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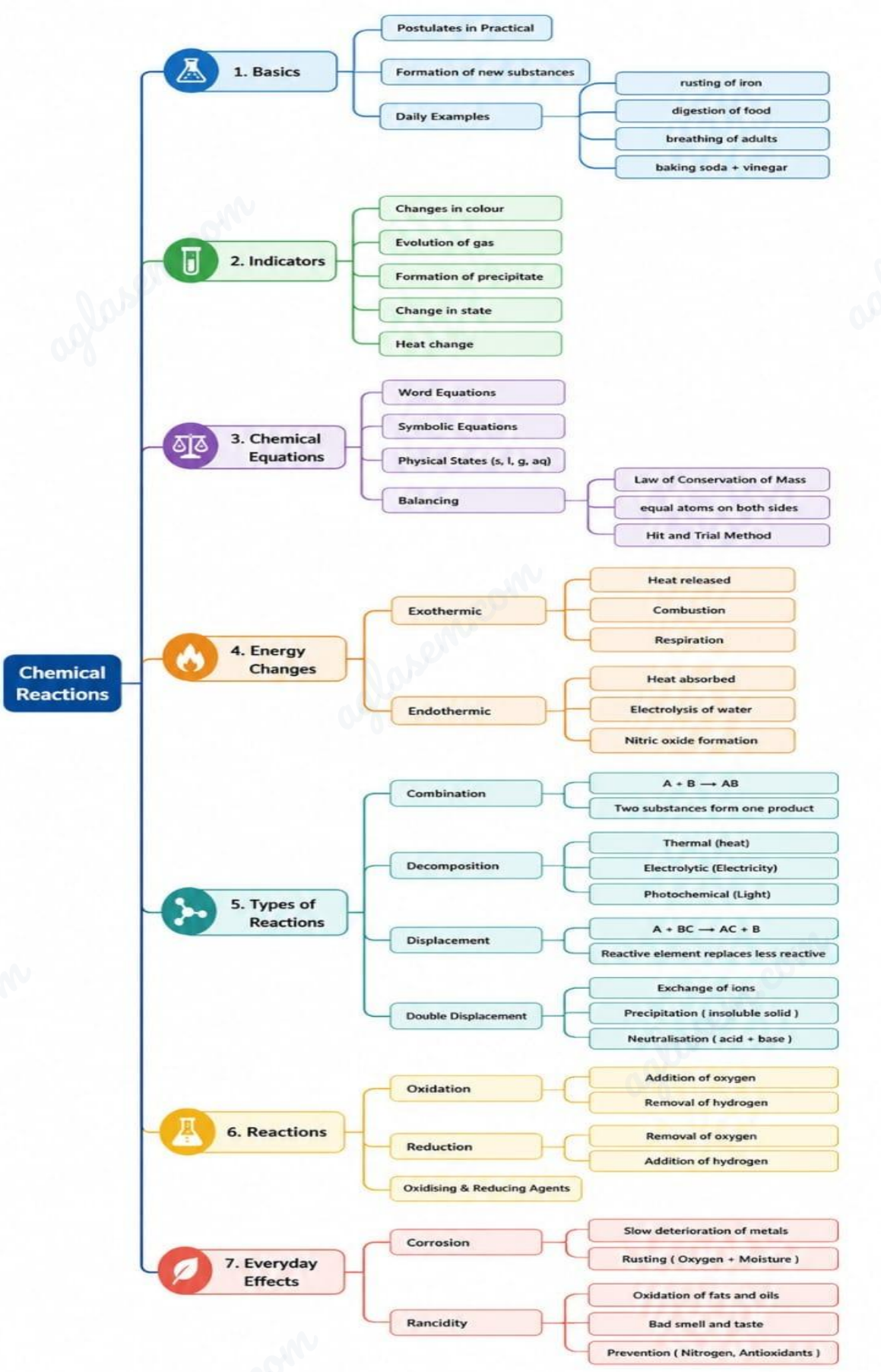
FOR MEGHALAYA CLASS 10 PREPARATION

MBOSE Class 10 Question Bank 2027 Science

EXAM	YEAR	TYPE	SUBJECT
Meghalaya Class 10	2027	Question Bank	Science

CHAPTER 1:CHEMICAL REACTIONS AND EQUATIONS

(A) MIND MAP



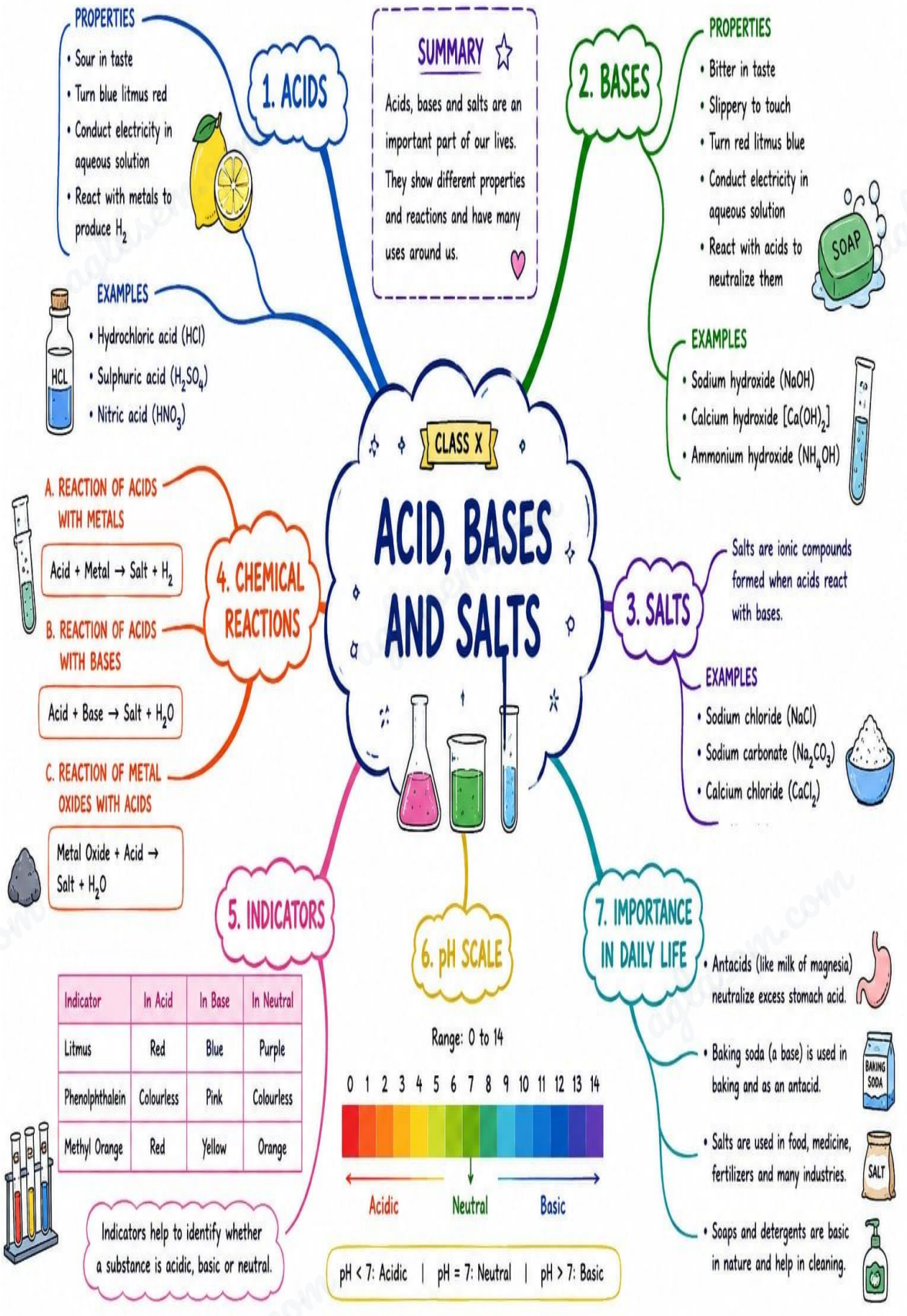
(B) SUMMARY

- **Chemical Reaction**: When one or more substance, undergo a chemical change, with the absorption or release of energy so as to form one or more products.
- **Reactant**: Substance(s) that take(s) part in chemical reaction.
- **Product**: The new substance(s) formed as a result of a chemical reaction
- **Chemical Equation**: The statement that describe a chemical reaction in terms of symbols and formulae.
- **Skeletal equation**: A chemical equation expressed in symbols and formulae, such that the numbers of atoms of different elements towards the side of reactants is not equal to the number of atoms of the same element towards the side of products.
- **Balance chemical equation**: A chemical equation in which the number of atoms of each element is same on both sides of reactant and product.
- **Chemical combination reaction**: When two substances react to form a new compound.
- **Chemical decomposition reaction**: When a compound decomposes on heating or absorbing some kind of energy so as to form two or more substances.
- **Thermal decomposition reaction**: A chemical compound when decomposes on heating so as to form two or more substances(elements or compounds).
- **Photo chemical decomposition reaction**: A chemical reaction in which a compound decomposes into simpler substances on the absorption of light energy.
- **Electrolytic decomposition reaction**: A chemical reaction in which a compound decomposes into simpler substances on passing electric current.
- **Chemical displacement reaction**: When a more active element displaces a less active element from its aqueous ionic compound.
- **Chemical double displacement reaction**: A chemical reaction in which two ionic compounds in their aqueous solution, react by exchanging their ions/ radicals, to form two new compounds.
- **Precipitation reaction**: The aqueous solution of two ionic compounds when reacts by exchanging their ions /radicals to form two or more new compounds such that one of the products formed is an insoluble salt, and hence formed as precipitate. The double displacement reactions are said to be precipitation reactions.
- **Precipitate**: An insoluble solid that is formed when two solutions react with each other and separate out from the solution.
- **Neutralisation**: When an acid reacts with a base to form salt and water.
- **Exothermic reaction**: A chemical reaction which proceeds with the release of heat energy.
- **Endothermic Reaction**: A chemical reaction which proceeds with the absorption of heat energy.
- **Oxidation**: is a process in which there is addition of oxygen or removal of hydrogen.
- **Reduction**: is a process in which there is addition of hydrogen or removal of oxygen.
- **Corrosion**: the slow destruction of metals on exposure to the environment due to oxidation.
- **Rancidity**: The oxidative deterioration of food stuff containing fats/oils.

