CBSE 2025 Science — Set 2

English Medium

Time Allowed: 3 Hours | Maximum Marks: 80

General Instructions:

1. This question paper contains 39 questions. All questions are compulsory.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 6 questions carrying 2 marks each.
4. Section C has 7 questions carrying 3 marks each.
5. Section D has 3 questions carrying 5 marks each.
6. Section E has 3 case-study based questions carrying 4 marks each.
7. Draw neat diagrams wherever required.

Section A

Multiple Choice Questions (1 mark each)

Q.1 [1 mark]

The correct balanced chemical equation showing exothermic reaction in which natural gas burns in air is:

(a) $CH_4 + O_2 \rightarrow CO_2 + 2H_2O$

(b) $CH_4 + 2O_2 \rightarrow 2CO_2 + 2H_2O$ + Energy

(c) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

(d) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ + Energy

Q.2 [1 mark]

The warning sign shown in the given figure must invariably be displayed/painted on the containers which contain hydroxide of:

(a) Aluminium

(b) Calcium

(c) Sodium

(d) Magnesium

Q.3 [1 mark]

The body of human beings works within the pH range of:

(a) 6.1 to 6.8

(b) 6.5 to 7.3

(c) 7.0 to 7.8

(d) 7.5 to 8.1

Q.4 [1 mark]

Aluminium powder is used in thermit welding because:

(a) Its reaction with iron is highly exothermic.

(b) When it is heated with iron (III) oxide, molten iron is obtained.

(c) When it is heated with iron (III) oxide, molten aluminium oxide is

obtained to join railway tracks.

(d) Its melting point is low as compared to iron and a molten alloy of iron and aluminium is formed on heating which is used to join railway tracks.

Q.5 [1 mark]

Two metals zinc and tin are dissolved separately in definite proportions in molten copper (the primary metal) to obtain two different alloys respectively known as:

(a) Bronze and Brass
(b) Brass and Solder
(c) Brass and Bronze
(d) Solder and Bronze

Q.6 [1 mark]

The opening and closing of stomata is regulated by:

(a) CO_2 concentration in stomata
(b) Temperature in guard cells
(c) O_2 concentration in stomata
(d) Amount of water in guard cells

Q.7 [1 mark]

One-cell thick blood vessels are known as:

(a) Alveoli
(b) Capillaries
(c) Arteries
(d) Veins

Q.8 [1 mark]

Observe the given figures A and B. When chhui-mui (sensitive) plant is touched, its leaves fold. This is due to:

(a) Hormonal effect

(b) Thermal effect
(c) Change in amount of water in cells
(d) Electromagnetic effect

Q.9 [1 mark]

Bryophyllum produces new plant through:

(a) Apical buds formed on the tip of the plant
(b) Vegetative buds produced in the notches of the leaf
(c) Flowers produced in the notches of the branches
(d) Fruits formed on the branches of the plant

Q.10 [1 mark]

The number of chromosomes in a cell division is halved. This kind of cell division is observed in:

(a) Only testis
(b) Only ovary
(c) Ovary and testis both
(d) All cells of the body

Q.11 [1 mark]

If the absolute refractive indices of two media X and Y are 6/5 and 4/3 respectively, then the refractive index of Y with respect to X will be:

(a) 10/9
(b) 9/10
(c) 9/8
(d) 8/9

Q.12 [1 mark]

An object is placed at a distance of 30 cm from the pole of a concave mirror. If its real and inverted image is formed at 60 cm in front of the mirror, the focal length of the mirror is:

(a) -15 cm
(b) -20 cm
(c) +20 cm
(d) +15 cm

Q.13 [1 mark]

In the given figure showing refraction through a prism, the angle of incidence and the angle of deviation respectively are:

(a) 1 and 5
(b) 7 and 6
(c) 7 and 4
(d) 1 and 6

Q.14 [1 mark]

An electric bulb is connected to a power supply of 220 V. If the current drawn by the bulb from the supply is 500 mA, the power of the bulb is:

(a) 11 W
(b) 110 W
(c) 220 W
(d) 1100 W

Q.15 [1 mark]

Four identical resistors of 12 Ω each are connected in series to form a square ABCD as shown in the figure. The resistance of the network between the points 1 and 2 is:

(a) 48 Ω
(b) 36 Ω
(c) 9 Ω
(d) 6 Ω

Q.16 [1 mark]

Identify from the following a group containing all non-biodegradable substances:

(a) Leather, Glass, Plastic
(b) Cotton, Wool, Nylon
(c) DDT, Polyester, Glass
(d) Leather, Silk, Wool

Q.17 [1 mark]

Assertion (A): The metals high up in the reactivity series cannot be obtained from their compounds by heating with carbon.

Reason (R): Displacement reactions can also be used to obtain metal.

(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.

Q.18 [1 mark]

Assertion (A): A mango seed will germinate to form a mango tree.

Reason (R): Heredity determines the process by which traits and characteristics are reliably inherited from parents to offspring.

(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.

