

MODEL TEST PAPER–1 (SOLVED)

(Based on the latest CBSE Sample Paper)

Time : 90 Minutes

Maximum Marks:

General Instructions

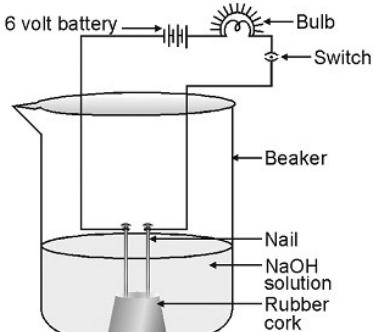
1. The Question paper contains three sections.
 2. Section A has 24 questions. Attempt any 20 questions.
 3. Section B has 24 questions. Attempt any 20 questions.
 4. Sections C has 12 questions. Attempt any 10 questions.
 5. All questions carry equal marks.
 6. Three is no negative marking.

- SECTION A -

Section-A consists of 24 questions. Attempt any 20 questions from this section.

The first attempted 20 questions would be evaluated.

5. In an attempt to demonstrate electrical conductivity through an electrolyte, the following apparatus was set up. Which among the following statements is correct?

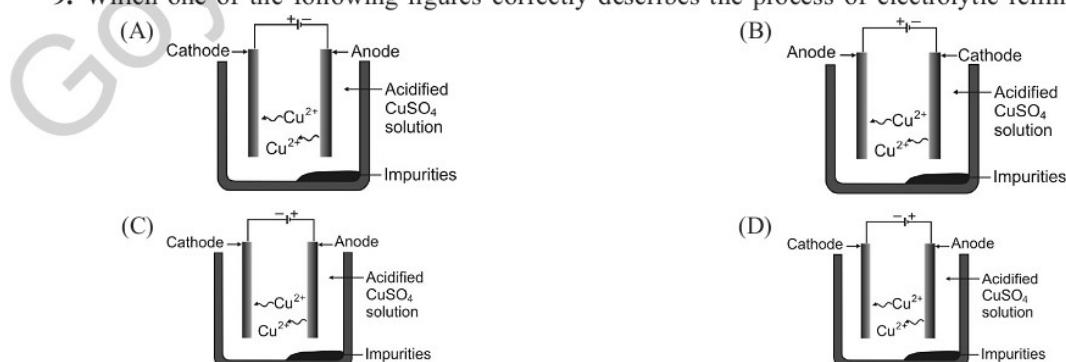


- (A) Bulb will not glow because electrolyte is not acidic.
 - (B) Bulb will glow because NaOH is a strong base and furnishes ions for conduction.
 - (C) Bulb will not glow because circuit is incomplete.
 - (D) Bulb will not glow because it depends upon the type of electrolytic solution.
6. Identify the correct representation of reaction occurring during chlor-alkali process.

- (A) $2\text{NaCl}(l) + 2\text{H}_2\text{O}(l) \rightarrow 2\text{NaOH}(l) + \text{Cl}_2(g) + \text{H}_2(g)$
- (B) $2\text{NaCl}(aq) + 2\text{H}_2\text{O}(aq) \rightarrow 2\text{NaOH}(aq) + \text{Cl}_2(g) + \text{H}_2(g)$
- (C) $2\text{NaCl}(aq) + 2\text{H}_2\text{O}(l) \rightarrow 2\text{NaOH}(aq) + \text{Cl}_2(aq) + \text{H}_2(aq)$
- (D) $2\text{NaCl}(aq) + 2\text{H}_2\text{O}(l) \rightarrow 2\text{NaOH}(aq) + \text{Cl}_2(g) + \text{H}_2(g)$

7. Reaction between X and Y, forms compound Z. The substance, X loses an electron and Y gains an electron. Which of the following properties is not shown by Z?
- (A) Has high melting point
 - (B) Has low melting point
 - (C) Conducts electricity in molten state
 - (D) Occurs as solid
8. A small piece of sodium is dropped into a beaker containing water. Which of the following observations is incorrect?
- (A) It floats on the surface of water to form a silvery ball.
 - (B) It darts over the surface of water and decreases in size.
 - (C) It catches fire and burns with a golden-yellow flame.
 - (D) The water on testing turns blue litmus to red.

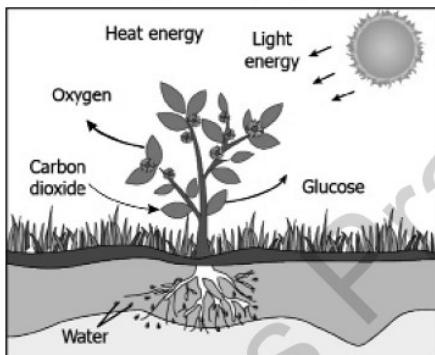
9. Which one of the following figures correctly describes the process of electrolytic refining?



10. Match the chemical substances given in Column (A) with their appropriate application given in Column (B)

Column (A)	Column (B)
(a) Bleaching powder	(i) Preparation of glass
(b) Baking soda	(ii) Production of H_2 and Cl_2
(c) Washing soda	(iii) Decolourisation
(d) Sodium chloride	(iv) Antacid
(A) a—(ii) b—(i)	c—(iv) d—(iii)
(B) a—(iii) b—(ii)	c—(iv) d—(i)
(C) a—(iii) b—(iv)	c—(i) d—(ii)
(D) a—(ii) b—(iv)	c—(i) d—(iii)

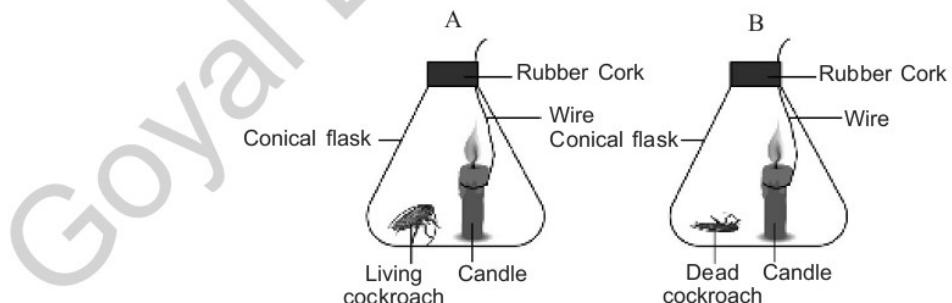
11. The image shows the process of making food by a plant.



Which statement can be concluded from the image?

- (A) Plants absorb CO_2 from air and H_2O from the soil as raw materials and convert them into glucose.
- (B) Plants absorb CO_2 from the soil and H_2O from air as raw materials and convert them into glucose.
- (C) Plants absorb O_2 from air and glucose from the soil as raw materials and convert them into light energy.
- (D) Plants absorb O_2 from air and minerals from the soil as raw materials and convert them into heat energy.

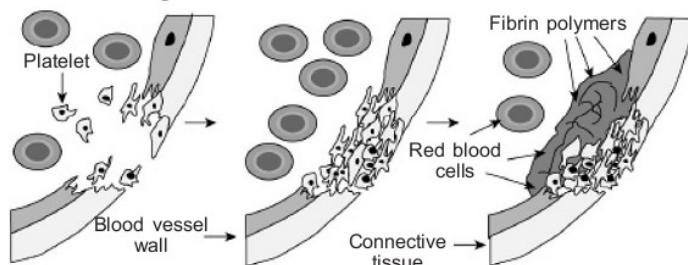
12. A student setup an experiment to study the human respiratory system. In the experiment, the student places a burning candle and a living cockroach in the flask A, while a burning candle and a dead cockroach in flask B. The burning of candle needs oxygen.



After 10 minutes, the student observes that the candle in flask A extinguishes faster while candle in flask B keeps burning for a longer time. What can be evaluated from this experiment?