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CHAPTER 2: ACIDS, BASES AND SALTS

(A) MIND MAP



(B) SUMMARY

- **Acids:** Substances that donate hydrogen ions (H^+) in solution. They are characterised by a sour taste, the ability to turn blue litmus red, and a pH less than 7. Examples: hydrochloric acid (HCl), sulphuric acid (H_2SO_4), lemon juice, vinegar etc.
- **Bases:** Substances that accept hydrogen ions (H^+) or donate hydroxyl ions (OH^-) in solution. They are characterised by a bitter taste, the ability to turn red litmus blue, and a pH greater than 7. Examples: sodium hydroxide (NaOH), potassium hydroxide (KOH), soap, baking soda etc.
- **Indicators:** Substances that change colour in the presence of acids or bases, helping to identify them. Examples include litmus solution, turmeric, and phenolphthalein.
- **Litmus:** Blue litmus turns red in acids; red litmus turns blue in bases.
- **Turmeric:** Remains yellow in acids but turns reddish-brown in bases.
- **Phenolphthalein:** Colourless in acids and pink in bases.
- **Methyl Orange:** Red in acids and yellow in bases.
- Chemical Properties of Acids and Bases

  Acids react with:
  - **Metals** to produce salt and hydrogen gas.
  - **Metal carbonates and metal hydrogen carbonates** to produce salt, carbon dioxide and water.
  - **Bases** to form salt and water (neutralisation).

  Bases react with:
  - **Acids** to produce salt and water (neutralisation).
  - **Certain metals** like zinc and aluminium to produce salt and hydrogen gas.
- The strength of **acids/bases** depends on the number of H^+ or OH^- ions produced in water.
- **Strong acids/bases** ionise completely in water.
- **Weak acids/bases** ionize partially in water.
- **pH**: pH measures the acidity or basicity of a solution.
- **pH Scale:**

  A scale used to measure the acidity or basicity of a solution, ranging from 0 to 14.

  Solutions with:
  - **pH less than 7:** Acidic
  - **pH = 7:** Neutral
  - **pH greater than 7:** Basic
- **Importance of pH in everyday life**
  - Our body functions properly within a narrow pH range (7-7.8)
  - Tooth decay begins when the mouth pH falls below 5.5.
  - Antacids help reduce excess stomach acid.
  - Farmers treat acidic soil with quick lime or slaked lime to improve soil fertility.
- **Salts:** Ionic compounds formed when the hydrogen of an acid is replaced by a metal or ammonium ion.
- Salts may be acidic (NH_4Cl), basic (Na_2CO_3) or neutral (NaCl) depending on the acids and bases from which they are formed.
- **Chemicals from Common Salt**

  (a) Sodium Hydroxide (NaOH)

  Prepared by the **chlor-alkali process**.

Used in making soaps, paper and detergents.

(b) Bleaching Powder [$CaOCl_2$]

Prepared by passing chlorine over dry slaked lime.

Used for bleaching cotton and paper, disinfecting drinking water and as an oxidising agent.

(c) Baking Soda ($NaHCO_3$)

Used in baking powder, fire extinguishers and as an antacid.

(d) Washing Soda ($Na_2CO_3 \cdot 10H_2O$)

Used for cleaning clothes, softening hard water and in glass, soap and paper industries.

- **Water of Crystallisation:** It is the fixed number of water molecules chemically attached to a salt.

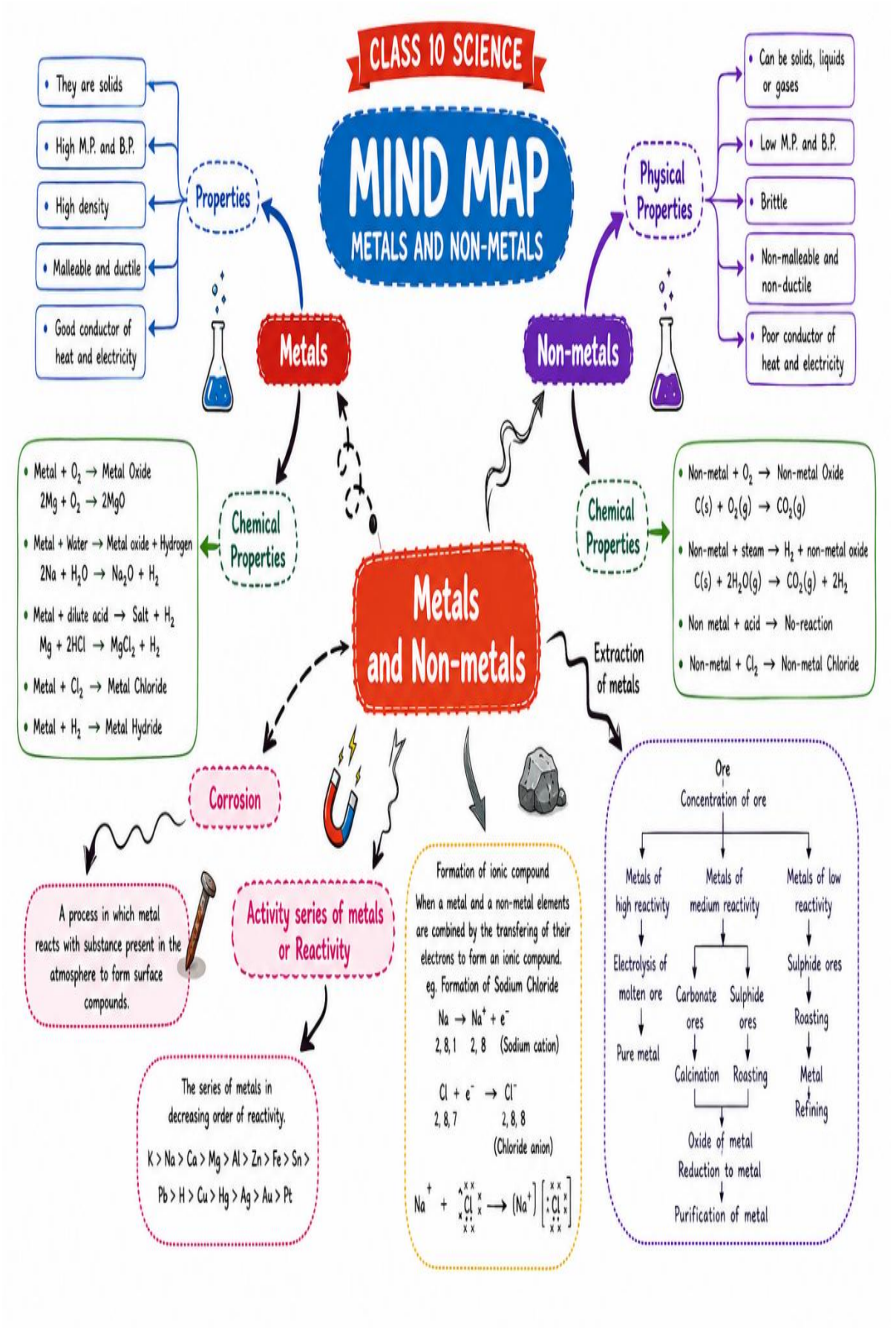
  Examples:
  - Copper sulphate: $CuSO_4 \cdot 5H_2O$
  - Washing soda: $Na_2CO_3 \cdot 10H_2O$
- **Plaster of Paris: $CaSO_4.\frac{1}{2}H_2O$.**

  Uses: for casts to immobilise broken bones, cast for statues, toys and for making fire proof materials etc.

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CHAPTER 3: METALS AND NON-METALS

(A) MIND MAP



(B) SUMMARY

Metals and non-metals are distinct categories of elements, differentiated by their physical and chemical properties.

Physical Properties:

- Metals are:
  - **Lustrous** (shiny).
  - They are **malleable** (can be beaten into thin sheets).
  - They are **ductile** (can be drawn into wires).
  - They are **good conductors** of heat and electricity.
  - They are **sonorous** (produce a ringing sound when struck).
  - Most metals are **hard** except **Sodium (Na)** and **Potassium (K)** which are soft metals.
  - Most metals are **solid** at room temperature except **Mercury (Hg)** (liquid at room temperature). **Gallium (Ga)** and **Caesium (Cs)** (melt at room temperature).
- Non-Metals are:
  - Generally **dull** (non-lustrous) except **Iodine**.
  - **Soft and Brittle** (break easily) except **Diamond** (hardest substance known).
  - Neither **malleable** nor **ductile**.
  - **Poor conductors** of heat and electricity except **Graphite** (conductor of electricity).
  - Usually not **sonorous**.

Chemical Properties Metals and Non-metals:

- **Reaction with Oxygen**
  - **Metals** react with oxygen to form **metal oxides**, which are generally **basic** in nature.
  - **Non-metals** also react with oxygen to form non-metal oxides, which are generally acidic.
  - **Amphoteric oxides:** Metal oxides which react with both acids and bases to form salt and water. Eg. Aluminium oxide (Al_2O_3), Zinc oxide (ZnO)
- **Reaction with Water**

  Different **metals** react differently with water.
  - Potassium and sodium react vigorously with cold water.
  - Calcium reacts less vigorously with cold water.
  - Magnesium reacts with hot water.
  - Iron reacts with steam.
  - Copper, silver and gold do not react with water.

  Non-metals generally do not react with water.
- **Reaction with Dilute Acids**

  Metals above hydrogen in the reactivity series react with dilute acids to produce salt and hydrogen gas. **Non-metals** generally do not react with dilute acids.
- **Reaction with Salt Solutions**

  A more reactive metal displaces a less reactive metal from its salt solution.
- **Reactivity Series:** The arrangement of metals in decreasing order of their reactivity.

  Metals can be arranged in a reactivity series based on their tendency to lose electrons and form positive ions. This series helps predict the outcome of reactions between metals and other substances.

  The decreasing order of reactivity is:

  K > Na > Ca > Mg > Al > Zn > Fe > Pb > (H) > Cu > Hg > Ag > Au

Ionic Compounds

- Metals lose electrons to form **positive ions (cations)**. Eg**:** Iron, copper, zinc, aluminium etc.
- Non-metals gain electrons to form **negative ions (anions)**. Eg: Oxygen, carbon, sulphur, nitrogen etc.

The attraction between oppositely charged ions forms an **ionic bond**.

Properties of Ionic Compounds

- Hard and brittle.
- High melting and boiling points.
- Conduct electricity in molten or aqueous state.
- Usually soluble in water.

Occurrence of Metals

Metals occur:

- In **Free State** (gold, silver, platinum).
- **Combined state** as ores (iron, aluminium, zinc).

An **ore** is a mineral from which a metal can be extracted economically.

Extraction of Metals

- Highly Reactive Metals are obtained by **electrolysis**. Eg: Sodium, Potassium, Calcium.
- Moderately Reactive Metals are extracted by **reduction using carbon**. Eg: Zinc, Iron, Lead.
- Less Reactive Metals are obtained by simply heating their ores or by simple reduction. Eg: Mercury, Copper.

