

CBSE Class 10 Science Important Questions & Answers (Chapter-Wise)

Chapter 1: Chemical Reactions and Equations

Q1. Why do we apply paint on iron articles?

Answer: We apply paint on iron articles to prevent them from rusting (corrosion). Paint cuts off the supply of air and moisture to the iron surface, preventing oxidation.

Q2. What is observed when a solution of potassium iodide is added to a solution of lead nitrate taken in a test tube? Write the balanced chemical equation and name the type of reaction.

Answer: A yellow precipitate of lead iodide is formed.

Equation: $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2\text{KI}(\text{aq}) \rightarrow \text{PbI}_2(\text{s})\downarrow + 2\text{KNO}_3(\text{aq})$

Type: Double Displacement Reaction (and Precipitation reaction).

Q3. A shiny brown colored element 'X' on heating in air becomes black in color. Name the element 'X' and the black colored compound formed.

Answer: Element 'X' is Copper (Cu). The black colored compound formed is Copper(II) oxide (CuO).

Equation: $2\text{Cu}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{CuO}(\text{s})$

Q4. Translate and balance: (a) Barium chloride reacts with aluminium sulphate to give aluminium chloride and barium sulphate. (b) Hydrogen gas combines with nitrogen to form ammonia.

Answer:

(a) $3\text{BaCl}_2(\text{aq}) + \text{Al}_2(\text{SO}_4)_3(\text{aq}) \rightarrow 2\text{AlCl}_3(\text{aq}) + 3\text{BaSO}_4(\text{s})$

(b) $3\text{H}_2(\text{g}) + \text{N}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$

Q5. Assertion (A): Decomposition of vegetable matter into compost is an exothermic reaction. Reason (R): Exothermic reactions are those in which heat is evolved along with the formation of products.

Answer: Both A and R are true and R is the correct explanation of A.

Q6. A student added dilute HCl to a test tube containing zinc granules and observed a gas. How can he test the gas evolved? What type of reaction is this? Write the equation.

Answer: The gas is Hydrogen. It can be tested by bringing a burning matchstick near the mouth of the test tube; it will burn with a 'pop' sound. It is a displacement reaction.

Equation: $\text{Zn}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g})\uparrow$

Chapter 2: Acids, Bases and Salts

Q1. State the chemical property in each case shown by the action of: (i) Water on quicklime (ii) Dilute acid on zinc granules.

Answer: (i) Combination reaction forming calcium hydroxide (slaked lime) with evolution of heat: $\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(aq)} + \text{Heat}$.

(ii) Displacement reaction where zinc displaces hydrogen from acid: $\text{Zn(s)} + 2\text{HCl(aq)} \rightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}\uparrow$

Q2. Why does distilled water not conduct electricity, whereas rain water does?

Answer: Distilled water is pure and lacks free ions. Rainwater contains dissolved acids (like carbonic acid) and salts, providing free ions (H^+ and others) that conduct electricity.

Q3. Write the chemical formula of washing soda. How is it prepared? Write its two uses.

Answer: Formula: $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$. It is prepared by heating baking soda (NaHCO_3) followed by recrystallization.

$2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$. $\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O} \rightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

Uses: Used in glass, soap, and paper industries; as a cleaning agent.

Q4. Assertion (A): Bleaching powder releases chlorine gas when exposed to air. Reason (R): Bleaching powder reacts with CO_2 and moisture present in the air.

Answer: Both A and R are true and R is the correct explanation of A.

Q5. A milkman adds a very small amount of baking soda to fresh milk. (a) Why does he do so? (b) What happens to the pH of fresh milk when it turns into curd?

Answer: (a) He does so to make the milk slightly alkaline so that it does not turn sour quickly into curd due to lactic acid formation. (b) When milk turns into curd, lactic acid is produced, which lowers the pH (makes it more acidic).

Chapter 3: Metals and Non-metals

Q1. Why do ionic compounds have high melting points?