Q.19 [1 mark]

Assertion (A): Nichrome is an alloy which is commonly used in electrical heating devices such as electric irons, toasters, etc.

Reason (R): The resistivity of nichrome is high and its resistance decreases with increase in temperature.

(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.

Q.20 [1 mark]

Assertion (A): Animals will not get energy if they eat (consume) coal as food.

Reason (R): Specific enzymes are needed for the breakdown of a particular food.

(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.

Section B

Very Short Answer Questions (2 marks each)

Q.21 [2 marks]

(a) In common practice silver is recovered from silver nitrate solution by the use of copper metal. Name the type of reaction that takes place in this process and give the chemical equation of the reaction involved.

(b) Name the method used for refining silver.

Q.22 [2 marks]

(a) Select from the following members of same homologous series:

(1) H-C-C-C=O (with appropriate H atoms)

(2) H-C=C-H (with appropriate H atoms)

(3) H-C-C-C-OH (with appropriate H atoms)

(4) H-C-C-C-C=O (with appropriate H atoms)

(b) What happens to (i) the melting point, and (ii) the solubility of compounds as the molecular mass of the compounds in a homologous series increases?

Q.23 [2 marks]

Name the parts of hind-brain of the human brain. Which part of the hind-brain controls involuntary actions such as blood pressure and salivation?

Q.24 [2 marks]

(a) Write one function of each of the following, in a seed:

(i) Seed coat, (ii) Cotyledon, (iii) Radicle, (iv) Plumule

(b) Write the main steps to culture yeast in the laboratory.

Q.25 [2 marks]

Out of the two lenses, one concave and the other convex, state which one will diverge a parallel beam of light falling on it. Draw a ray diagram to show the principal focus of the lens.

OR

(a) A ray of light after refraction from a convex lens emerges parallel to its principal axis.

(i) Draw a labelled ray diagram to show it.

(ii) In this case, the incident ray before refraction from the lens passes through a point on its principal axis. Name the point.

OR

Q.25 [2 marks]

(OR for Q25) (a) A ray of light after refraction from a convex lens emerges parallel to its principal axis.

(i) Draw a labelled ray diagram to show it.

(ii) In this case, the incident ray before refraction from the lens passes through a point on its principal axis. Name the point.

Q.26 [2 marks]

An electric kettle is rated 750 W, 220 V. Find the cost of energy consumed by the kettle when it is connected to a power supply of 220 V and a fuse of current rating 3 A. What should the fuse rating be? Give reason for your answer.

Section C

Short Answer Questions (3 marks each)

Q.27 [3 marks]

(a) (i) Define the term decomposition reaction. Write one chemical equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.

(ii) Decomposition of vegetable matter into compost is considered an exothermic reaction. Why?

OR

(b) Why are decomposition reactions called the opposite of combination reactions? Write one chemical equation each for these two types of reactions mentioning the name of the reactant(s) and the product(s) involved in the reactions.

Q.28 [3 marks]

(a) Write the electron-dot structures of (i) sodium, and (ii) oxygen. Using

these structures, show the formation of sodium oxide. Mark the anion and cation present in this compound. (At. No. - Sodium = 11 and Oxygen = 8)

OR

(b) (i) Compare with a mineral acid, mention its pH properties.

(ii) 'X' reacts with alcohols to produce sweet smelling compounds, used in making perfumes. Name the reaction and write its chemical equation.

(iii) 'X' reacts with sodium carbonate to produce a colourless gas which turns lime water milky. Write the chemical equation for the reaction giving the name of the salt produced.

(iv) When sodium carbonate is added to 'X', a colourless gas is produced which turns lime water milky. Write the chemical equation of the reaction giving the name of the salt produced.

Q.29 [3 marks]

(a) Define hormone.

(b) 'Hormones should be secreted in precise quantities. We have a feedback mechanism through which this is done.' With the help of an example justify the statement.

Q.30 [3 marks]

(a) The lowest part of the ear called earlobe, is closely attached to the side of the head in some of us (Figure 'X'), and not in others, called free earlobe (Figure 'Y'). Attached and free earlobes are two variants found in human populations. The gene for free earlobe is dominant over attached earlobes.

(a) A man with attached earlobes marries a woman having free earlobes. 50% of their children have free earlobes and 50% have attached earlobes. Explain the inheritance of this trait and write the trait combinations of the progeny.

(b) Write the gene combinations of the father and the mother in the above case.

Q.31 [3 marks]

(a) A convex lens forms an 8.0 cm long image of a 2.0 cm long object which is kept at a distance of 6.0 cm from the optical centre of the lens. If the object and the image are on the same side of the lens, find (i) the nature of the image, (ii) the position of the image, and (iii) the focal length of the lens.

Q.32 [3 marks]

Three resistors of 2 Ω, 3 Ω and 6 Ω are connected in (i) series, and (ii) parallel. Draw the arrangements of the resistors and find the equivalent resistance of each arrangement.

Q.33 [3 marks]

Write the essential function performed by ozone at the higher levels of the atmosphere. How is it formed in the upper atmosphere? Write the name of the group of chemicals mainly responsible for the depletion of ozone layer.