- (A) Candle produces high amount of carbon dioxide
- (B) Living beings consume oxygen during respiration
- (C) Burning of candle decreases the life span of cockroach
- (D) Water vapour produced by living beings prevents burning of candle

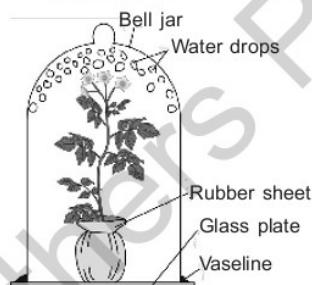
13. The image shows the healing of a wound.



Based on the image, what explains the process?

- (A) Platelets form clot by plugging the site of injury
- (B) Platelets use component of broken vessel to form clot
- (C) Red blood cells divide and replace the broken vessel at the site of injury
- (D) Red blood cells and platelets migrate to site of injury and secrete substance that forms new vessel

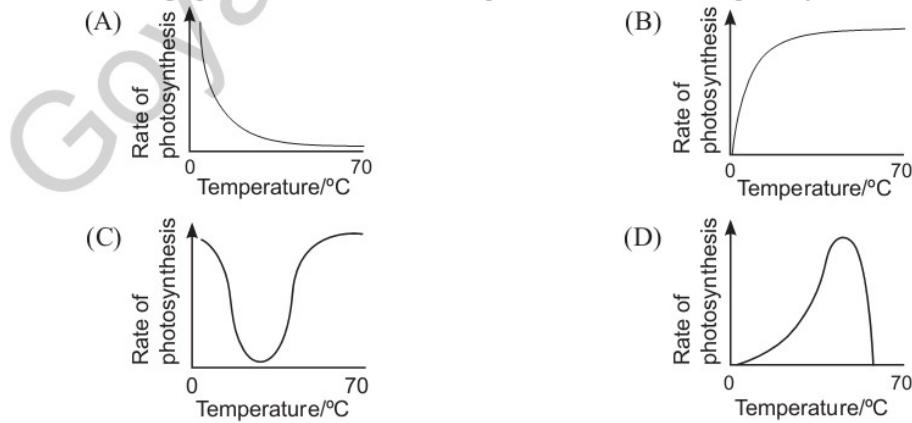
14. A student setup an experiment using a well-watered plant. The plant's roots and soil were covered with a rubber sheet. The plant was then kept in a glass bell jar and sealed with vaseline at the bottom part to prevent the flow of air. The student keeps the apparatus in the light and observes water drops inside the jar after 2 hours as shown in the image.



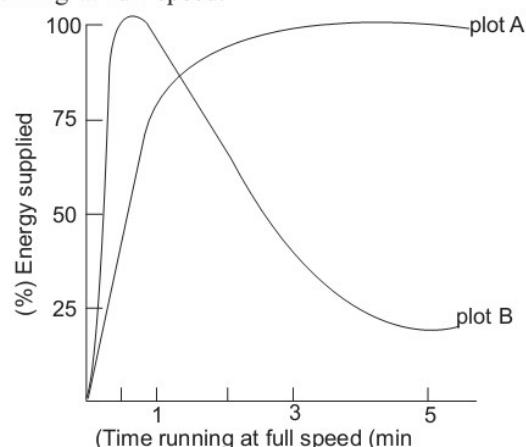
What can be evaluated about transpiration from this experiment?

- (A) Plant leaves give off water in the form of vapour.
- (B) Heat from the outside warms the jar which melts the vaseline into vapour.
- (C) Plant absorbs water from environment thus extra water appears on the inside of jar.
- (D) Covered roots and stem of the plant decreases the temperature of jar resulting in condensation of moisture into vapour.

15. Which graph shows the effect of temperature on the rate of photosynthesis?



16. Study the graph below that represents the amount of energy supplied with respect to the time while an athlete is running at full speed.



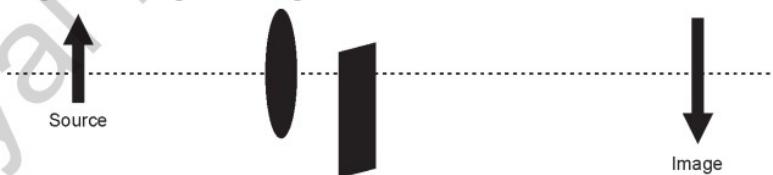
Choose the correct combination of plots and justification provided in the following table.

	Plot A	Plot B	Justification
(A)	Aerobic	Anaerobic	Amount of energy is low and inconsistent in aerobic and high in anaerobic
(B)	Aerobic	Anaerobic	Amount of energy is high and consistent in aerobic and low in anaerobic
(C)	Anaerobic	Aerobic	Amount of energy is high and consistent in aerobic and low in anaerobic
(D)	Anaerobic	Aerobic	Amount of energy is high and inconsistent in anaerobic and low in aerobic

17. The de-oxygenated blood from the body organs first enters :

- (A) into right atrium of the heart through vena cava.
- (B) into left atrium of the heart through vena cava.
- (C) into right ventricle of the heart through vena cava.
- (D) into right atrium of the heart through aorta.

18. An image is formed by a converging lens. Suppose the bottom half of the lens is covered, as shown, the expected changes to image will be :

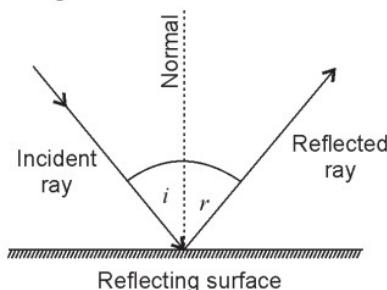


- (A) The image disappears
- (B) The image fades
- (C) The image is formed closer to the lens
- (D) The bottom half of the image disappears

19. The image formed by a concave mirror is virtual and magnified, when object is placed

- (A) at infinity
- (B) at centre of curvature of concave mirror
- (C) at focal point of concave mirror
- (D) in between the principal focus and the pole of concave mirror

20. The image shows reflection of light on a mirror.



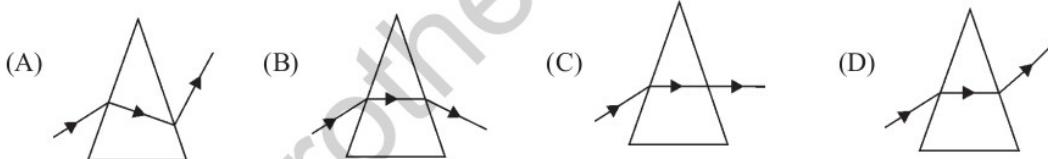
Based on the image, what can be inferred?

- (A) The incident ray, reflected ray, and normal at the point of reflection lie on a common plane.
- (B) The angle of incidence, angle of reflection, and normal at the point of reflection lie on a common plane.
- (C) The angle between incident ray and normal is greater than the angle between normal and the reflected ray.
- (D) The angle between incident ray and normal is smaller than the angle between normal and the reflected ray.

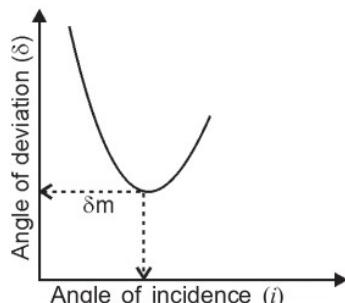
21. Rekha placed a juice bottle at a distance of 20 cm in front of a convex mirror which has a focal length of 20 cm. Where is the image likely to form?