Answer: Ionic compounds have strong electrostatic forces of attraction between oppositely charged ions. A large amount of energy is required to break these bonds, resulting in high melting and boiling points.

Q2. Give reasons: (a) Platinum, gold, and silver are used to make jewelry. (b) Sodium, potassium, and lithium are stored under kerosene oil.

Answer: (a) They are highly malleable, ductile, and least reactive (do not corrode).
(b) They are highly reactive and react vigorously with oxygen and moisture in the air, potentially causing fire. Kerosene prevents their contact with air.

Q3. Differentiate between roasting and calcination with balanced equations.

Answer:

Roasting: Heating ore in the presence of excess air. Used for sulphide ores. Eq: $2\text{ZnS} + 3\text{O}_2 \rightarrow 2\text{ZnO} + 2\text{SO}_2$

Calcination: Heating ore in the absence of air. Used for carbonate/hydroxide ores. Eq: $\text{ZnCO}_3 \rightarrow \text{ZnO} + \text{CO}_2$

Q4. What is thermite reaction? Write its use.

Answer: The reaction between aluminium powder and iron(III) oxide to produce molten iron and aluminium oxide is called the thermite reaction.

Eq: $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow 2\text{Fe(l)} + \text{Al}_2\text{O}_3 + \text{Heat}$.

Use: Used to join railway tracks or cracked machine parts.

Q5. Assertion (A): Carbonate and sulphide ores are usually converted into oxides during extraction. Reason (R): It is easier to obtain a metal from its oxide as compared to its sulphide or carbonate.

Answer: Both A and R are true and R is the correct explanation of A.

Chapter 4: Carbon and its Compounds

Q1. What is a homologous series? Explain with an example.

Answer: A series of carbon compounds having the same functional group and similar chemical properties, where successive members differ by a $-\text{CH}_2$ unit and 14u in mass.
Example: Alkanes (Methane CH_4 , Ethane C_2H_6 , Propane C_3H_8).

Q2. Why are carbon and its compounds used as fuels for most applications?

Answer: Carbon compounds burn in oxygen to release a large amount of heat and light energy due to the high energy stored in their C-C and C-H bonds. They also have high ignition temperatures, making them stable at room temperature.

Q3. Write the next higher homologue of C_3H_7OH . Give the IUPAC name of the given compound and draw its structure.

Answer: Next higher homologue: C_4H_9OH (Butanol).

IUPAC name of C_3H_7OH : Propanol.

Structure: $H_3C-CH_2-CH_2-OH$

Q4. Write the equation for the reaction of ethanol with sodium metal.

Answer: $2CH_3CH_2OH + 2Na \rightarrow 2CH_3CH_2O^-Na^+$ (Sodium ethoxide) + $H_2(g)\uparrow$

Q5. Assertion (A): Detergents are more effective than soaps in hard water. Reason (R): The calcium and magnesium salts of detergents are soluble in water.

Answer: Both A and R are true and R is the correct explanation of A.

Q6. A compound 'X' has the molecular formula $C_2H_4O_2$. It reacts with sodium bicarbonate to liberate CO_2 . Identify 'X', write its structure, and write the chemical equation.

Answer: 'X' is Ethanoic acid (Acetic acid, CH_3COOH).

Equation: $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2\uparrow$

Chapter 5: Life Processes

Q1. Why is diffusion insufficient to meet the oxygen requirements of multicellular organisms like humans?

Answer: In multicellular organisms, all cells are not in direct contact with the environment. Diffusion is too slow to transport oxygen deep into the body tissues. Therefore, a specialized circulatory system is required.

Q2. Where do plants get each of the raw materials required for photosynthesis?

Answer: CO_2 is obtained from the atmosphere through stomata. Water is absorbed from the soil by roots and transported upwards. Sunlight is captured by chlorophyll in leaves.

Q3. Explain the process of breakdown of glucose in a cell in the absence of oxygen.

Answer: In the absence of oxygen (anaerobic respiration), glucose breaks down into ethanol, carbon dioxide, and a small amount of energy.