Refining of Metals

Impure metals are purified by **electrolytic refining**. Eg: Copper

Corrosion

Corrosion is the gradual destruction of metals due to reaction with air, moisture or chemicals. Examples:

- Rusting of iron.
- Black coating on silver.
- Green coating on copper.

Prevention of Corrosion

- Painting, Oiling or greasing, Galvanisation, Alloying, Electroplating

Alloys

An alloy is a homogeneous mixture of a metal with another metal or non-metal.

Examples:

Brass = Copper + Zinc

Bronze = Copper + Tin

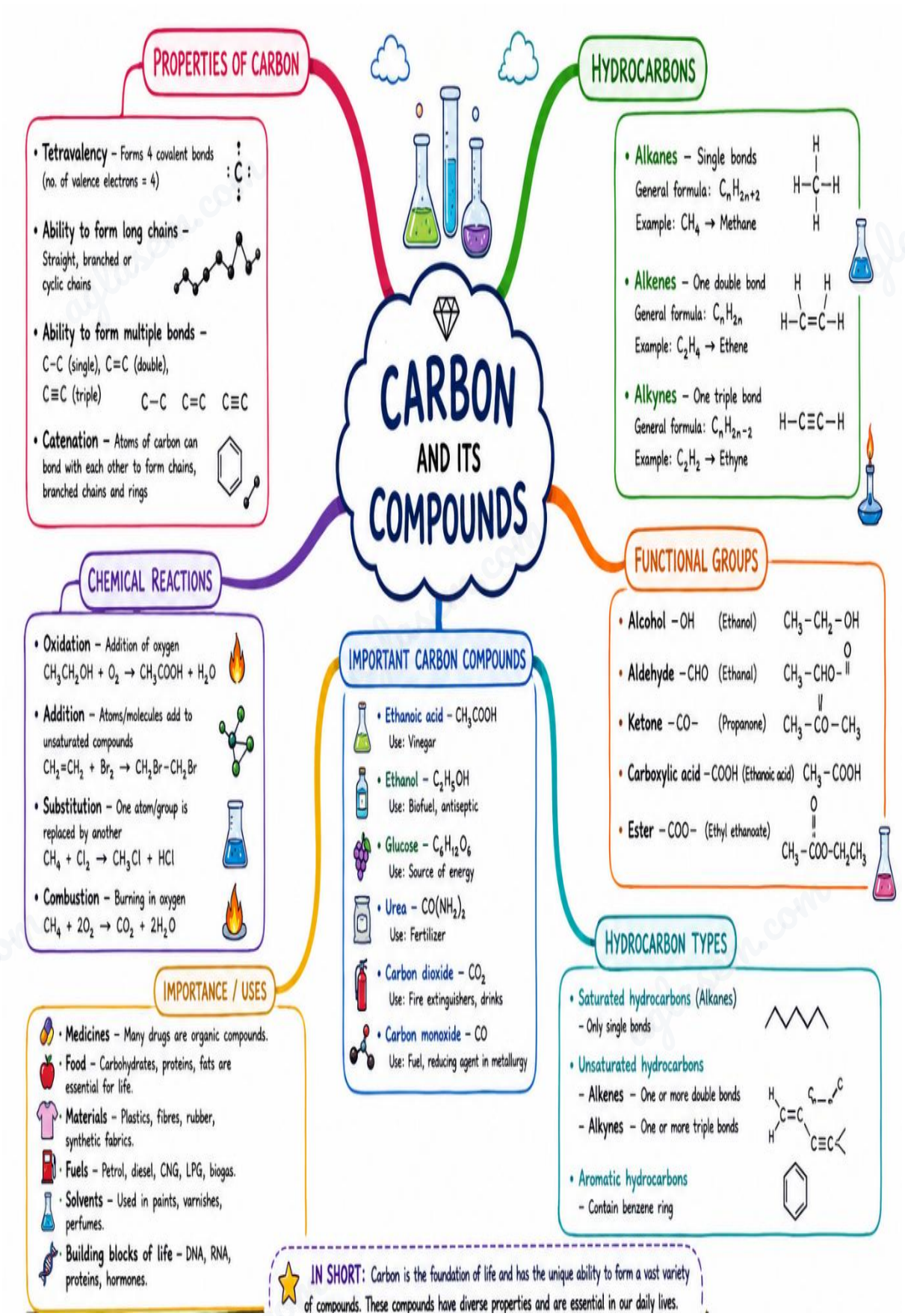
Solder = Lead + Tin

Stainless Steel = Iron + Chromium + Nickel + Carbon

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CHAPTER 4: CARBON AND ITS COMPOUNDS

(A) MIND MAP



(B) SUMMARY

- Carbon is a versatile element and carbon compounds play important roles in life processes and by meeting our daily needs
- Covalent bonds are formed between two similar or different atoms by sharing electrons in their valence shell such that both of them can achieve the structure of the nearest noble gas.

Tetravalency: Carbon has four valence electrons and forms **covalent bonds** by sharing electrons with other atoms. Carbon also forms compounds containing single, double and triple covalent bonds between carbon atoms.

Catenation: Catenation is the ability of an atom to form strong covalent bonds with other atoms of the same element, creating long straight chains, branched chains, or ring structures

Saturated and Unsaturated Compounds:

- **Saturated hydrocarbons (Alkanes):** Contain only single bonds between carbon atoms.
- **Unsaturated hydrocarbons (Alkenes and Alkynes):** Contain double or triple bonds.

Homologous Series: A family of organic compounds with the same functional group and similar chemical properties. Successive members differ by a **$-CH_2-$** group.

Functional Groups: Atoms or group of atoms that determine the chemical properties of carbon compounds.

- Alcohol (**–OH**)
- Aldehyde (**–CHO**)
- Ketone (**>C=O**)
- Carboxylic acid (**–COOH**)

Chemical Properties of Carbon Compounds:

- **Combustion** – burns in oxygen to produce carbon dioxide, water, and heat.
- **Oxidation** – addition of oxygen or removal of hydrogen.
- **Addition reaction** – occurs in unsaturated compounds.
- **Substitution reaction** – occurs in saturated compounds.

Ethanol (C_2H_5OH) is used as a fuel, solvent, and in medicines.

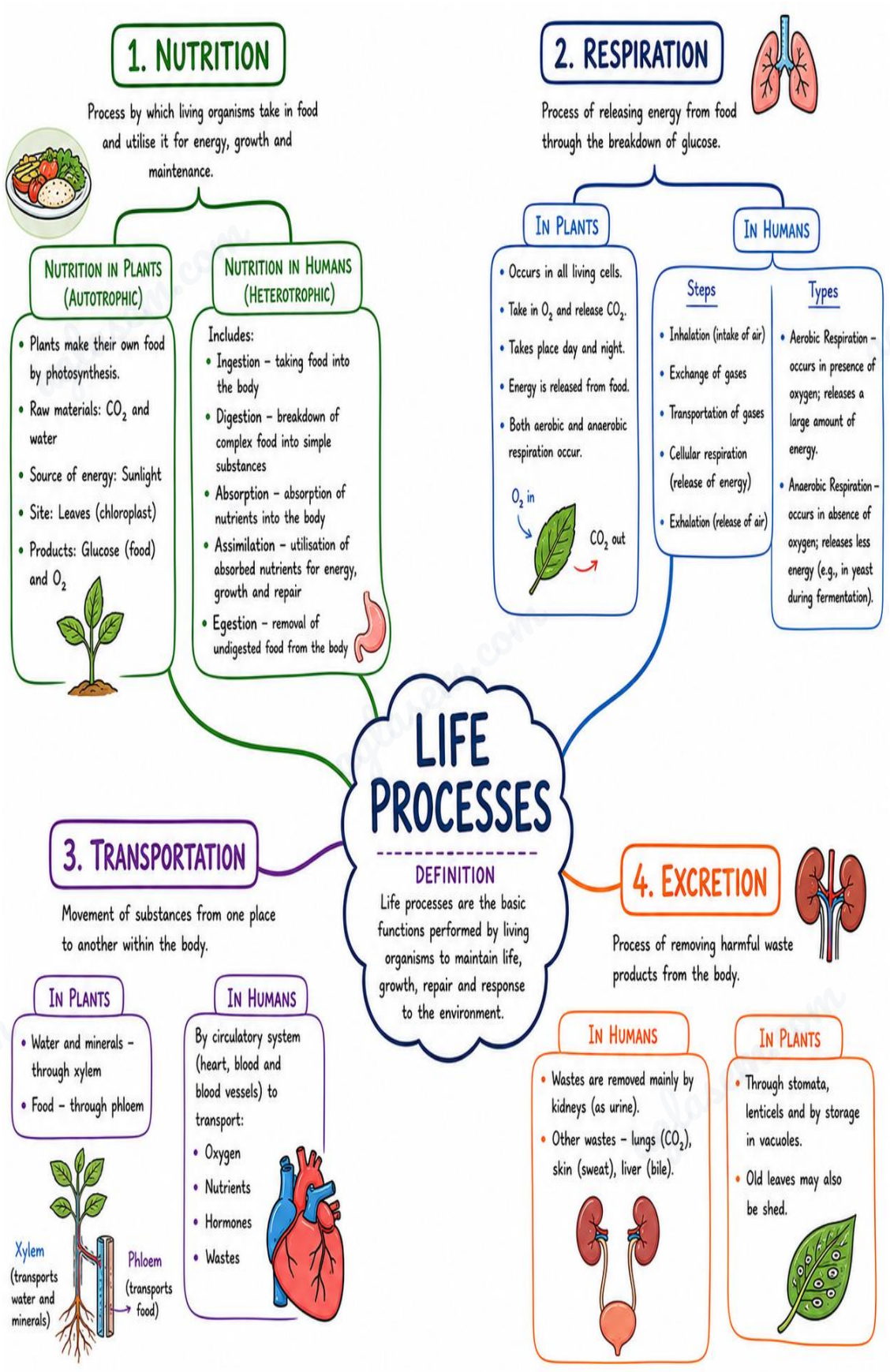
Ethanoic acid (CH_3COOH), also called acetic acid, is the main component of vinegar and is used as a preservative.

- When ethanol reacts with ethanoic acid, an **ester** is formed, producing a pleasant smell.
  This reaction is called **esterification**.
- **Soaps:** Soaps are sodium or potassium salts of long-chain carboxylic acids (fatty acids).
- **Detergents**: Detergents are ammonium or alkyl benzene sulphonate salts of a long chain of carboxylic acids.
- Soaps clean by forming **micelles**, which trap oil and grease in water. However, soaps do not work well in hard water because they form scum. Detergents work effectively in both soft and hard water.

