the paper and out of the plane of the paper respectively.

(D) pointing out of the plane of the paper and into the plane of the paper respectively.

Question 18. Which one of the following is not a natural ecosystem?

[1 Marks]

(A) Pond ecosystem

(B) Grassland ecosystem

(C) Forest ecosystem

(D) Cropland ecosystem

Question 19.

Assertion (A): Some vegetable oils are healthy.

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

[1 Marks]

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

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

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

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

Question 20.

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

Reason (R): Women have XX sex chromosomes.

[1 Marks]

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

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

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

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

Question 21.

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.

[1 Marks]

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

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

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

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

Question 22.

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

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

[1 Marks]

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

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

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

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

Question 23. A metal 'X' is used in thermit process. When 'X' is heated with oxygen, it gives an oxide 'Y', which is amphoteric in nature. 'X' and 'Y' respectively are :

[1 Marks]

(A) Mn, MnO_2

(B) Mg, MgO

(C) Al, Al_2O_3

(D) Fe, Fe_2O_3

Section C

Question 24.

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

[2 Marks]

Question 25. The melting and boiling points of carbon compounds are generally low and they are largely non-conductors of electricity. State two conclusions based on these two properties.

[2 Marks]

Question 26. Sometimes while running, the athletes suffer from muscle cramps. Why? How is respiration in this case different from aerobic respiration?

[2 Marks]

Question 27. Write the other name given to lymph. State its two functions.

[2 Marks]

Question 28. Some unicellular organisms such as Plasmodium and Leishmania differ in the manner in which they reproduce. Name and explain the reproductive process taking place in them.

[2 Marks]

Question 29.

The heat produced at a point due to concentration of sunlight by a convex lens burns a paper. (a)Explain why it happens. (b) Name the term given to the point at which the paper starts burning.

[2 Marks]

Question 30. An electric source can supply a charge of 500 coulomb. If the current drawn by a device is 25 mA, find the time in which the electric source will be discharged completely.

[2 Marks]

Question 31.

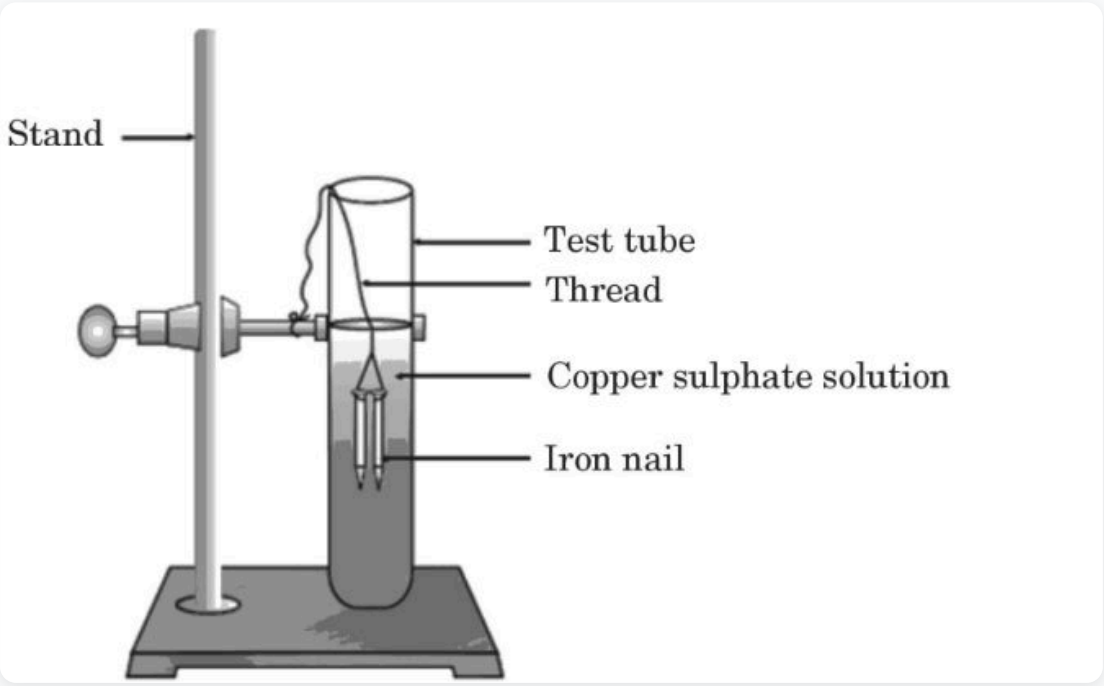
Write chemical equation for the chemical reaction which occurs when the aqueous solutions of barium chloride and sodium sulphate react together. Write the symbols of the ions present in the compound precipitated in the reaction.

[2 Marks]

Section D

Question 32. Study the experimental set-up shown in the diagram and write the chemical equation for the chemical reaction involved. Name and define the type of reaction. List two other metals which can be used in place of iron to show the same type of reaction with copper sulphate solution.

[3 Marks]



Question 33. Name the ore of mercury and state the form in which it is found in nature. Write the chemical equations along with the conditions required for the reactions involved in the extraction of mercury from its ore.

[3 Marks]

Question 34. 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.

[3 Marks]

Question 35.

Mendel crossed pure tall pea plants (TT) with pure short pea plants (tt) and obtained F_1 progeny. When the plants of F_1 progeny were self-pollinated, plants of F_2 progeny were obtained.

(a) What did the plants of F_1 progeny look like? Give their gene combination.