- (A) At focus behind the mirror
- (B) At focus in front of the mirror
- (C) At a distance of 10 cm behind the mirror
- (D) At a distance of 10 cm in front of the mirror

22. Which image shows the deviation of light in a prism?



23. Graph between angle of incidence and angle of deviation through an equilateral prism is shown in figure.

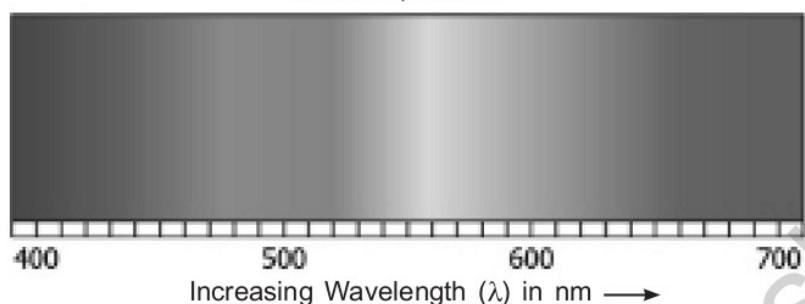


Which of the following is true for the given graph?

- (A) On the increase of angle of incidence, the angle of deviation first decreases then increases.
- (B) On the decrease of angle of incidence, the angle of deviation first increases then decreases.
- (C) On the increase of angle of incidence, the angle of deviation first increases then decreases.
- (D) On the decrease of angle of incidence, the angle of deviation first decreases then remains constant.

- 24.** Rekha learns that the scattering of sunlight depends on the wavelength of the light and size of particles present in the atmosphere. The student collects the data about the wavelength of the visible lights and size of the particle as shown.

Visible Spectrum



Particle	Size (nm)
P	360
Q	450
R	530
S	640

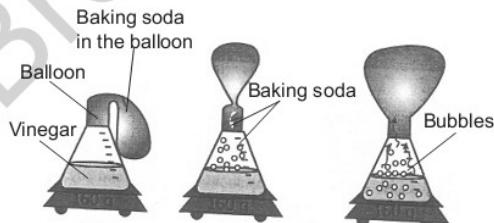
Which particles will scatter blue light?

- (A) P and R (B) R and S (C) P and Q (D) Q and S

SECTION B

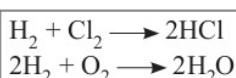
Section-B consists of 24 questions (Al. No. 25 to 48). Attempt any 20 questions from this section. The first attempted 20 questions would be evaluated.

- 25.** Aradhya poured 100 ml of water in a bottle and added 40 ml vinegar to it. A balloon was filled with 25g baking soda and was fixed at the mouth of the bottle. Slowly the shape of the balloon changed, as shown.



She claims that a chemical change happened when the two substances were mixed. Is the claim made by the student correct?

- (A) Yes, as a new substance was formed in the form of a gas.
 (B) Yes, as the mass remains the same throughout the experiment.
 (C) No, as the formation of bubbles in the mixture shows a physical change.
 (D) No, as the change in the shape and size of the balloon shows a physical change.
- 26.** The image shows some chemical reactions.



Which option identifies the reactants and products of the reactions?

(a)	Reactants	Products
	H ₂ , Cl ₂ and HCl	H ₂ , O ₂ and H ₂ O

(b)	Reactants	Products
	H ₂ , Cl ₂ and H ₂ O	H ₂ , Cl ₂ , H ₂ and O ₂

(c)	Reactants	Products
	H ₂ , Cl, H ₂ and O ₂	HCl and H ₂ O

(d)	Reactants	Products
	H ₂ , O ₂ and H ₂ O	H ₂ , Cl ₂ and HCl

27. If a few drops of a concentrated acid accidentally spills over the hand of a student, what should be done?

- (A) Wash the hand with saline solution
- (B) Wash the hand immediately with plenty of water and apply a paste of sodium hydrogen carbonate
- (C) After washing with plenty of water, apply sol
- (D) Neutralise the acid with a strong alkali

28. Four students studied reactions of zinc and sodium carbonate with dilute hydrochloric acid and dilute sodium hydroxide solution and presented their results as follows. The (3) represents evolution of gas whereas (7) represents no reaction.

	Zn	Na ₂ CO ₃
HCl	3	3
NaOH	3	7

(A)

	Zn	Na ₂ CO ₃
HCl	3	7
NaOH	3	3

(B)

	Zn	Na ₂ CO ₃
HCl	7	7
NaOH	3	3

(C)

	Zn	Na ₂ CO ₃
HCl	3	3
NaOH	7	7

(D)

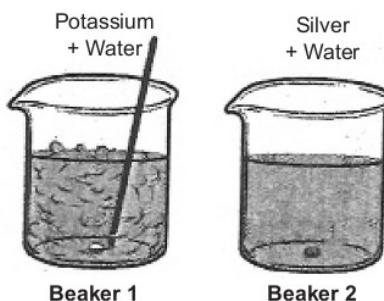
The right set of observations is that of student

- (a) A
- (b) B
- (c) C
- (d) D

29. Which of the following metals reacts with nitric acid and produces hydrogen gas?

- (A) Sodium
- (B) Magnesium
- (C) Aluminium
- (D) Iron

30. Sarabha drops pieces of potassium and silver in beakers containing water. The figure shows the reaction



What are the products formed in each beaker?

- (A) Beaker 1: K₂O and H₂O; Beaker 2: AgO and H₂O
- (B) Beaker 1: KOH and H₂O; Beaker 2: Ag₂O and H₂O
- (C) Beaker 1: K₂O and H₂O; Beaker 2: No reaction takes place
- (D) Beaker 1: KOH and H₂O; Beaker 2: No reaction takes place

Question No. 31 to 34 consist of two statements—Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- (A) Both A and R are true and R is the correct explanation of A.
- (B) Both A and R true and R is not the correct explanation of A.
- (C) A is true but R is false.
- (D) A is false but R is true.

31. Assertion: When dilute sulphuric acid is added to barium chloride solution a white precipitate is formed.

Reason: The formation of a white precipitate of barium sulphate is characteristic of the reaction.

32. Assertion: Ethanol ($\text{CH}_3\text{CH}_2\text{OH}$) and glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) solutions are not acidic in nature while sulphuric acid (H_2SO_4) is acidic in nature.

Reason: Ethanol and glucose do not produce H_3O^+ in solutions.

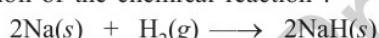
33. Assertion: All the plants prepare the intermediate substance after photosynthesis.

Reason: The plants growing in the desert convert the intermediate substance into glucose.

34. Assertion: The part of the pencil immersed in water appears to be bent and short.

Reason: The rays of light bend from its path while travelling from water to air or vice-versa.

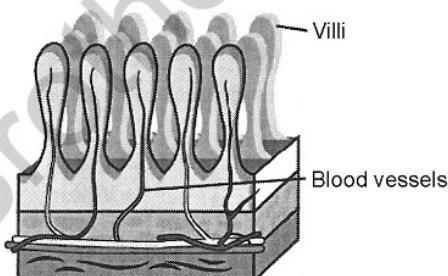
35. Consider the following equation of the chemical reaction :



This equation represents :

- (A) combination as well as reduction
- (B) decomposition as well as oxidation reaction
- (C) oxidation as well as displacement reaction
- (D) combination as well as oxidation reaction

36. The image shows a cross section of small intestine.



What will be the likely happen if the number of villi increases in the intestine?

- (A) combination as well as reduction
- (B) decomposition as well as oxidation reaction
- (C) oxidation as well as displacement reaction
- (D) combination as well as oxidation reaction

37. Which of these reactions occur in photosynthesis?

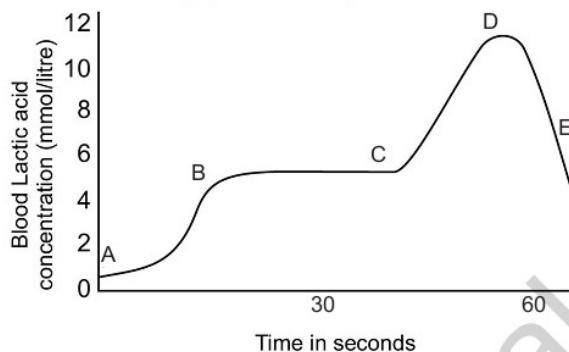
- (A) Carbon dioxide is reduced and water is oxidised.
- (B) Water is reduced and carbon dioxide is oxidised.
- (C) Carbon dioxide and water are oxidised.
- (D) Carbon dioxide and water are reduced.