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CHAPTER 5: LIFE PROCESSES

(A) MIND MAP



(B) SUMMARY

Life Processes

Life processes are the basic functions that keep living organisms alive:
Nutrition, Respiration, Transportation and Excretion.

1. Nutrition

- Definition: The process of obtaining and using food for energy, growth, and repair.
- Types:
  - Autotrophic – organisms make their own food.
    It is of two types: Photosynthesis; Chemosynthesis.
  - Heterotrophic – organisms depend on others.
    It is primarily of three types; Parasitic, Saprophytic and Holozoic.

Photosynthesis:

- $6CO_2 + 6H_2O$ --(Sunlight, Chlorophyll)--> $C_6H_{12}O_6 + 6O_2$
- Requirements: Sunlight, chlorophyll, carbon dioxide, water.
- Human digestion pathway:
  Mouth → Oesophagus → Stomach → Small Intestine → Large Intestine → Rectum → Anus
- Enzymes: Salivary amylase, Pepsin, Bile, Pancreatic enzymes.

2. Respiration

- Breakdown of food to release energy.
- Aerobic: Uses oxygen, more energy, $CO_2 + H_2O$.
- Anaerobic: No oxygen, less energy, lactic acid (muscles) or alcohol + CO_2 (yeast).
- Respiratory pathway: Nostrils → Nasal cavity → Trachea → Bronchi → Lungs → Alveoli.

3. Transportation

- Humans: Heart, blood and blood vessels.
- Arteries carry blood away from heart;
- veins carry blood toward the heart;
- capillaries exchange materials.
- Blood:
  - RBCs carry oxygen,
  - WBCs fight infection,
  - Platelets clot blood,
  - Plasma transports substances.
  - Double circulation: Pulmonary and systemic.
  - Plants: Xylem transports water/minerals; phloem transports food.

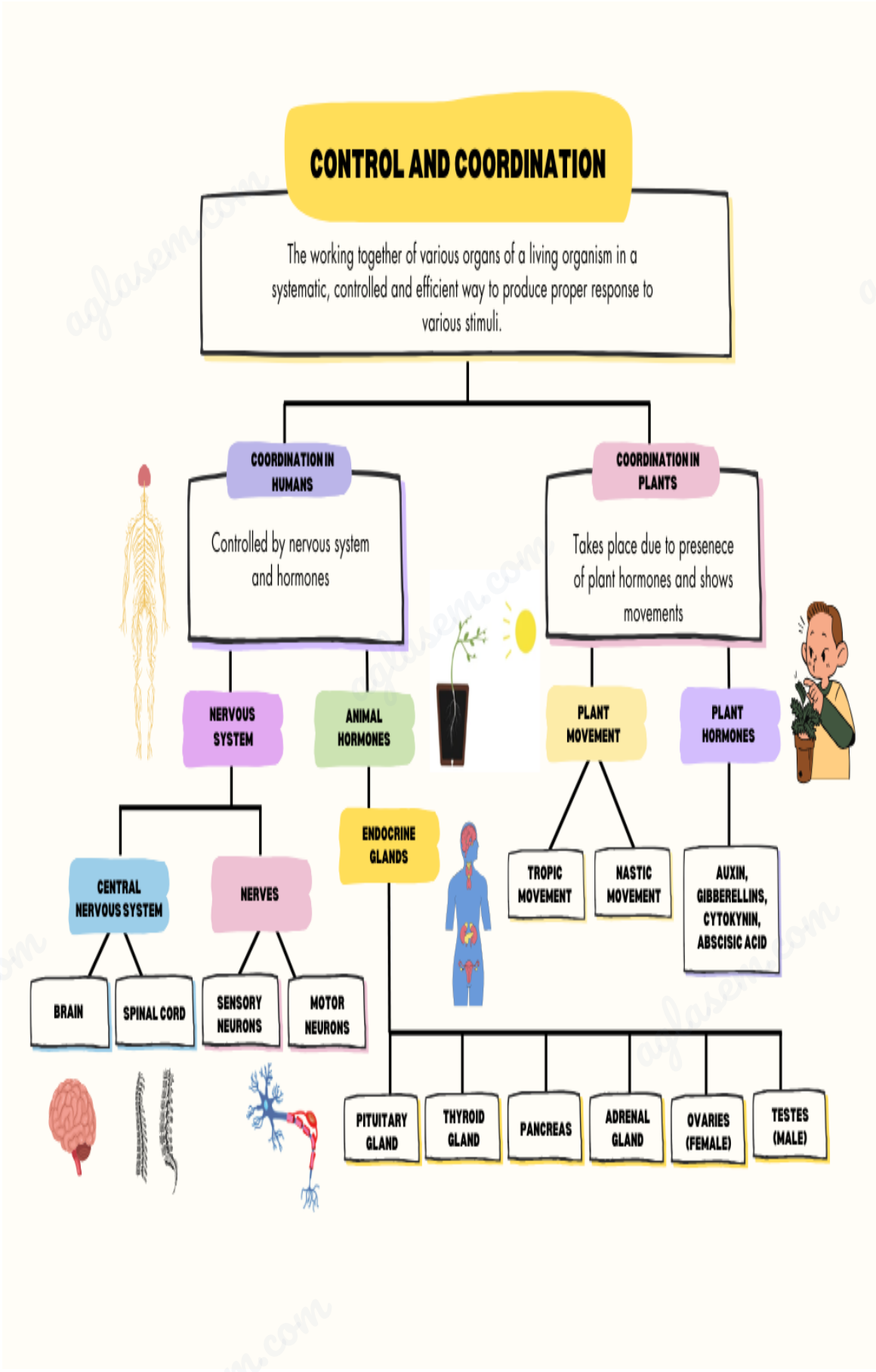
4. Excretion

- Removal of metabolic wastes.
- Parts: Kidneys, ureters, urinary bladder, urethra.
- Nephron is the functional unit.
- Urine formation: Filtration, reabsorption, secretion.
- Plants remove wastes via storage, stomata and shedding leaves.

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CHAPTER 6: CONTROL AND COORDINATION

(A) MIND MAP



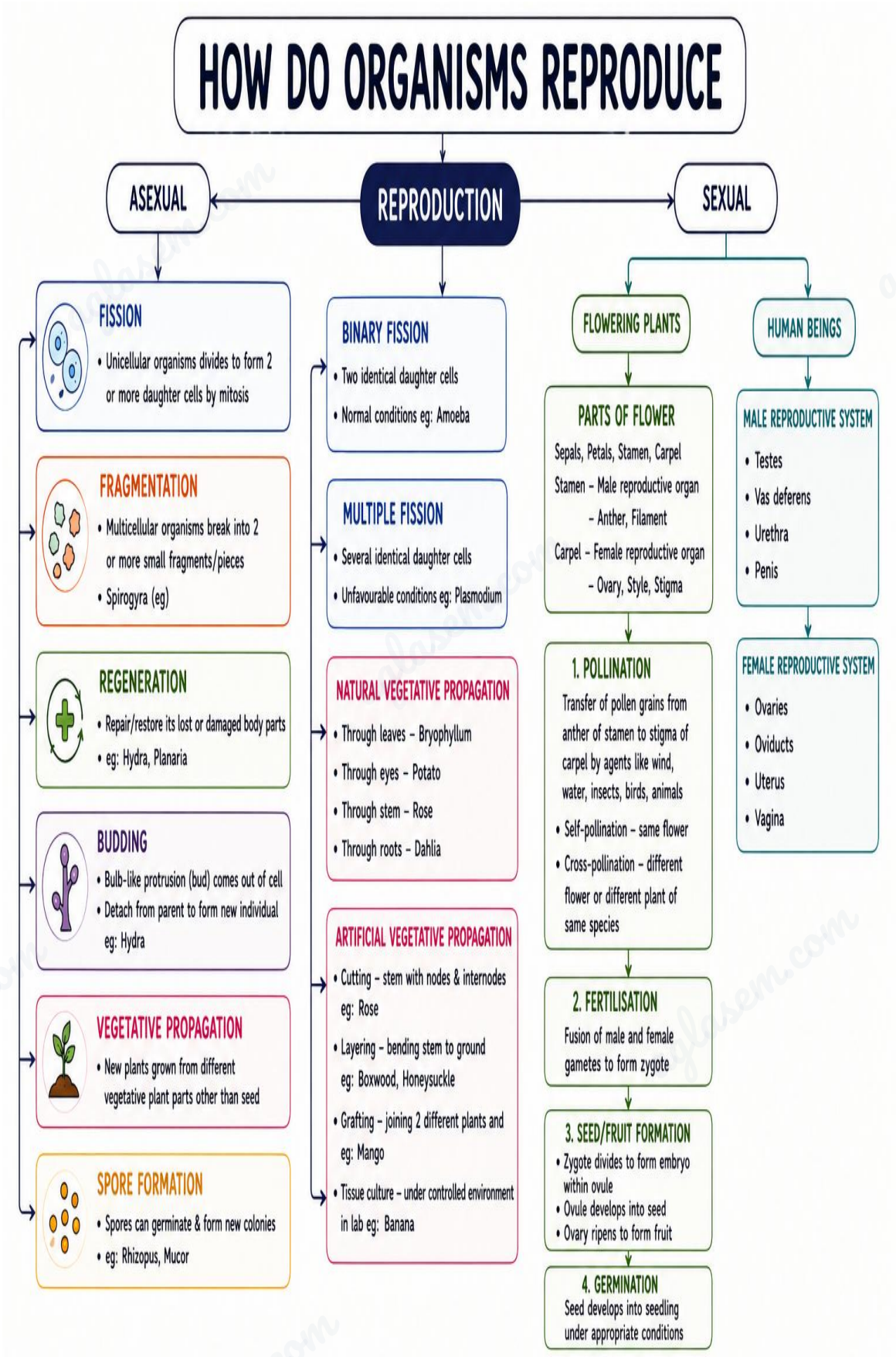
(B) SUMMARY

- What is Control and Coordination?
    - Control and coordination help organisms respond to stimuli. Animals use the nervous and endocrine systems.
    - Plants use hormones and growth responses.
- Control and Coordination in Animals
    - **Neuron** is the structural and functional unit.
    - **Parts**: Dendrites, Cell body (Cyton), Axon.
    - **Nerve impulses** travel from receptors to brain/spinal cord and then to effectors.
- **Reflex Action**
    - A quick automatic, involuntary response.
      Example: Pulling hand from a hot object.
    - Reflex Arc: Receptor → Sensory neuron → Spinal cord → Motor neuron → Effector.
- **Human Brain**
    - Forebrain: Thinking, memory, voluntary actions.
    - Midbrain: Visual and auditory reflexes.
    - Hindbrain: Balance, breathing, heartbeat, swallowing.
    - Protection: Skull, meninges, cerebrospinal fluid.
- **Coordination in Plants**
    - Tropic movements: Phototropism, Geotropism, Hydrotropism, Thigmotropism, Chemotropism.
    - Nastic movement: Mimosa leaves fold on touch.
- **Plant Hormones**
    - Auxin–growth;
    - Gibberellin–stem growth/seed germination;
    - Cytokinin–cell division;
    - ABA–growth inhibition and dormancy.
    - Ethylene-ripening of fruits
- **Hormones in Animals**
    - Pituitary–Growth hormone;
    - Thyroid–Thyroxine;
    - Pancreas–Insulin;
    - Adrenal–Adrenaline;
    - Testes–Testosterone;
    - Ovaries–Oestrogen.
- **Nervous vs Hormonal Control**
    - Nervous: electrical, fast, short-lasting, through nerves.
    - Hormonal: chemical, slow, long-lasting, through blood.