Equation: $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2 + \text{Energy}$

Q4. Assertion (A): The inner lining of the small intestine has millions of tiny finger-like projections called villi. Reason (R): Villi increase the surface area for absorption of digested food.

Answer: Both A and R are true and R is the correct explanation of A.

Chapter 6: Control and Coordination

Q1. What is the difference between a reflex action and walking?

Answer: A reflex action is an involuntary, rapid, automatic response to a stimulus controlled by the spinal cord without brain intervention. Walking is a voluntary action that requires conscious thought and is controlled by the brain.

Q2. How does chemical coordination occur in plants? Give examples.

Answer: Chemical coordination in plants occurs through plant hormones (phytohormones). For example, Auxins promote cell elongation; Gibberellins promote stem growth; Cytokinins promote cell division; Abscissic acid inhibits growth.

Q3. Why is the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron, but not the reverse?

Answer: Neurotransmitters are released only at the axonal end. The receptors for these neurotransmitters are present only on the dendritic membrane. Thus, the signal can only travel one way.

Q4. A doctor advises a patient to take an injection of insulin. Which gland is not functioning properly in the patient? Name the disease and the hormone responsible.

Answer: The Pancreas is not functioning properly. The disease is Diabetes. The hormone is Insulin, which regulates blood sugar levels.

Chapter 7: How do Organisms Reproduce?

Q1. What is the role of the seminal vesicle and the prostate gland?

Answer: Seminal vesicles secrete a fluid rich in fructose to provide energy to sperms. The prostate gland secretes a fluid that neutralizes the acidic environment of the vagina, protecting the sperms.

Q2. Why is variation beneficial to the species but not necessarily for the individual?

Answer: Variation helps a species survive environmental changes. If an environment changes drastically, some individuals with specific variations may survive, ensuring the continuation of the species, even if that variation didn't benefit a specific individual previously.

Q3. How does the embryo get nourishment inside the mother's body?

Answer: The embryo gets nourishment through the placenta, a disc-shaped tissue embedded in the uterine wall. It contains villi on the embryo's side and blood spaces on the mother's side, allowing for the transfer of glucose, oxygen, and nutrients.

Q4. Assertion (A): The placenta is a vital connection between the mother and the developing fetus. Reason (R): It provides oxygen and nutrients to the fetus and removes waste products.

Answer: Both A and R are true and R is the correct explanation of A.

Chapter 8: Heredity

Q1. How do Mendel's experiments show that traits may be dominant or recessive?

Answer: Mendel crossed a tall pea plant (TT) with a short pea plant (tt). The F₁ generation was all tall (Tt). When F₁ plants self-pollinated, the F₂ generation had a 3:1 ratio of tall to short plants. The reappearance of the short trait in F₂ proved it was recessive but present in F₁, while tallness was dominant.

Q2. How is the sex of a child determined in human beings?

Answer: Females have XX chromosomes, and males have XY chromosomes. The egg always contributes an X. If the sperm contributes an X, the zygote becomes XX (female). If the sperm contributes a Y, the zygote becomes XY (male). Hence, the father determines the sex of the child.

Q3. Assertion (A): Traits acquired during the lifetime of an individual are not inherited.

Reason (R): Changes in non-reproductive tissues cannot be passed on to the DNA of germ cells.

Answer: Both A and R are true and R is the correct explanation of A.

Q4. A pure tall pea plant (TT) is crossed with a pure dwarf pea plant (tt). Work out the cross up to F₂ generation. State the phenotypic and genotypic ratios.

Answer:

F1: $TT \times tt = \text{All } Tt$ (Tall)
F2: $Tt \times Tt = TT : Tt : tt$ (3 Tall : 1 Dwarf)
Genotypic Ratio: 1 TT : 2 Tt : 1 tt
Phenotypic Ratio: 3 Tall : 1 Dwarf

Chapter 9: Light - Reflection and Refraction

Q1. State the laws of refraction of light.