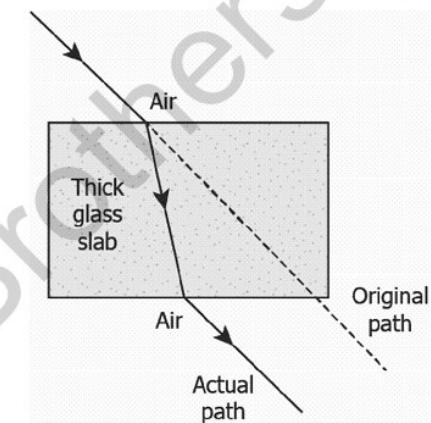
38. Respiration differs from the process of combustion in the fact that :

- (A) all the energy stored in glucose is released at once due to combustion.

- (B) all energy stored in glucose is gradually released due to combustion.
(C) comparatively large quantity of energy is produced due to combustion.
(D) the carbohydrates act as the combustion substance.

39. The graph given alongside represents the blood lactic acid concentration of an athlete during a race of 400 m and shows a peak at point D. The blood of an athlete was tested before, during and after a 400 m race. Lactic acid production has occurred in the athlete while running in the 400 m race. Which of the following processes explains this event?

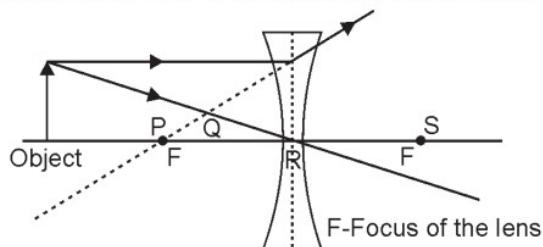




What causes the ray of light to deviate from its original path while passing from air to glass slab?

- (A) Change in the amount of light.
(B) Change in the direction of wind flow.
(C) Change in the temperature of the air.
(D) Change in the density of the medium.

42. The image represents the rays of light travelling through a concave lens.



Where is the image most likely to form?

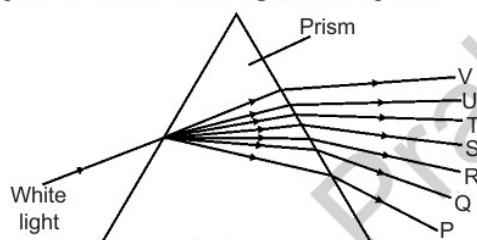
43. In which of the following cases the distance between object and its image formed will be zero?

- (A) When object is placed at centre of curvature of a convex mirror.
 - (B) When object is placed at centre of curvature of a concave mirror.
 - (C) When object is placed at focal point of a concave mirror.
 - (D) When object is placed in between centre of curvature and focal point of a concave mirror.

44. Which of the following statements is true?

- (A) A convex lens has 4 diopetre power having a focal length 0.25 m.
 - (B) A convex lens has - 4 diopetre power having a focal length 0.25 m.
 - (C) A concave lens has 4 diopetre power having a focal length 0.25 m.
 - (D) A concave lens has - 4 diopetre power having a focal length 0.5 m.

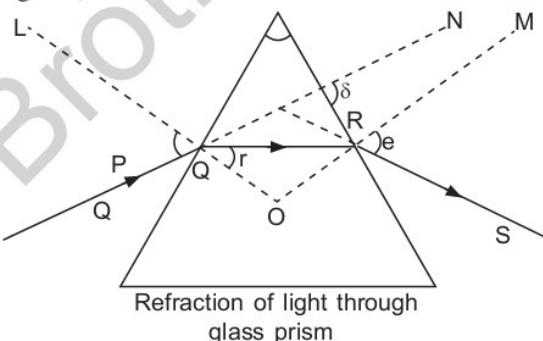
45. The image shows the dispersion of the white light in the prism.



What will be the colours of the P, Q and R?

- (A) P: green; Q: violet; R: red
 - (B) P: violet; Q: indigo; R: blue
 - (C) P: red; Q: violet; R: green
 - (D) P: red; Q: green; R: violet

46. In the given figure, angles i , r and e are

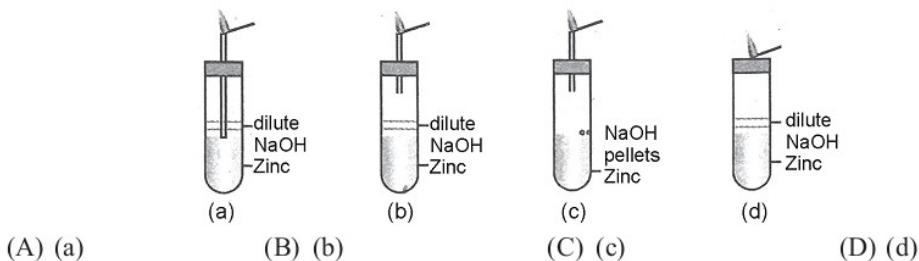


- (A) angles of refraction, incidence and emergence respectively
 - (B) angles of incidence, emergence and refraction respectively
 - (C) angles of incidence, refraction and emergence respectively
 - (D) angles of emergence, incidence and refraction respectively

47. When stars are viewed near the horizon, they appear

- (A) slightly above than its actual position
 - (B) slightly below than its actual position.
 - (C) at the same actual position
 - (D) fluctuating above and below

48. Which one of the following set ups is the most appropriate for the evolution of hydrogen gas and its identification?



= SECTION C =

Section-C consists of three cases followed by questions. Three are a total of 12 questions in this section. Attempt 10 questions from this section.

The first attempted 10 questions would be evaluated.

Case-1 :

A saturated solution of sodium chloride is prepared in water. This solution is commonly called brine solution. When electricity is passed through brine solution, it decomposes to form sodium hydroxide. This process is called the chlor-alkali process because of the products formed-chlor for chlorine and alkali for sodium hydroxide.



Sodium hydroxide solution is formed near the cathode. Chlorine gas is given off at the anode and hydrogen gas at the cathode.

49. An aqueous solution of sodium chloride is called
(A) common salt (B) table salt (C) brine solution (D) rock salt

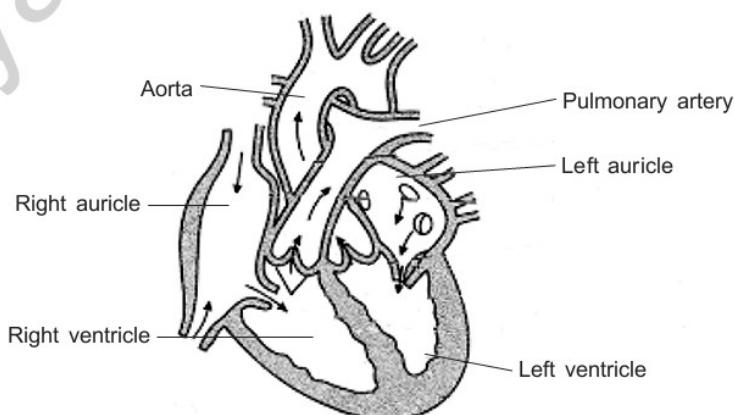
50. Which of these reactions takes place at anode in this reaction?
(A) $2\text{Cl}^-(\text{aq}) - 2e \rightarrow 2\text{Cl} \longrightarrow \text{Cl}_2(\text{g})$ (B) $2\text{Cl}(\text{aq}) + 2e \longrightarrow 2\text{Cl}^-$
(C) $2\text{Na}^+(\text{aq}) + 2e \longrightarrow 2\text{Na}(\text{s})$ (D) $2\text{Na} - 2e \longrightarrow 2\text{Na}^+(\text{aq})$