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Chapter 7: How Do Organisms Reproduce?

(A) MIND MAP



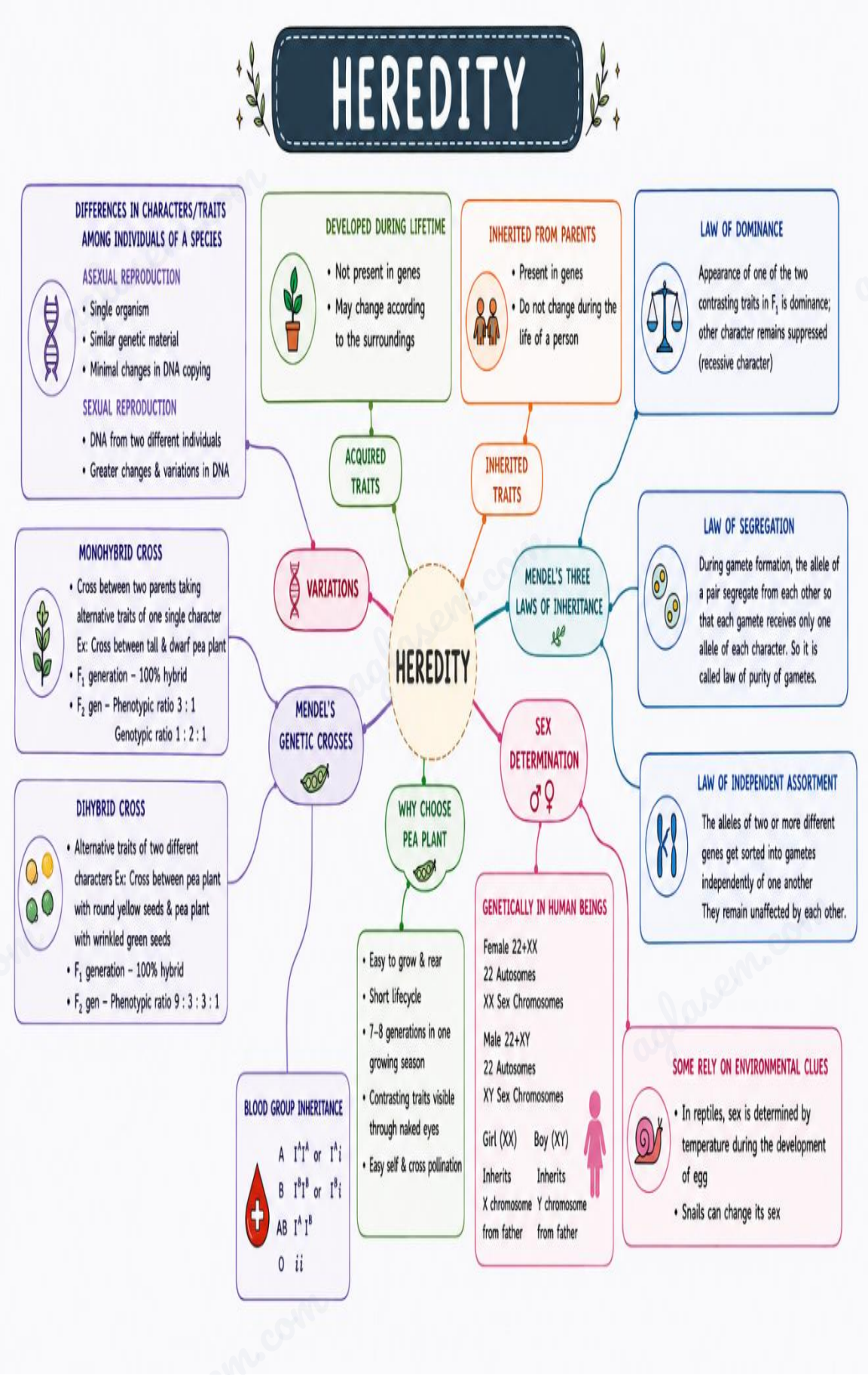
(B) SUMMARY

- Reproduction is the biological process by which organisms produce new individuals of the same species. It ensures continuity of species and introduces variations.
- **Types of Reproduction**
  - Asexual reproduction: One parent, no gametes, genetically similar offspring.
  - Methods: Binary fission, Multiple fission, Budding, Fragmentation, Regeneration, Spore formation, Vegetative propagation.
- **Sexual Reproduction**
  - Involves two parents. Male and female gametes fuse during fertilisation to produce genetically varied offspring.
- **Reproduction in Flowering Plants**
  - Flower parts: Stamen (male), Carpel/Pistil (female).
  - Pollination: Self and Cross.
  - Fertilisation forms a zygote.
  - After fertilisation: Zygote→Embryo, Ovule→Seed, Ovary→Fruit.
- **Reproduction in Human Beings**
  - Male: Testes, Scrotum, Vas deferens, Penis.
  - Female: Ovaries, Fallopian tubes, Uterus, Vagina.
  - Fertilisation occurs in the fallopian tube. Embryo develops in the uterus.
- **Puberty**
  - Growth of reproductive organs, hormonal changes, secondary sexual characteristics, reproductive maturity.
- **Reproductive Health**
  - Contraceptive methods: Condoms, Oral pills, Copper-T, Vasectomy, Tubectomy.
  - Importance: Prevents unwanted pregnancy, family planning, reduces STIs.
- **Important Diagrams**
  - Binary fission in Amoeba, Budding in Hydra, Spore formation in Rhizopus
  - Flower structure
  - Male and Female reproductive systems.
- **Must Remember**
  - Asexual vs Sexual reproduction,
  - Methods with examples
  - Parts of flower
  - Pollination
  - Fertilisation
  - Human reproductive systems
  - Embryo development
  - Contraceptive methods.

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CHAPTER 8: HEREDITY

(A) MIND MAP



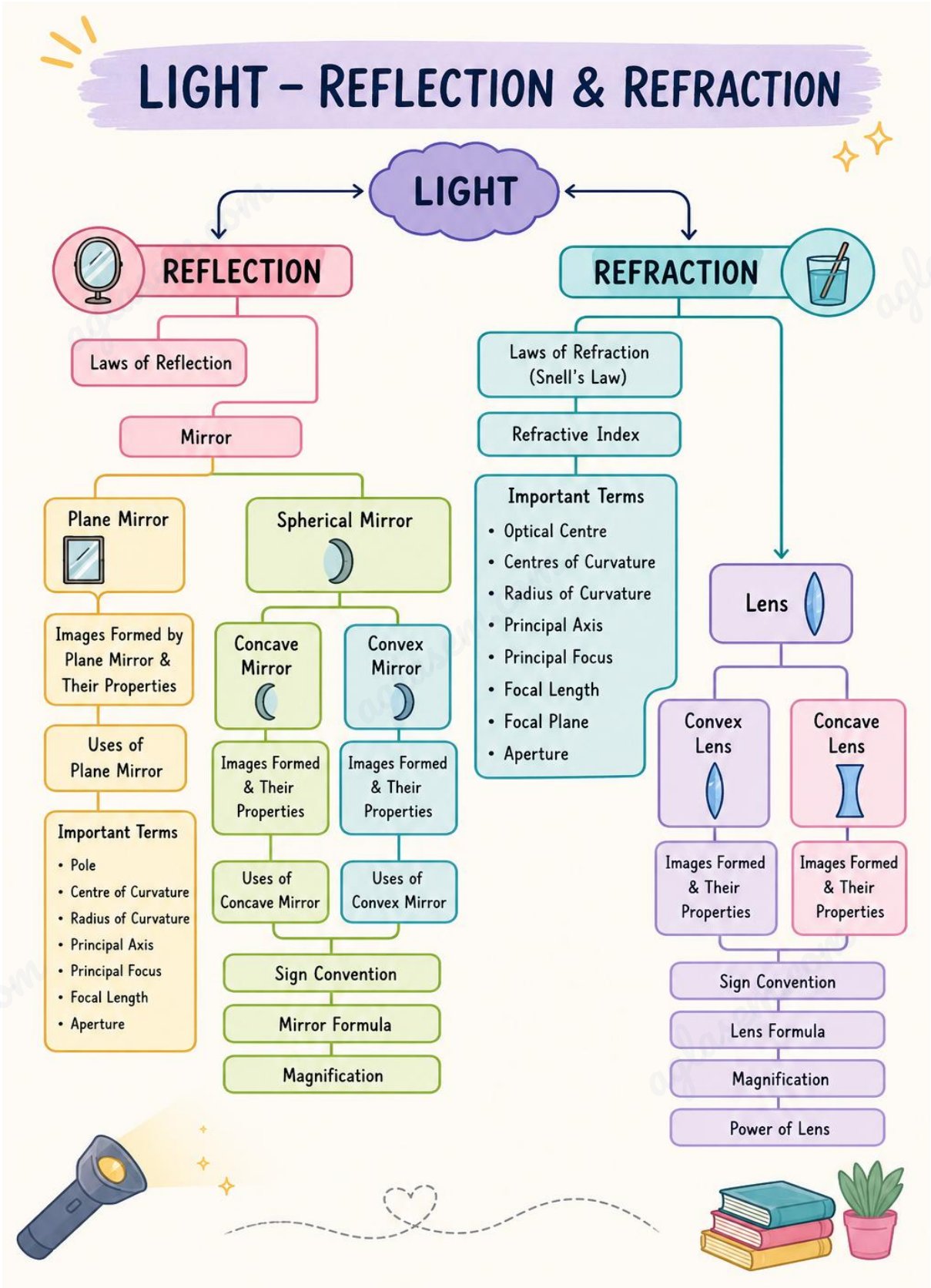
(B) SUMMARY

- Heredity is the transmission of traits from parents to offspring through genes. It explains similarities and differences between parents and offspring.
- Variations: Variation is the difference in characteristics among individuals.
- Importance:
    - Helps adaptation.
    - Increases survival.
    - Basis of evolution.
    - Types:
        - Inherited variations.
        - Acquired variations (not inherited).
- Mendel's Experiments
    - Gregor Johann Mendel is the Father of Genetics.
    - He experimented on pea plants and concluded that traits are controlled by genes.
    - Some traits are dominant while others are recessive.
- Important Terms
    - Gene: Basic unit of heredity.
    - Alleles: Different forms of the same gene.
    - Dominant trait: Expressed with one dominant allele.
    - Recessive trait: Expressed only with two recessive alleles.
- Monohybrid Cross
    - Example: TT × tt
    - F1 Generation: All Tall (Tt)
    - F2 Generation:
    - Genotypic ratio: 1 TT : 2 Tt : 1 tt
    - Phenotypic ratio: 3 Tall : 1 Dwarf
- Sex Determination in Humans
    - Humans have 23 pairs of chromosomes.
    - Female: XX
    - Male: XY
    - The father's sperm determines whether the child is XX (girl) or XY (boy).