Section D

Long Answer Questions (5 marks each)

Q.34 [5 marks]

(a) (i) A compound 'X' having two carbon atoms in its molecule turns blue litmus red and 'X' in 5-8% solution in water is widely used as a preservative. Identify the compound 'X' and write its structure.

(ii) Compare its pH nature with a mineral acid.

(iii) 'X' on reacting with alcohols produces sweet smelling compounds, used in making perfumes. Name the reaction and write its chemical equation.

(iv) When sodium carbonate is added to 'X', a colourless gas is produced which turns lime water milky. Write the chemical equation for the reaction giving the name of the salt produced.

OR

(b) (i) Giving one example each, differentiate between saturated and

unsaturated hydrocarbons with a structural formula.

(ii) Write the method of converting an unsaturated hydrocarbon into a saturated hydrocarbon. Name the industry where this reaction is commonly used.

(iii) Write the name and structure of a hydrocarbon having double bond and four carbon atoms in its one molecule.

Q.35 [5 marks]

(a) (i) 'The length of the small intestine in various animals depends on the food they eat.' Justify the statement.

(ii) Discuss the role of the pancreas and bile juice in the digestion of food in human beings.

(iii) How is the small intestine designed to absorb digested food?

OR

(b) (i) State the role of rings of cartilage present in the throat.

(ii) Discuss the role of the ribs and diaphragm when air is taken in during the breathing cycle.

(iii) Why do we get muscle cramps during heavy exercise? Explain.

Q.36 [5 marks]

(a) The given figure shows the current passing through the straight conductor XY. A variable resistance, ammeter, battery, and key are shown in the circuit.

(i) Copy the diagram and draw the magnetic field lines when current flows from conductor X to Y.

(ii) Name and state the rule used in determining the direction of the magnetic field lines in the situation given above.

(iii) State Fleming's left hand rule. Using this rule, determine the direction of force applied on an electron entering a uniform magnetic field as shown in the figure.

OR

(b) (i) Define the term solenoid. Draw the pattern of the magnetic field lines in and around a current carrying straight solenoid. Mark on the pattern the (i) direction of current, (ii) direction of field lines near the ends of the solenoid, and (iii) region where the magnetic field is uniform.

(ii) How would you make an electromagnet using a current carrying solenoid?

Section E

Case Study Based Questions (4 marks each)

Q.37 [4 marks]

Case Study: Acid-base indicators can be used to distinguish between an acid and a base. Universal indicator, a mixture of several indicators, shows different colours at different concentrations of acids and bases, thereby indicating their pH on the pH scale of 0-14. The pH of a solution is measured by pH paper, which is a paper impregnated with a universal indicator.

Q.37(a) [4 marks]

(Q37a) Solution P is a strong acid while solution Q is a strong base. On the pH scale, where would you place the solutions P and Q?

Q.37(b) [4 marks]

(Q37b) Which solution has a pH of 7? Is it acidic, basic or neutral? Name any other example of a solution whose pH is likely to be 7 and state the colour it would impart to the pH paper.

Q.37(c) [4 marks]

(Q37c) (i) When the pH of a solution is decreased from 4 to 2, what effect does it produce on its hydronium ion concentration? State the colour change shown by the pH paper.

OR

(ii) A person is feeling pain and irritation in the stomach due to indigestion. What could be the pH of the fluid in the stomach? Write the common name of the medicines people use for remedy. Give the chemical name of 'milk of magnesia' often used for this purpose.

Q.38 [4 marks]

Case Study: When a girl is born, the ovaries already contain thousands of immature eggs. On reaching puberty, some of these start maturing. One matured egg is released every month by one of the ovaries. The two oviducts unite into an elastic bag-like structure known as uterus.

Q.38(a) [4 marks]

(Q38a) Write the site of fertilization in human female.

Q.38(b) [4 marks]

(Q38b) How does the uterus prepare itself to receive and nurture the growing embryo? Explain.

Q.38(c) [4 marks]

(Q38c) (i) What happens when the egg is not fertilised?

OR

(ii) How does the developing embryo get nutrition from the mother's blood? Explain.

Q.39 [4 marks]

Case Study: A person allowed a narrow beam of white light from the sun to enter a dark room through a small aperture and placed a glass prism in its path in such a manner that the beam falls on the face AB of the prism as shown in the figure. A screen S is placed on the other side of the prism, facing AC. On turning the prism slowly, a beautiful band of colours is

obtained on the screen. It is the spectrum of sunlight.

Q.39(a) [4 marks]

(Q39a) Name the phenomenon due to which a prism splits the incident white light into a band of colours.

Q.39(b) [4 marks]

(Q39b) State the reason for getting a band of seven colours in the above case.

Q.39(c) [4 marks]

(Q39c) (i) Explain with the help of a labelled ray diagram, an experimental arrangement to show the recombination of the spectrum of white light.

OR

(ii) Draw a labelled ray diagram to show the formation of a rainbow.