51. Which of these reactions takes place at cathode in this reaction?
(A) $2\text{Cl}^-(\text{aq}) - 2e \rightarrow 2\text{Cl} \longrightarrow \text{Cl}_2(\text{g})$ (B) $2\text{Na}^+(\text{aq}) + 2e^- \longrightarrow 2\text{Na}(\text{s})$
(C) $2\text{Cl}^- + 2e^- \longrightarrow 2\text{Cl}^-(\text{aq})$ (D) $2\text{Na}(\text{s}) - 2e^- \longrightarrow 2\text{Na}^+(\text{aq})$

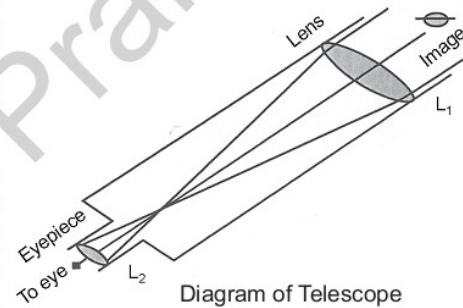
52. Which of these gases is taken off at the anode?
(A) Chlorine (B) Hydrogen (C) Oxygen (D) None of these

Case-2 :

The human heart is a muscular organ made up of cardiac muscles. It is a four-chambered organ to prevent intermixing of oxygenated and de-oxygenated blood. A thick wall muscle called septum that separates the two sides left and right of the heart. Look at the picture.



- 53.** The upper two chambers and lower two chambers are called:
- (A) Ventricles and auricles respectively (B) Auricles and ventricles respectively
 (C) Ventricles and valves respectively (D) Arteries and veins respectively
- 54.** The artery which carries de-oxygenated blood from the heart to lungs is called :
- (A) Pulmonary artery (B) Hepatic artery
 (C) Renal artery (D) All arteries
- 55.** Pulmonary vein brings :
- (A) oxygenated blood from the lungs to the heart
 (B) de-oxygenated blood from the heart to the lungs
 (C) oxygenated blood from the heart to the lungs
 (D) de-oxygenated blood from the lungs to the heart
- 56.** Tricuspid valve is found between :
- (A) right auricle and right ventricle (B) left auricle and left ventricle
 (C) right auricle and left ventricle (D) left auricle and right ventricle
- Case-3 :**
- Sumati wanted to see the stars of the night sky. She knows that she needs a telescope to see those distant stars. She finds out that the telescopes, which are made of lenses, are called refracting telescopes and the ones which are made of mirrors are called reflecting telescopes.
- So she decided to make a refracting telescope. She bought two lenses, L_1 and L_2 . Out of which L_1 was bigger and L_2 was smaller. The larger lens gathers and bends the light, while the smaller lens magnifies the image. Big and thick lenses are more powerful. So to see far away, she needed a big powerful lens.
- Unfortunately, she realised that a big lens is very heavy. Heavy lenses are hard to make and difficult to hold in the right place. Also since the light is passing through the lens, the surface of the lens has to be extremely smooth. Any flaws in the lens will change the image. It would be like looking through a dirty window.
- 57.** Based on the diagram shown, what kind of lenses would Sumati need to make the telescope?
- (A) Concave lenses (B) Convex lenses
 (C) Bifocal lenses (D) Flat lenses
- 58.** If the powers of the lenses L_1 and L_2 are in the ratio of 4:1, what would be the ratio of the focal length of L_1 and L_2 ?
- (A) 4 : 1 (B) 1 : 4 (C) 2 : 1 (D) 1 : 1
- 59.** What is the formula for magnification obtained with a lens?
- (A) Ratio of height of image to height of object
 (B) Double the focal length
 (C) Inverse of the radius of curvature
 (D) Inverse of the object distance
- 60.** Sumati did some preliminary experiment with the lenses and found out that the magnification of the eyepiece (L_2) is 3. If in her experiment with L_2 she found an image at 24 cm from the lens, at what distance did she put the object?
- (A) 72 cm (B) 12 cm (C) 8 cm (D) 6 cm



1

Chemical Reactions and Equations

IMPORTANT POINTS

- The changes which take place in substances can be broadly classified as **physical changes** and **chemical changes**.
- During a **physical change**, only the state of the substance changes, but not its chemical composition. Furthermore, a physical change is a temporary change, which can be reversed by changing the physical experimental conditions. At the same time no net energy is absorbed or given out.
- During a **chemical change**, the state as well as the chemical composition of a substance changes. Furthermore, a chemical change is a permanent change, which cannot be reversed by changing the physical experimental conditions. At the same time, either energy is absorbed or given out.
- Whenever, a chemical change occurs, the process which takes place, is called a **chemical reaction**.
- During a chemical reaction one or more of the following changes occur :
 - (i) Energy (generally in the form of heat or light) is either absorbed or given out.
 - (ii) New substances are formed.
 - (iii) The state of the reacting substances changes.
 - (iv) There may be a change in colour of the reacting substances.
 - (v) The temperature of the reacting substances changes.
 - (vi) A gas may be evolved during the chemical reaction.
 - (vii) The substances formed during a chemical reaction do not change back to the original substance, when the physical experimental conditions are altered.
- A chemical equation which represents a chemical reaction briefly in words is called a **word equation**.
- The substance/substances which take part in a chemical reaction are called **reactants**.
- The new substance/substances formed as a result of chemical reactions, are called **products**.
- A **plus sign** is put in between reactants or products, if their number is two or more.
- An **arrow** (\longrightarrow) is put between reactants and products. This sign is read as "**to yield**" or "**to form**".
- The **direction of the arrow** points in the direction in which the reaction proceeds.
- A **chemical equation** is a statement that describes a chemical reaction in terms of symbols and formulae.
- A chemical equation expressed in symbols and formulae, such that the number of atoms of different elements towards the side of the reactants is not equal to number of atoms of the same elements towards the side of the products, is called a **skeletal equation or an unbalanced equation**.
- An unbalanced equation is **unacceptable or is no equation**, because, it goes against the law of conservation of mass.
- A chemical equation in which the number of atoms of each element are same on the side of reactants and products, is called a **balanced chemical equation**.
- A **balanced chemical equation tells us :**
 - (i) about the substances taking part in a chemical reaction and the products formed.
 - (ii) about the symbols and formulae of the reactants and products.

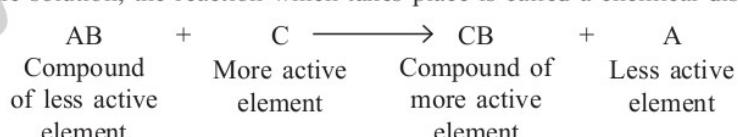
- (iii) about the number of atoms or molecules of the reactants and products involved in the chemical reaction.
- (iv) about the weights of the reactants and products involved in the chemical reaction.
- **A balanced chemical equation does not tell us :**
 - (i) the physical state of the reactants and products.
 - (ii) whether the reaction will come to completion or not.
 - (iii) about the speed of the chemical reaction.
 - (iv) about the physical conditions which bring about the chemical reaction.
 - (v) about changes, such as precipitation, change in colour, evolution of heat, light, etc., during the chemical reaction.
- When one or more substances (elements or compounds) undergo a chemical change, with the absorption or release of energy (generally, heat energy) so as to form one or more products, then the change which takes place, is called a **chemical reaction**.
- **Chemical composition combination reaction :** When two elements or compounds react chemically to form a single new compound, the chemical reaction which takes place is called a chemical composition reaction or a chemical combination reaction.



- **Chemical decomposition reaction :** When a chemical compound decomposes on heating or absorbing some other kind of energy, so as to form two or more new substances (elements or compounds), then the chemical reaction which takes place is called a chemical decomposition reaction or a chemical decombination reaction.