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CHAPTER 9: LIGHT – REFLECTION AND REFRACTION.

(A) MIND MAP



(B) SUMMARY

- Light is a form of energy that produces the sensation of sight.
- Reflection is the bouncing back of light into the same medium after striking a surface.
    - Laws of Reflection
    - The angle of incidence (∠i) is equal to the angle of reflection (∠r).
    - The incident ray, reflected ray, and the normal at the point of incidence all lie in the same plane.
- **Spherical Mirrors:**
    - **Concave Mirror**: A spherical mirror whose reflecting surface is curved inwards. Itconverges parallel rays to a point.It forms a virtual and erect image when the object is placed between focus (F) and pole (P) of the mirror. In other cases, it always forms a real, inverted image of the object, if the object is placed beyond focus (F).
    - **Uses:** as Shaving mirrors, Dentist's mirrors, Vehicle headlights and torches, Solar furnaces
    - **Convex Mirror**: A spherical mirror whose reflecting surface is curved outwards. It Diverges light rays. It always forms virtual, erect and diminished image of the object whatever may be the position of the object in front of the mirror.
    - **Uses:** as a Rear-view mirrors in vehicles, Security mirrors in shops
- **Important Terms**
    - Pole (P): Centre of the mirror.
    - Centre of Curvature (C): Centre of the sphere of which the mirror is a part.
    - Radius of Curvature (R): Distance between P and C.
    - Principal Axis: Straight line passing through P and C.
    - Principal Focus (F): Point where rays parallel to the principal axis meet (in case of concave) or appear to diverge (in case of convex) mirror.
    - Focal Length (f): Distance between P and F.
    - Relation: R = 2f
    - Real image: The image which can be obtained on the screen is called real image. It is inverted with respect to the object.
    - Virtual image: The image which cannot be obtained on the screen is called a virtual image. It is erect with respect to the object.
    - Mirror Formula
    - $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$
    - Magnification of Mirror

      $m = \frac{h'}{h} = -\frac{v}{u}$
- **Refraction of Light**: is the bending of light when it passes from one transparent medium to another because its speed changes.
- **Laws of Refraction**
    - The incident ray, refracted ray and normal lie in the same plane.

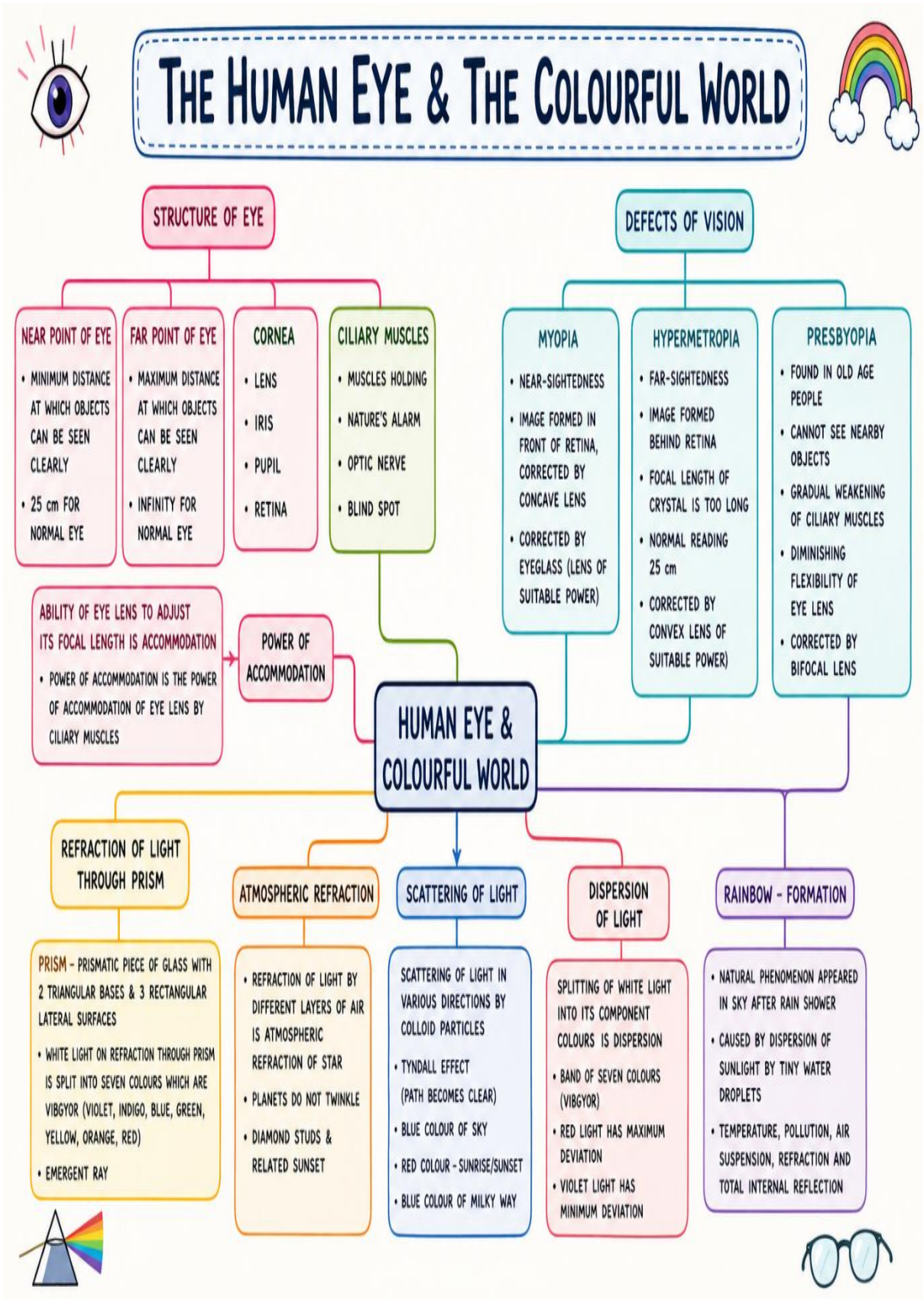
- The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media.
  $\frac{\sin i}{\sin r} = \text{constant}$ **(Snell's Law)**
- This constant is called the refractive index (n).

- **Lenses**
  - **Convex Lens:** Thicker at the centre. It converges light rays. It can form real or virtual images.It forms a virtual and erect image when the object is placed between focus (F1) and the optical centre (O) of the lens. In other cases, it always forms a real, inverted image of the object, if the object is placed beyond focus (F1).
  - **Uses:** in Magnifying glass, Camera, Microscope, Human eye correction(Hypermetropia)
  - **Concave Lens:** Thinner at the centre. It diverges light rays. It Always forms a virtual, erect and diminished image.
  - **Uses:** in Spectacles for Myopia, door eye viewers
- Lens Formula: $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$
- Magnification of Lens: $m = \frac{h'}{h} = \frac{v}{u}$
- Power of a Lens: the reciprocal of its focal length in metre. Its SI Unit is Dioptre (D)
  $P = \frac{1}{f}$
- Convex lens → Positive power
- Concave lens → Negative power
- **Important Sign Convention**
  According to the New Cartesian Sign Convention:
  - All distances are measured from the pole (mirror) or optical centre (lens).
  - Distances measured in the direction of incident light are positive.
  - Distances measured opposite to the direction of incident light are negative.
  - Heights above the principal axis are positive.
  - Heights below the principal axis are negative.

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CHAPTER 10: THE HUMAN EYE AND THE COLOURFUL WORLD.