Answer: (i) The incident ray, refracted ray, and the normal at the point of incidence all lie in the same plane. (ii) The ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant (Snell's Law).

Q2. An object is placed at a distance of 10 cm from a convex mirror of focal length 15 cm. Find the position and nature of the image.

Answer: Given: $u = -10$ cm, $f = +15$ cm.

Using $1/v + 1/u = 1/f \rightarrow 1/v = 1/f - 1/u = 1/15 - (-1/10) = 1/15 + 1/10 = (2+3)/30 = 5/30 = 1/6$.

$v = +6$ cm. The image is formed 6 cm behind the mirror, it is virtual, erect, and diminished.

Q3. Why do we prefer a convex mirror as a rear-view mirror in vehicles?

Answer: A convex mirror always forms an erect, virtual, and diminished image. It provides a wider field of view compared to a plane mirror, allowing the driver to see a larger area of the traffic behind.

Q4. Important Numerical 1: An object 4 cm in height is placed at a distance of 15 cm from a concave mirror of focal length 10 cm. Find the position, nature, and size of the image formed.

Answer: $u = -15$ cm, $f = -10$ cm, $h = +4$ cm.

$1/v = 1/f - 1/u = (-1/10) - (-1/15) = -1/10 + 1/15 = (-3+2)/30 = -1/30$.

$v = -30$ cm. The image is real and inverted.

Magnification $m = -v/u = -(-30)/(-15) = -2$.

Image size $h' = m \times h = -2 \times 4 = -8$ cm.

Chapter 10: The Human Eye and the Colourful World

Q1. What is the far point and near point of the human eye with normal vision?

Answer: The far point is infinity (the eye can see objects clearly at any distance up to infinity). The near point is 25 cm (the closest distance at which the eye can focus clearly without strain).

Q2. A student has difficulty reading the blackboard while sitting in the last row. What defect of vision is he suffering from? How can it be corrected? Draw the ray diagram.

Answer: He is suffering from Myopia (Nearsightedness). The image of distant objects forms in front of the retina. It is corrected using a concave (diverging) lens of suitable focal length to shift the image back onto the retina.

Q3. Why does the sky appear blue?

Answer: The sky appears blue due to the scattering of sunlight by particles in the atmosphere. Shorter wavelengths (blue/violet) scatter more than longer wavelengths (Rayleigh scattering). Since our eyes are more sensitive to blue, the sky appears blue.

Q4. Assertion (A): Stars twinkle but planets do not. Reason (R): Planets are much closer to Earth than stars, so they act as extended sources of light.

Answer: Both A and R are true and R is the correct explanation of A.

Chapter 11: Electricity

Q1. Why is the tungsten used almost exclusively for filament of electric lamps?

Answer: Tungsten has a very high melting point (3380°C) and high resistivity. It does not melt even when heated to incandescence to emit light.

Q2. Why are the conductors of electric heating devices made of an alloy rather than a pure metal?

Answer: Alloys have high resistivity and do not burn easily (oxidize) at high temperatures, making them ideal for heating devices like toasters or electric irons.

Q3. Important Numerical 1: Two resistors of 4Ω and 6Ω are connected in parallel. This combination is connected to a battery of 12V. Find the total current drawn from the battery.

Answer: Parallel resistance ($1/R = 1/4 + 1/6 = 3/12 + 2/12 = 5/12$). $R = 12/5 = 2.4\Omega$.
Total current $I = V/R = 12 / 2.4 = 5 \text{ A}$.

Q4. Important Numerical 2: An electric bulb is rated 220V and 100W. When it is operated on 110V, find the power consumed.

Answer: $R = V^2/P = (220)^2/100 = 48400/100 = 484\Omega$.

New Power $P' = (V')^2/R = (110)^2/484 = 12100/484 = 25 \text{ W}$.

Q5. Assertion (A): A fuse wire is always connected in series with the live wire. Reason (R): Fuse wire melts and breaks the circuit when current exceeds a safe limit.