- Chemical decomposition reaction can be further classified into three types.
 - (a) **Thermal decomposition reaction:** When a chemical compound decomposes on heating so as to form one or more substances (elements or compounds), then the chemical reaction is called a thermal decomposition reaction.
 - (b) **Photo-decomposition reaction:** When a chemical compound decomposes on absorbing light energy, so as to form two or more different substances, then the reaction which takes place is called a photo-decomposition reaction.
 - (c) **Electrochemical reaction:** When a chemical compound in an aqueous or fused state decomposes into two different substances on the passage of electric current then the reaction is called an electrochemical reaction.
- **Chemical displacement reaction :** When a more active element displaces a less active element from its aqueous ionic solution, the reaction which takes place is called a chemical displacement reaction.



- Metals arranged in linear form in the order of their decreasing chemical activity is called **metal activity series**.



The above list constitutes the metal activity series in which potassium is the most active metal and gold is the least active metal.

- **Chemical double displacement reaction:**

A chemical reaction in which two ionic compounds in their aqueous solutions, react by exchanging their ions/radicals, to form two new compounds is called a chemical double displacement reaction.



Chemical double displacement reaction can be further classified into two kinds.

- (a) **Precipitation reaction:** When aqueous solutions of two ionic compounds react by exchanging their ions/radicals, to form two or more compounds, such that one of the products formed is an insoluble salt, and hence, forms a precipitate, the double displacement reaction is said to be a precipitation reaction.
- (b) **Neutralisation reaction:** When an aqueous solution of an acid reacts with a base (alkali) by exchanging their ions/radicals to form salt and water as the only products, the reaction which takes place is called a neutralisation reaction.
- **Exothermic reactions:** A chemical reaction which proceeds with the release (evolution) of heat energy, is called an exothermic reaction.
- **Endothermic reaction :** A chemical reaction which proceeds with the absorption of heat energy, is called an endothermic reaction.
- **Oxidation reaction :** When a substance gains oxygen or loses hydrogen, the reaction taking place is called an oxidation reaction.
- **Reduction reaction :** When a substance gains hydrogen or loses oxygen, the reaction taking place is called a reduction reaction.
- **Corrosion of metals :** Formation of layers of undesired compounds, such as metallic oxides or hydroxides on the surface of metals is called as corrosion of metals.
- **Rusting :** Slow conversion of iron into hydrated ferric oxide, in the presence of moisture and air is called rusting.
- **Rust :** The flaky, non sticky brown powder formed on the surface of iron, when iron is exposed to moist air, is called rust.
- **Conditions for rusting :** Iron should be exposed to : (i) water, (ii) air, at the same time.
- **Rancidity :** The oxidation of food materials, so that they become stale and start smelling is called rancidity.

SECTION A

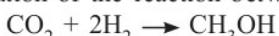
Choose the correct answer from the options given below:

1. Magnesium ribbon burns with a dazzling
(A) White Flame (B) Blue flame (C) Yellow flame (D) Red flame
2. On burning magnesium changes into
(A) magnesium hydroxide (B) magnesium oxide
(C) magnesium hydride (D) magnesium carbonate
3. Which of the following gas is formed after the reaction of zinc and dilute sulphuric acid?
(A) Oxygen (B) Hydrogen (C) Carbon dioxide (D) Sulphur dioxide
4. Calcium oxide reacts vigorously with water to produce
(A) calcium hydroxide (B) calcium hydride
(C) calcium carbonate (D) calcium hydrogen carbonat
5. Reaction of calcium oxide with water is an example of
(A) decomposition reaction (B) displacement reaction
(C) combination reaction (D) double displacement reaction
6. Which of the following is used for white washing of the wall?
(A) Calcium oxide (B) Calcium carbonate
(C) Calcium sulphate (D) Calcium hydroxide
7. Which of the following does give a shin finish to the walls after two to three days of white washing?
(A) Calcium oxide (B) Calcium hydroxide
(C) Calcium sulphate (D) Calcium carbonate
8. When two or more substances (elements or compounds) combine to form a single product, the reaction is called.
(A) combination reaction (B) decomposition reaction
(C) displacement reaction (D) double displacement reaction
9. The decomposition of vegetable matter into compost is an example of
(A) endothermic reaction (B) exothermic reaction
(C) combination reaction (D) decomposition reaction
10. Which one amongst the following is a complete balanced equation?
(A) $\text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_3 + \text{SO}_2$ (B) $2\text{FeSO}_4 \rightarrow \text{Fe}_3\text{O}_4 + \text{SO}_2 + \text{SO}_3$
(C) $2\text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$ (D) $3\text{FeSO}_4 \rightarrow \text{Fe}_3\text{O}_4 + \text{SO}_2 + \text{SO}_3$
11. Which of the following gas is formed after heating of calcium carbonate?
(A) Oxygen gas (B) Hydrogen gas
(C) Carbon dioxide gas (D) Carbon monoxide gas
12. Which one amongst the following is a complete balanced equation?
(A) $\text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbO} + \text{NO}_2 + \text{O}_2$ (B) $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$
(C) $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 2\text{NO}_2 + 2\text{O}_2$ (D) $\text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbO} + 2\text{NO}_2 + 3\text{O}_2$
13. In electrolysis of water, the ratio of volumes of hydrogen and oxygen formed, will be
(A) 2 : 1 (B) 1 : 2 (C) 3 : 2 (D) 2 : 3
14. Which of the following is/are formed after the decomposition of silver chloride?
(A) Silver (B) Chlorine (C) Oxygen (D) Both (A) and (B)
15. The decomposition of silver chloride is used in
(A) painting (B) photography (C) galvanising (D) silver-plating

29. A student adds barium hydroxide to hydrochloric acid to form a white-coloured barium chloride. Which option gives the balanced chemical equation of the reaction?

(A) $\text{HCl} + \text{Ba(OH)}_2 \rightarrow \text{BaCl}_2 + 2\text{H}_2\text{O}$
(B) $2\text{HCl} + \text{Ba(OH)}_2 \rightarrow \text{BaCl}_2 + 2\text{H}_2\text{O}$
(C) $2\text{HCl} + \text{Ba(OH)}_2 \rightarrow \text{BaH}_2 + 2\text{HCl} + \text{O}_2$
(D) $\text{HCl} + 2\text{Ba(OH)} \rightarrow 2\text{BaCl}_2 + 2\text{H}_2\text{O} + \text{O}_2$

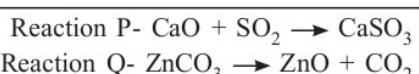
30. A student writes a chemical equation of the reaction between carbon monoxide and hydrogen.



How can the reaction be classified?

- (A) The reaction is an example of a combination reaction as a compound separates into two compounds.
(B) The reaction is an example of a decomposition reaction as a compound dissociates into two compounds.
(C) The reaction is an example of a combination reaction as a compound and an element react to form a single compound.
(D) The reaction is an example of a decomposition reaction as two compounds react to form a single compound.

31. A student learns that some products are formed as a result of combining two compounds while some compounds are formed as a result of dissociation of a compound. The image shows two reactions.



Which reaction is an example of a combination reaction and a decomposition reaction?

- (A) both the reactions are examples of combination reaction
(B) both the reactions are examples of a decomposition reaction
(C) reaction P is an example of a combination reaction while reaction Q is an example of decomposition reaction
(D) P is an example of a decomposition reaction while reaction Q is an example of a combination reaction

32. The chemical reaction between potassium chloride and silver nitrate is given by the chemical equation.



What can be inferred from the chemical equation?

- (A) Silver nitrate and potassium chloride undergo a decomposition reaction to form silver chloride and potassium nitrate
(B) Silver nitrate and potassium chloride undergo a displacement reaction to form silver chloride and potassium nitrate
(C) Silver nitrate and potassium chloride undergo a combination reaction to form silver chloride and potassium nitrate
(D) Silver nitrate and potassium chloride undergo double displacement reaction to form silver chloride and potassium nitrate

33. A student adds lead and silver to two different test tubes containing an equal amount of copper sulphate solution. The student observes that the colour of the solution in the test tube with lead changes. What explains the change in the colour of the solution?