(A) MIND MAP



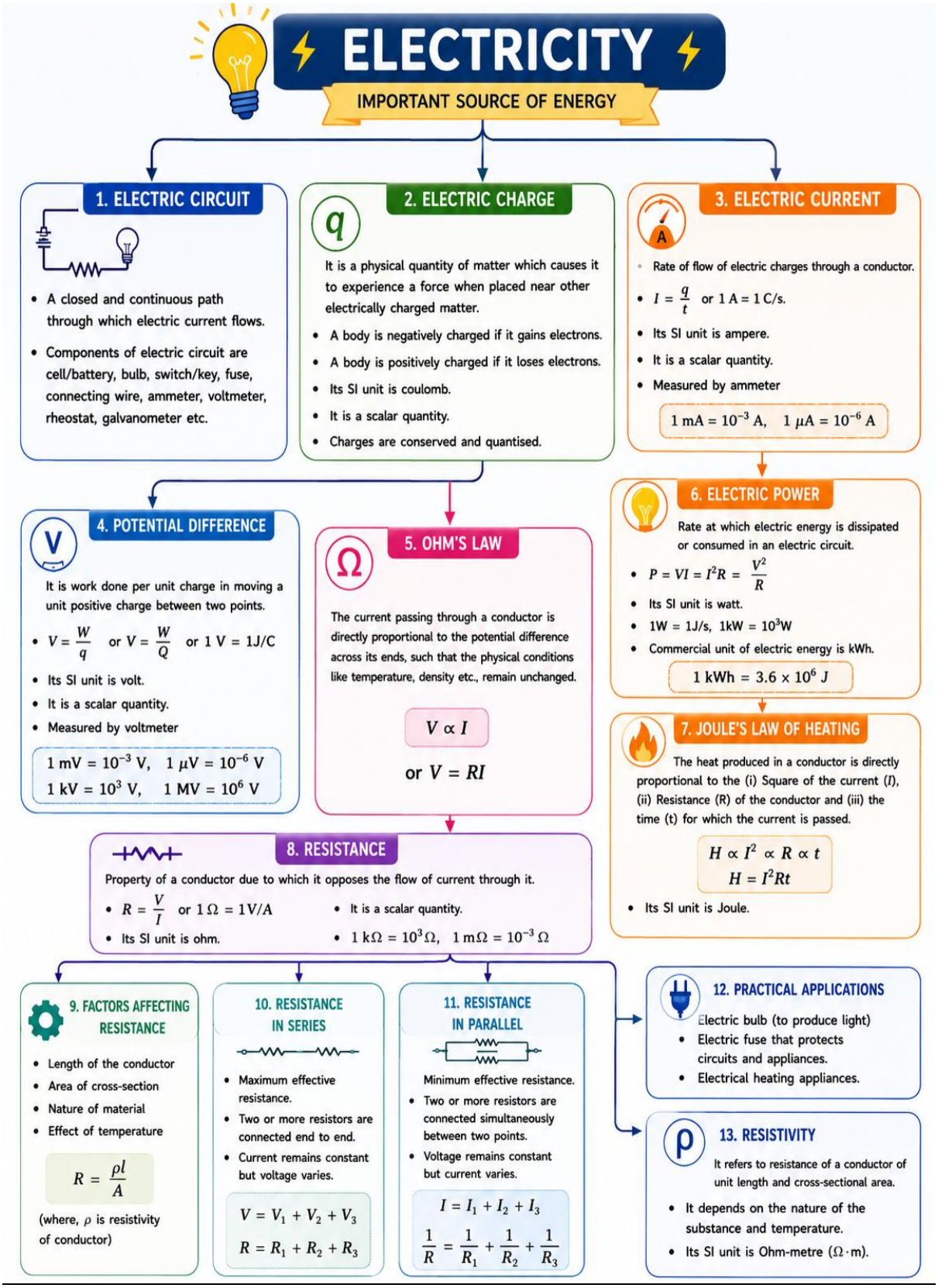
(B) SUMMARY

- **Human Eye** – Structure & Function
  The human eye is a light sensitive organ that helps us see objects by forming images on the retina.
- **Main Parts:**
  - Cornea: Transparent front layer; allows light to enter.
  - Iris: Controls the size of the pupil.
  - Pupil: Opening through which light enters the eye.
  - Lens: Convex lens that focuses light on the retina.
  - Ciliary muscles: Change the curvature of the lens (for focusing).
  - Retina: Screen where a real and inverted image is formed.
  - Optic nerve: Sends signals to the brain.
- **Power of Accommodation**
  - The ability of the eye lens to adjust its focal length to see objects at different distances clearly.
  - Near point of the eye is 25 cm. The eye Lens becomes thicker to see nearby objects.
  - Far point of the eye is infinity. The eye Lens becomes thinner to see distance objects.
- **Defects of Vision & Correction**
  - Myopia (near-sightedness)
    - Can see nearby objects clearly, distant objects appear blurred.
    - Image forms in front of retina.
    - Corrected using concave lens.
  - Hypermetropia (far-sightedness)
    - Can see distant objects clearly, nearby objects appear blurred.
    - Image forms behind retina.
    - Corrected using convex lens.
  - Presbyopia
    - Age-related defect; difficulty seeing nearby objects.
    - Corrected using convex lenses.
- **Refraction of Light Through a Prism**
  - Dispersion of light: Splitting of white light into its component colours on passing through a glass prism is called dispersion of light.
  - Spectrum: The band of colour components of a light beam obtained on a white screen when passed through a glass prism is called spectrum.
- **Atmospheric Refraction**: When the light rays pass through the atmosphere having different densities and refractive indices, then refraction takes place. This is known as atmospheric refraction.
  - Twinkling of stars occurs due to atmospheric refraction.
  - Advanced sunrise and delayed sunset happen due to bending of light.
- **Scattering of Light**
  - The sky appears blue because shorter wavelengths scatter more.
  - Sun appears red at sunrise/sunset due to scattering of blue light.

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CHAPTER 11: ELECTRICITY.

(A) MIND MAP



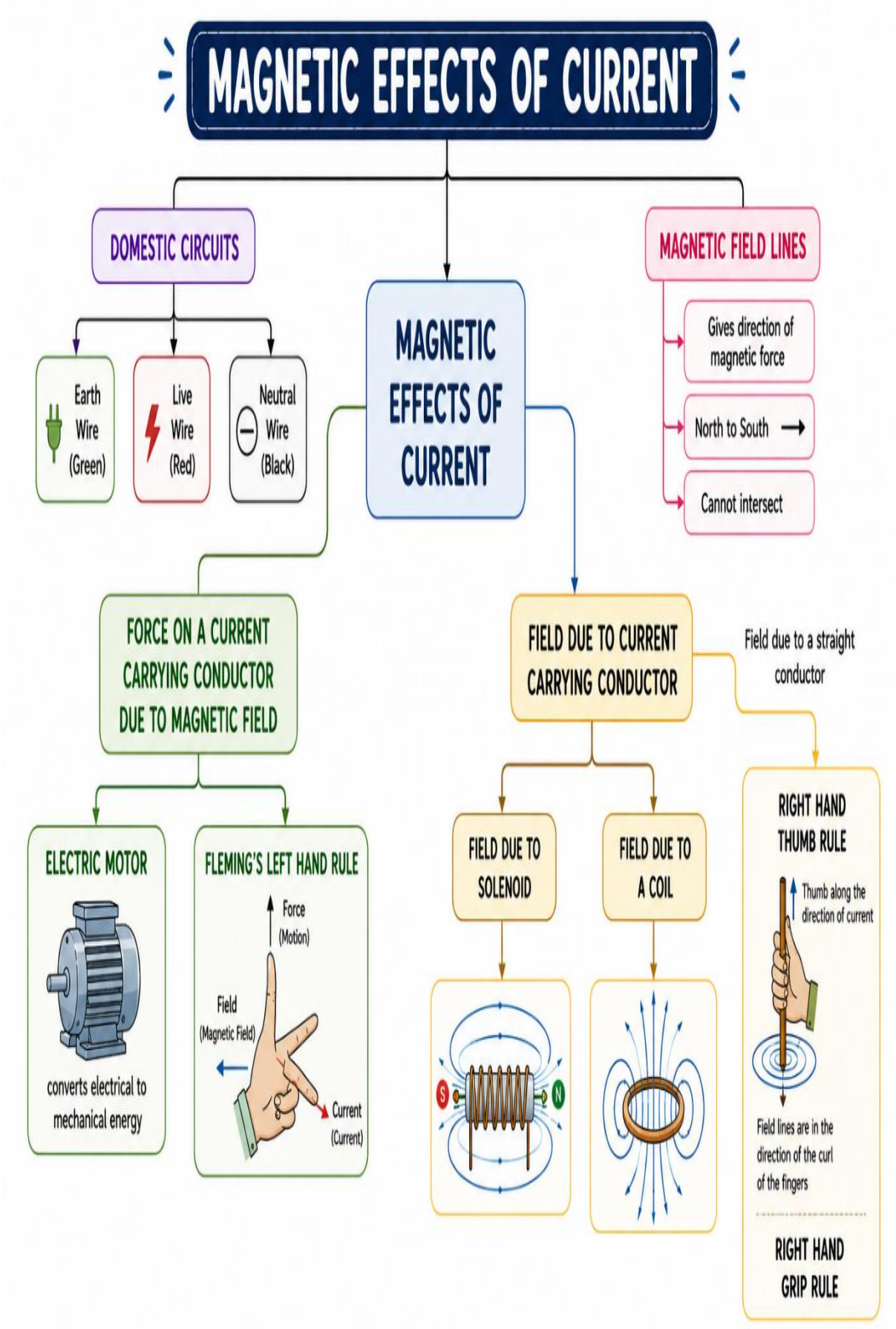
(B) SUMMARY

- **Electric Charge**: Property of matter that causes attraction or repulsion.
  - Two types: Positive (+), Negative (−)
  - Like charges repel, unlike attract.
  - SI unit: Coulomb (C)
- **Electric Current** (I): The flow of electric charge (electrons) in a definite direction in a conductor. $I = \frac{Q}{t}$.
  - SI Unit: Ampere (A)
  - 1 Ampere = 1 Coulomb of charge flowing per second.
  - The electric current is measured by ammeter
- **Potential Difference**: is the work done to move a unit charge from one point to another.
  - Formula:$V = \frac{W}{Q}$
  - SI Unit: Volt (V).
  - The potential difference is measured by voltmeter
- **Ohm's Law**: at constant temperature, the current flowing through a conductor is directly proportional to the potential difference across its ends.
  - Formula: V = IR
- **Resistance** (R): The opposition or obstruction offered by a conductor to the flow of electrons is called electric resistance.
  - SI unit of resistance is ohm (**Ω**).
  - Resistance depends on: length of a conductor, area of cross section, temperature and nature of the material.
  - Resistance $R = \rho \frac{l}{A}$
- **Resistivity**: Resistivity is a property of the material of a conductor.
  - SI unit is Ohm-metre (Ωm).
- **Combination of Resistors**
  - (a) Series Combination: Same current flows through all resistors.
    - Total resistance:$R = R_1 + R_2 + R_3 + \ldots\ldots$
  - (b) Parallel Combination: Same potential difference across each resistor.
    - Formula: $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots\ldots..$
- **Electric Power**: Electric power is the rate at which electrical energy is consumed.
  - SI of electric power Unit: Watt (W).
  - 1 kilowatt (kW) = 1000 W.
  - Formula: P = VI, P = I^2R, P = V^2/R
- **Electrical Energy**: Electrical energy consumed is:
  - E = Pt
  - Commercial unit: kilowatt-hour (kWh)
- **Heating Effect** of Electric Current: When current passes through a resistor, heat is produced.
- **Joule's Law of Heating**: H = I^2Rt
  - Applications: In Electric iron, Heater, Toaster, Electric kettle, Geyser
- **Electric Fuse**: An electric fuse is a safety device made of a wire with a low melting point.
  - It melts when excess current flows.
  - Protects electrical appliances from overload and short circuit.