Answer: Both A and R are true and R is the correct explanation of A.

Chapter 12: Magnetic Effects of Electric Current

Q1. What is the function of an earth wire? Why is it necessary to earth metallic appliances?

Answer: The earth wire provides a low-resistance conducting path for electric current to the ground. If a live wire touches the metal body of an appliance, the current flows safely to the earth, preventing a severe electric shock to the user.

Q2. State the rule to find the direction of force acting on a current-carrying conductor placed in a magnetic field.

Answer: Fleming's Left-Hand Rule: Stretch the thumb, forefinger, and middle finger of your left hand mutually perpendicular to each other. If the forefinger points in the direction of the magnetic field and the middle finger in the direction of the current, the thumb will point in the direction of the force/motion of the conductor.

Q3. Explain the principle and working of an electric motor.

Answer: Principle: A current-carrying conductor placed in a magnetic field experiences a mechanical force.

Working: When current flows through the armature coil in a magnetic field, equal and opposite forces act on its two arms, causing it to rotate. The split-ring commutator reverses the current direction every half rotation, ensuring continuous rotation.

Q4. Assertion (A): A current-carrying conductor experiences a force in a magnetic field.

Reason (R): The magnetic field exerts pressure on the conductor causing it to move.

Answer: Both A and R are true but R is not the correct explanation of A (the force is due to the interaction of the magnetic field of the conductor and the external magnetic field).

Top 25 Quick Revision Q&A

1. Balance: $\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2$

Ans: $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$

2. Why is Plaster of Paris stored in a dry container?

Ans: To prevent it from absorbing moisture and hardening into Gypsum.

3. Write the electron dot structure of Ethane.

Ans: Seven shared electron pairs (C-C single bond and six C-H bonds).

4. Why do we feel cramps during sudden physical activity?

Ans: Due to anaerobic respiration forming lactic acid in muscles.

5. What prevents backflow of blood in the heart?

Ans: Valves (tricuspid, bicuspid, semilunar valves).

6. Hormone secreted by the pancreas and its function?

Ans: Insulin; regulates blood sugar levels.

7. What happens to the ovary and uterus if fertilization fails?

Ans: The corpus luteum degrades, progesterone drops, and the uterine lining (endometrium) sheds (menstruation).

8. TT x tt cross: What is F1 height?

Ans: All tall (Tt).

9. State the mirror formula.

Ans: $1/f = 1/v + 1/u$.

10. Define 1 Dioptre.

Ans: The power of a lens with a focal length of 1 meter.

11. Why can't the eye see objects closer than 25 cm?

Ans: The ciliary muscles cannot contract enough to thicken the lens further.

12. State the relation between R, L, and A.

Ans: $R \propto L$ and $R \propto 1/A$.

13. State Ohm's law.

Ans: $V = IR$ (Voltage is directly proportional to current at constant temperature).

14. Equivalent resistance of 5Ω and 10Ω in series?

Ans: 15Ω .

15. Why are magnets used in electric motors?

Ans: To provide the external magnetic field that forces the coil to rotate.

16. Function of a split ring in an electric motor?

Ans: Acts as a commutator to reverse current direction every half-cycle.

17. Two safety measures in electric circuits?

Ans: Electric fuses and earthing.

18. Alloy used for bulb filaments?

Ans: Tungsten.

19. Why is tungsten used?

Ans: High melting point and high resistivity.

20. Formula for focal length if power is given?

Ans: $f = 1/P$ (in meters).

21. Define refractive index.

Ans: Ratio of the speed of light in a vacuum to its speed in the medium.

22. Why does light bend when changing mediums?

Ans: Due to a change in the speed of light.

23. Green pigment in plants and its role?

Ans: Chlorophyll; absorbs sunlight for photosynthesis.

24. Function of bile juice in digestion?

Ans: Emulsification of fats (breaking large fat globules into smaller ones).

25. Chemical formula of washing soda?

Ans: $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$.