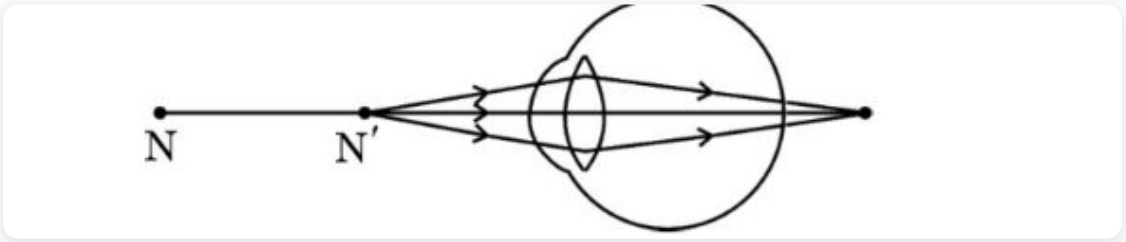
(b) Why could the gene for shortness not be expressed in plants of F_1 progeny?

(c) Write the ratio of the plants obtained in F_2 progeny and state the conclusion that can be drawn from this experiment.

[3 Marks]

Question 36. Study the diagram given below and answer the questions that follow: (i) Name the defect of vision depicted in this diagram stating the part of the eye responsible for this condition. (ii) List two causes of this defect. (iii) Name the type of lens used to correct this defect and state its role in this case.

[3 Marks]



Question 37.

(a) What happens when a bundle of wires of soft iron is placed inside the coil of a solenoid carrying a steady current? Name the device obtained. Why is it called so?

(b) Draw the magnetic field lines inside a current carrying solenoid. What does this pattern of magnetic field lines indicate ?

[3 Marks]

Question 38. 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?

[3 Marks]

Question 39.

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.

[3 Marks]

Section E

Question 40.

A few crystals of ferrous sulphate were taken in a dry boiling tube and heated. Tiny water droplets were observed in the tube after some time.

(i) From where did these water droplets appear? Explain.

(ii) What colour change will be observed during heating?

(iii) How many molecules of water are attached per molecule of $FeSO_4$ crystal? Write the molecular formula of crystalline forms of (I) Copper sulphate, and (II) Sodium carbonate.

(iv) State how is Plaster of Paris obtained from gypsum. Write two uses of Plaster of Paris.

[5 Marks]

Question 41. Design an experiment to demonstrate that carbon dioxide is essential for photosynthesis. Write the observation and conclusion of the experiment.

[5 Marks]

Question 42.

(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.

(ii) Draw a schematic diagram of a circuit consisting of a battery of four 1.5 V cells, a 5 Ω resistor, a 10 Ω resistor and a 15 Ω resistor connected in series. Now find (I) the electric current passing through the circuit, and (II) potential difference across the 10 Ω resistor when the plug key is closed.

[5 Marks]

Question 43.

An acid 'X' present in tamarind when mixed with 'Y', produces a mixture 'Z'. 'Z' on addition to a dough when heated makes cakes soft and spongy. 'Y' is prepared from common salt and helps in faster cooking.

(i) Write the common names of 'X', 'Y' and 'Z', and the chemical formula of 'Y'.
(ii) How is 'Y' prepared and how does it help in making cakes soft and spongy? Illustrate the reaction with suitable chemical equation.
(iii) Write the name and chemical formula of a mild base other than 'Y' used as an antacid.

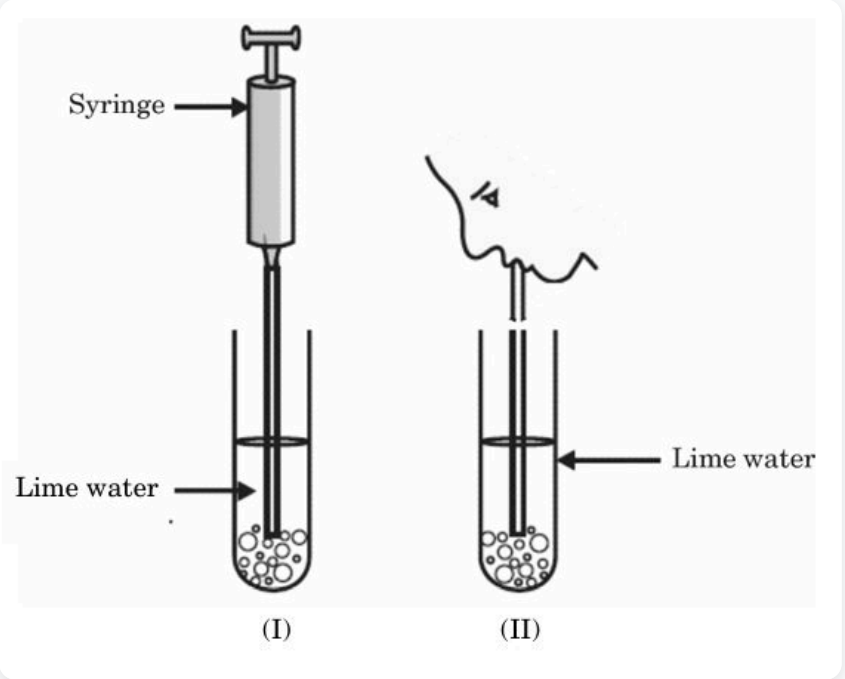
[5 Marks]

Question 44.

(i) In the experimental set-up shown above in diagram (I) atmospheric air is being passed into lime water with a syringe while in diagram (II) air is being exhaled into lime water. The time taken for the lime water to turn milky in both the test tubes is different. Give reason.

(ii) Draw the diagram of an open stomatal pore and label (I) Guard cells, and (II) Chloroplast on it. Mention two functions performed by stomata.

[5 Marks]



Question 45.

(i) When is the potential difference between two points said to be 1 volt ?

(ii) A copper wire has a diameter of 0·2 mm and resistivity of $1{\cdot}6 \times 10^{-8}$ Ωm. What will be the length of this wire to make its resistance 14Ω ? How much does the resistance change, if the diameter of the wire is doubled ?

[5 Marks]