- (A) A displacement reaction takes place as lead replaces copper from the solution.
(B) A combination reaction takes place as lead combines with sulphate in the solution.
(C) decomposition reaction takes place as copper dissociates from sulphate in the solution.
(D) A double displacement reaction takes place as copper dissociates from sulphate and lead combines with sulphate in the solution.

34. The image shows a reaction between iron oxide and hydrogen.



Which option shows the compounds undergoing oxidation and reduction?

	Oxidation	Reduction
(A)	4H_2	3Fe
(B)	3Fe	4H_2
(C)	Fe_3O_4	$4\text{H}_2\text{O}$
(D)	$4\text{H}_2\text{O}$	Fe_3O_4

35. The image shows a reaction between zinc and hydrogen.



Which option shows oxidation

- (A) $\text{Zn} \rightarrow \text{Zn}^{2+}$ (B) $2\text{H}^+ \rightarrow \text{H}_2$ (C) $\text{Zn}^{2+} \rightarrow \text{Zn}$ (D) $\text{H}_2 \rightarrow 2\text{H}^+$

36. A student notices that her silver jewellery turned dull and had a grey-black film over it after wearing for a few months. What results in the change in colour of the silver metal?

- (A) dust deposits over the jewellery which changes its colour
(B) the jewellery comes in contact with air, moisture, and acids and corrodes
(C) the polish over the jewellery was removed after wearing for a few months
(D) silver breaks due to wear and tear and turns its colour changes due to rusting

37. A student notices that a new hammer made of iron is shiny while an old one kept in the toolbox for long has a reddish-brown powder deposit over it. What does the change in colour of the hammer indicate?

- (A) effect of moisture on metals
(B) iron hammer turns brown after time
(C) effects of kept in a box for a longer duration
(D) iron changes colour when kept with other tools

38. A student notices that the bread kept out has a green coloured coating over it after a few days. What explains the reason for the student's observation?

- (A) the oils in the bread oxidises and causes rancidity
(B) bread comes in contact with atmospheric moisture and corrodes
(C) the oils in the bread reduces and cause the change in the colour of the bread
(D) comes in contact with the atmospheric nitrogen and a layer deposit over it

39. A student learns that food companies fill bags of chips with nitrogen gas. What is the purpose packing it with nitrogen?

- (A) it prevents rancidity of chips
(B) it keeps the mosquitoes away from chips
(C) it keeps the chips dry if the pack falls in water
(D) it prevents chips from spilling out when the pack is opened

40. A chemical reaction is characterised by:

- (A) a change in state
(B) formation of new products
(C) evolution or absorption of energy
(D) all the above.

- SECTION B

- 60.** The removal of hydrogen from a substance is known as :
(A) oxidation (B) calcination (C) reduction (D) hydration
- 61.** One of the following is an endothermic reaction. This is :
(A) reaction of quicklime with water
(B) combination of nitrogen and oxygen to form nitric oxide
(C) combination of glucose and oxygen to form carbon dioxide and water
(D) combination of zinc and sulphuric acid to form zinc sulphate and hydrogen
- 62.** Which of the following is an exothermic reaction?
(A) Process of photosynthesis
(B) Decomposition of silver chloride
(C) electrolysis of water
(D) process of respiration
- 63.** When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of a :
(A) Combination reaction (B) Displacement reaction
(C) Decomposition reaction (D) Double displacement reaction
- 64.** Calcium oxide reacts vigorously with water to produce slaked lime.
$$\text{CaO}(s) + \text{H}_2\text{O}(l) \rightarrow \text{Ca}(\text{OH})_2(aq)$$
- This reaction can be classified as :
(a) Combination reaction (b) Exothermic reaction
(c) Endothermic reaction (d) Oxidation reaction
- Which of the following is a correct option?
(A) (a) and (c) (B) (c) and (d)
(C) (a), (c) and (d) (D) (a) and (b)
- 65.** In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution:
(i) exchange of atoms takes place (ii) exchange of ions takes place
(iii) a precipitate is produced (iv) an insoluble salt is produced
(A) (ii) and (iv) (B) (i) and (iii)
(C) only (i) (D) (ii), (iii) and (iv)
- 66.** A solution of slaked lime in water is called:
(A) milk of lime (B) limewater
(C) calcium hydroxide solution (D) none of these
- 67.** The colour of ferrous sulphate crystals is:
(A) deep green (B) bluish green (C) light green (D) none of these
- 68.** When FeSO_4 is strongly heated it gives off some gases. These gases:
(A) have a suffocating smell like burning sulphur
(B) fume strongly in the moist air
(C) do not fume strongly in moist air
(D) both (A) and (B)
- 69.** Barium chloride solution is mixed with sodium sulphate solution. A white insoluble precipitate is formed which is chemically:
(A) barium sulphide (B) barium sulphite
(C) barium sulphate (D) barium carbonate

70. Four students were asked to carry out the experiment to study the double displacement reaction between barium chloride and sodium sulphate. Which of the following is the correct procedure and observation?

S.No.	Procedure	Observation
I	Mixed powder of barium chloride and sodium sulphate	The colour of mixture changes to yellow
II	Mixed solutions of barium chloride and sodium sulphate	Thick white precipitate is formed
III	Added solution of barium chloride to sodium sulphate powder	Solution becomes turbid
IV	Added powder of barium chloride to sodium sulphate solution	No change is observed

Choose the correct report :

71. A student took solid quicklime in a china dish and added a small amount of water. He heard:

72. Rahul adds aqueous solution of barium chloride to an aqueous solution of sodium sulphate. He would observe that :

- (A) a pungent smelling gas is evolved.
 - (B) the colour of the solution turns red.
 - (C) a yellow precipitate is formed after sometime.
 - (D) a white precipitate is formed almost immediately.

73. To show that iron is more reactive than copper, the correct procedure is to:

- (A) prepare ferrous sulphate solution and dip copper strip in it.
 - (B) prepare copper sulphate solution and dip iron strip in it.
 - (C) add dil. nitric acid on both strips
 - (D) heat iron and copper strips both

74. Reddish brown deposit observed on iron nails, when these are kept in aqueous solution of CuSO_4 , is that of

- (A) Cu₂O (B) CuO (C) Cu (D) CuS

- 75.** Match the items given in column A with column B.

A	B
(a) Ferrous sulphate crystal + Heat	(I) Combination reaction
(b) Quicklime + water.	(II) Decomposition reaction
(c) Copper sulphate solution + Iron nail	(III) Double displacement reaction
(d) Sodium sulphate solution + Barium chloride solution	(IV) Displacement reaction

- | (a) | (b) | (c) | (d) |
|--------|-----|-----|-----|
| (A) I | II | III | IV |
| (B) II | I | III | IV |
| (C) II | I | IV | III |
| (D) I | II | IV | III |

76. Aqueous solutions of zinc sulphate and iron sulphate were taken in test tubes X and Y by four students I, II, III and IV. Metal pieces of iron and zinc were dropped in the two solutions and observations made after several hours recorded in the form of a table as given below :.

Observation by	Metal	Solution	Colour change of solution	Deposit/Residue obtained
I	Fe	ZnSO ₄	turned green	silvery grey coating
	Zn	FeSO ₄	no change	no change
II	Fe	ZnSO ₄	no change	black residue
	Zn	FeSO ₄	colour faded	grey coating
III	Fe	ZnSO ₄	no change	no change
	Zn	FeSO ₄	turned colourless	grey residue
IV	Fe	ZnSO ₄	no change	grey residue
	Zn	FeSO ₄	no change	black residue

The correct reporting has been made in observations reported by the student :

77. Out of the following four pairs of metallic salts, the pair of salts whose each salt forms coloured solution when dissolved separately in two beakers containing water is :

- (A) CuSO_4 ; ZnSO_4
 (B) FeSO_4 ; ZnSO_4
 (C) FeSO_4 ; CuSO_4
 (D) CuSO_4 ; $\text{Al}_2(\text{SO}_4)_3$

78. Four different test tubes were filled with aluminium sulphate solution. Different metals were introduced into these test tubes in the following manner.

Test tubes	Metal introduced	Observation
1	Zn	No change
2	Fe	No change
3	Cu	No change
4	Al	No change

The correct inference which we draw from here is :

- (A) Zn is more reactive than Al
 - (B) Cu is more reactive than Al
 - (C) Zn is more reactive than Cu
 - (D) Al is more reactive than Zn, Fe and Cu

79. A student added aluminium, copper, zinc and iron metals to copper sulphate solution in four different test tubes. In one of the test tubes he observed that no colour change of copper sulphate solution took place. Mark that test tube :

(i) Test tube 1	Aluminium + copper sulphate
(ii) Test tube 2	Zinc + copper sulphate
(iii) Test tube 3	Copper + copper sulphate
(iv) Test tube 4	Iron + copper sulphate

- (A) Test tube 1 (B) Test tube 2 (C) Test tube 3 (D) Test tube 4

- 80.** Colour of zinc metal is :
(A) reddish brown (B) drak grey (C) blackish grey (D) like silver
- 81.** Some crystals of copper sulphate were dissolved in water. The colour of the solution obtained would be :
(A) green (B) red (C) blue (D) brown
- 82.** The zinc and copper metal used in the laboratory for doing experiment is available respectively in the form of:
(A) Zn filings, Cu turnings (B) Zn strips, Cu pellets
(C) Zn granules, Cu turnings (D) Zn pellets, Cu strips

Questions No. 83 to 92 consist of two statements – Assertion (A) and Reasons (R). Answer these questions selecting the appropriate option given below :

- (A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true and R is not the correct explanation of A
(C) A is true but R false.
(D) A is false but R is true.

83. Assertion : Formation of curd from milk is a chemical change.

Reason : The chemical composition of curd is different from the chemical composition of milk.

84. Assertion : When dilute sulphuric acid is added to barium chloride solution a white precipitate is formed.

Reason : The formation of a white precipitate of barium sulphate is characteristic of the reaction.

85. Assertion: Mostly all the combination reactions are exothermic reactions.

Reason: Nitrogen and oxygen are heated at a very high temperature, they combine to form nitric oxide and a lot of heat is absorbed in this reaction.

86. Assertion: A chemical process in which a substance gains oxygen or loses hydrogen is called oxidation reaction.

Reason: The substance that causes the addition of oxygen or removal of hydrogen is called reducing agent.

87. Assertion: Zinc is less active metal than iron in the metal reactivity series.

Reason: Zinc will get oxidised first. Thus, as long as zinc is present, rusting of iron is not possible.

88. Assertion: After white washing the walls, a shiny white finish on walls is obtained after two to three days.

Reason: Calcium oxide reacts with carbon dioxide to form calcium hydrogen carbonate which gives shiny white finish.

89. Assertion: $Zn + H_2SO_4 \rightarrow + ZnSO_4 + H_2$; It is balanced chemical equation.

Reason: In the above equation, the number of atoms of each element remains the same before and after the chemical reaction.

90. Assertion: $Mg + O_2 \rightarrow MgO$; It is a unbalanced chemical equation.

Reason: In the above equation, the number of atoms of each element is not the same on both sides of the equation.

91. Assertion: Usually physical states are not included in a chemical equation.

Reason: Physical states are not necessary to specify the chemical equation.

92. Assertion: The decomposition reactions require energy either in the form of heat, light or electricity for breaking down the reactants.

Reason: The decomposition reaction is a kind of exothermic reaction.

- SECTION C -

Case :

Chemical reaction is a process during which one or more substances undergo a chemical change, with the absorption or release of energy, so as to form one or more new substances.

A rearrangement of atoms takes place such that a new substance formed have completely different properties. The elements present in the reaction do not change into different elements. The substances which take part in a chemical reaction are called reactants and substances formed after the reaction, the new substances formed are called products.

Chemical reactions are not carried out in science laboratories, a large number of reactions keep on occurring around us in daily life. In a chemical reaction, the amount of reactants keeps on decreasing, whereas that of products keeps on increasing with time, until the reaction is over.

93. The substances take part in a chemical reaction are called
(A) original substances (B) new substances
(C) reactants (D) products

94. The substances formed after the reaction are called
(A) new substances (B) original substances
(C) reactants (D) products

95. In a chemical reaction, the amount of reactants keeps on
(A) decreasing with time (B) increasing with time
(C) either (A) or (B) (D) none of these

96. In a chemical reaction, the amount of products keeps on
(A) decreasing with time (B) increasing with time
(C) either (A) or (B) (D) none of these

97. A chemical reaction is characterised by
(A) a change in state (B) formation of new products
(C) evolution or absorption of energy (D) all of these

Case :

The description of a chemical reaction “when magnesium ribbon is heated in air (oxygen), it catches fire and burns to form magnesium oxide”. Writing in the form of a sentence is quite long. It can be done in a shorter way. The simplest way is to write the chemical reaction in the form of a word equation. A chemical equation that represents a chemical equation briefly in words is called word equation.

It is possible to make chemical equation more concise and useful, if we write them using chemical symbols and formulae.

A chemical equation is a statement that describes a chemical reaction in terms of symbols and formulae.

Case :

If a substance gains oxygen or loses hydrogen during a reaction, it is oxidised. But when a substance loses oxygen or gains hydrogen during a reaction, it is reduced. In any oxidation-reduction reaction, oxidation and reduction take place simultaneously.





CHAPTER 1 : CHEMICAL REACTIONS AND EQUATIONS

SECTION A

- 1.** (A) **2.** (B) **3.** (B) **4.** (A) **5.** (C) **6.** (D) **7.** (D) **8.** (A) **9.** (B) **10.** (C)
11. (C) **12.** (B) **13.** (A) **14.** (D) **15.** (B) **16.** (B) **17.** (C) **18.** (B) **19.** (B) **20.** (D)
21. (D) **22.** (D) **23.** (C) **24.** (D) **25.** (A) **26.** (B) **27.** (C) **28.** (D) **29.** (B) **30.** (C)
31. (C) **32.** (D) **33.** (A) **34.** (A) **35.** (A) **36.** (B) **37.** (A) **38.** (A) **39.** (A) **40.** (A)
41. (D) **42.** (A) **43.** (D) **44.** (D) **45.** (B) **46.** (C) **47.** (A)

SECTION B

- 48.** (D) **49.** (D) **50.** (B) **51.** (C) **52.** (B) **53.** (C) **54.** (C) **55.** (A) **56.** (D) **57.** (C)
58. (C) **59.** (C) **60.** (A) **61.** (B) **62.** (D) **63.** (D) **64.** (D) **65.** (D) **66.** (B) **67.** (C)
68. (D) **69.** (C) **70.** (B) **71.** (B) **72.** (D) **73.** (B) **74.** (C) **75.** (C) **76.** (C) **77.** (C)
78. (D) **79.** (B) **80.** (C) **81.** (C) **82.** (C) **83.** (A) **84.** (B) **85.** (B) **86.** (B) **87.** (D)
88. (C) **89.** (A) **90.** (A) **91.** (C) **92.** (C)

SECTION C

93. (C) 94. (D) 95. (A) 96. (B) 97. (D) 98. (C) 99. (D) 100. (C) 101. (C) 102. (D)
103. (A) 104. (B) 105. (C) 106. (C) 107. (A) 108. (A) 109. (B) 110. (A) 111. (B) 112. (D)
113. (B) 114. (A) 115. (A) 116. (B) 117. (C)