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CHAPTER 12: MAGNETIC EFFECT OF CURRENT

(A) MIND MAP



(B) SUMMARY

- **Magnetic Effect of Electric Current**: When electric current flows through a conductor, it produces a magnetic field around it.
- **Magnetic Field**: A magnetic field is the region around a magnet or a current-carrying conductor where its influence can be felt.
  - Magnetic Field represented by magnetic field lines.
  - They form closed loops.
  - The direction of magnetic field lines:
    - North → South.(Outside the magnet) and
    - South → North.(Inside the magnet)
  - No two field lines intersect.
- **Magnetic Field Due to Electric Current**

(a) Straight Current-Carrying Conductor

  - Produces circular magnetic field lines around it.
  - Direction given by Right-Hand Thumb Rule:
  - Thumb → current direction
  - Fingers → magnetic field direction

(b) Circular Loop

  - Magnetic field lines become concentric circles near the wire.
  - At the centre, field lines are nearly straight and parallel.
  - Strength increases with: Increase in current, More number of turns
- **Solenoid:** A solenoid is a coil of many circular turns of insulated wire. Produces a magnetic field similar to a bar magnet. Inside the solenoid: strong and uniform field.
- **Electromagnet**: A solenoid with a soft iron core becomes an electromagnet. Strength depends on: Current, Number of turns, Nature of core
- **Force on a Current-Carrying Conductor**: A conductor carrying current in a magnetic field experiences a force.
  - Direction given by **Fleming's Left-Hand Rule:**
    - Thumb → force
    - Fore finger → magnetic field
    - Central finger → current
- Domestic Electric Circuits: Household circuits include:
  - Live wire (red) → carries current
  - Neutral wire (black) → returns current
  - Earth wire (green) → safety
- **Safety Devices**

  - Fuse: Made of thin wire with low melting point, Protects from overloading

- MCB (Miniature Circuit Breaker): Automatically switches off during overload

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CHAPTER 13: OUR ENVIRONMENT

(A) MIND MAP



(B) SUMMARY

- **Environment:** The environment includes all living (biotic) and non-living (abiotic) components that interact with one another.
- **Ecosystem**
  An ecosystem is a functional unit where living organisms interact with each other and with the non-living environment.
  - **Biotic**: Producers, Consumers, Decomposers.
  - **Abiotic**: Air, Water, Soil, Sunlight, Temperature, Minerals.
- **Food Chain**
  A food chain shows the flow of food and energy.
  Example: Grass → Grasshopper → Frog → Snake → Eagle.
- **Trophic levels:** Producers, Primary consumers, Secondary consumers, Tertiary consumers.
- **Food Web**
  A food web is a network of interconnected food chains. It provides stability to the ecosystem.
- **Flow of Energy**
  - The Sun is the ultimate source of energy.
  - Energy flows in one direction: Sun → Producers → Consumers → Decomposers.
  - 10% Law: Only about 10% of energy is transferred to the next trophic level.
- **Decomposers**
  - Examples: Bacteria and fungi.
  - Functions: Break down dead organisms and recycle nutrients.
- **Biodegradable and Non-biodegradable Substances**
  - Biodegradable: Vegetable waste, paper, cotton, leaves.
  - Non-biodegradable: Plastic, glass, metals, pesticides.
- **Biological Magnification**
  Increase in the concentration of harmful chemicals at successive trophic levels. Top consumers accumulate the highest concentration.
- **Ozone Layer**
  - The ozone layer protects Earth from harmful UV rays.
  - Cause of depletion: CFCs.
  - Effects: Skin cancer, cataracts, damage to plants and animals.
- **Waste Management (3Rs)**
  - Reduce: Use fewer resources.
  - Reuse: Use items again.
  - Recycle: Convert waste into useful products.

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SECTION A
Multiple Choice Questions (MCQ)
[Chemistry]

1. Which of the following is not a physical change?
(A) Boiling of water to give water vapour
(B) Melting of ice to give water
(C) Dissolution of salt in water
(D) Combustion of Liquefied Petroleum Gas (LPG)
Answer: (D)

2. A colorless gas that smells like burning sulphur and causes coughing is
(A) Hydrogen
(B) Sulphur dioxide
(C) Sulphur trioxide
(D) Nitrogen dioxide
Answer: (B)

3. Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved?
(A) Displacement reaction
(B) Oxidation reaction
(C) Combination reaction
(D) Double displacement reaction
Answer: (D)

4. Which of the following is (are) an endothermic process (es)?
(A) Dilution of sulphuric acid
(B) Freezing of water
(C) Condensation of water vapours
(D) Evaporation of water
Answer: (D)

5. Which one of the following processes involve chemical reactions?
(A) Storing of oxygen gas under pressure in a gas cylinder
(B) Liquefaction of air
(C) Keeping petrol in a china dish in the open
(D) Heating copper wire in presence of air at high temperature
Answer: (D)

6. Which of the following indicates chemical equation
(A) Change in size
(B) Change in mass
(C) Formation of precipitate
(D) Change in position
Answer: (C)

7. Which of the following is an oxidation reaction?
(A) Water freezing into ice
(B) Salt dissolving in water
(C) Sugar melting in pan
(D) Iron rusting when exposed to air
Answer: (D)

8. Which of the following is a decomposition reaction
(A) Burning of food
(B) Photosynthesis
(C) Digestion of food
(D) Rusting of iron
Answer: (B)

9. $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$
Identify the substance oxidised in the above equation.
(A) $MnCl_2$
(B) HCl
(C) H_2O
(D) MnO_2
Answer: (B)

10. In which reaction does a solid get separated from the solution?
(A) Neutralization reaction
(B) Precipitation reaction
(C) Redox reaction
(D) Displacement reactions
Answer: (B)

11. The main cause of rancidity of foods is the reaction of fats and oils by
(A) Hydrolysis
(B) Substitution
(C) Oxidation
(D) Reduction
Answer: (C)

12. Which of the following completes and balances the equation
$Ca(OH)_2(s) + __ \rightarrow CaCO_3 + H_2O$
(A) CO_2 (g)
(B) H_2 (g)
(C) N_2 (g)
(D) O_2 (g)
Answer: (A)

13. Consider the following chemical reaction:
$3Fe\ (s) + 4H_2O\ (g) \rightarrow Fe_3O_4\ (s) + 4H_2\ (g)$
Which statement correctly describes the physical state and role of water (H_2O) in this process?
(A) Water is in liquid state and acts as an oxidizing agent.
(B) Water is in liquid state and acts as a reducing agent.

(C) Water is in gaseous state (steam) and acts as an oxidizing agent.
(D) Water is in gaseous state (steam) and acts as a reducing agent.

Answer: (C)

14. A student rubs a magnesium ribbon with sandpaper before burning it in the air. What is the fundamental purpose of this step?
(A) To increase the surface temperature of the ribbon for rapid ignition.
(B) To remove a protective layer of basic magnesium carbonate from its surface.
(C) To convert magnesium into a highly volatile state.
(D) To ensure that moisture from the surroundings does not extinguish the flame.

Answer: (B)

15. A balanced chemical equation is strictly governed by which fundamental law of nature?
(A) Law of Definite Proportions
(B) Law of Multiple Proportions
(C) Law of Conservation of Mass
(D) Law of Gaseous Volumes

Answer: (C)

16. To prevent structural failure and economic loss in infrastructure projects, engineering teams coat structural iron beams with paint or zinc layers. How does this intervention protect the metal?
(A) It chemically converts the iron into a noble metal like platinum.
(B) It creates a physical barrier that prevents iron from interacting with oxygen and moisture.
(C) It absorbs environmental moisture to speed up safe internal reactions.
(D) It creates an alkaline medium that dissolves acidic rain before contact.

Answer: (B)

17. A group of students wants to design a cost-effective self-heating emergency food pouch. They need a chemical reaction that releases a safe, significant amount of heat energy upon activation. Which of the following pairs of reactants should they select?
(A) Ammonium nitrate and water
(B) Calcium oxide and water
(C) Sodium chloride and water
(D) Barium hydroxide and ammonium chloride

Answer: (B)

18. Silver articles are highly prized for their brilliance, but they gradually turn black when exposed to open air for a long time. This is primarily caused by a chemical reaction with which environmental component?
(A) Oxygen gas to form silver oxide (Ag_2O).
(B) Carbon dioxide gas to form silver carbonate (Ag_2CO_3).
(C) Hydrogen sulphide gas to form a layer of silver sulphide (Ag_2S).
(D) Nitrogen gas to form silver nitride (Ag_3N).

Answer: (C)

19. When hydrogen sulphide gas (H_2S) is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is formed, and sulphuric acid remains in the solution. This reaction is a classic example of a:
(A) Combination reaction
(B) Displacement reaction
(C) Double displacement reaction
(D) Decomposition reaction

Answer: (C)

20. Water is removed when substance 'X' is heated, as well as its colours changes from green, then substance X is
(A) $Ca\ SO_4$
(B) $CuSO_4$
(C) $FeSO_4$
(D) $BaSO_4$

Answer: (C)

21. Which of the following is true for acids?
(A) Bitter and change red litmus to Blue.
(B) Sour and change red litmus to blue.
(C) Sour and change blue litmus to red.
(D) Bitter and change blue litmus to red.

Answer: (C)

22. An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?
(A) Baking powder
(B) Lime
(C) Ammonium hydroxide solution

(D) Hydrochloric acid

Answer: (D)

23. To protect tooth decay, we are advised to brush our teeth regularly. The nature of the toothpastes commonly used is

(A) acidic
(B) neutral
(C) basic
(D) corrosive

Answer: (C)

24. Which of the following statements is correct about an aqueous solution of an acid and of a base?
    (i) Higher the pH, stronger the acid
    (ii) Higher the pH, weaker the acid
    (iii) Lower the pH, stronger the base
    (iv) Lower the pH, weaker the base

(A) (i) and (iii)
(B) (ii) and (iii)
(C) (i) and (iv)
(D) (ii) and (iv)

Answer: (D)

25. Which one of the following can be used as an acid–base indicator by a visually impaired student?

(A) Litmus
(B) Turmeric
(C) Vanilla essence
(D) Petunia leaves

Answer: (C)

26. A student notices after eating sour candy, their teeth feel sensitive. What could be the reason for this.

(A) The candy makes the teeth stronger
(B) The candy increases the pH level , making the mouth more basic
(C) The candy decreases the pH level, making the mouth more acidic.
(D) The candy has no effect on pH level

Answer: (C)

27. A student adds water to concentrated acid instead of acid to water. What will happen ?

(A) no reaction
(B) explosion or splashing
(C) cooling
(D) neutralisation

Answer: (B)

28. Baking soda is heated during cooking. Gas released is

(A) oxygen
(B) nitrogen
(C) carbon dioxide
(D) hydrogen

Answer: (C)

29. Blue colour copper sulphate turns white on heating due to loss of water, but blue colour returns due to

(A) Heat
(B) Hydration
(C) Evaporation
(D) Loss of ion

Answer: (B)

30. A person suffering from acute gastric acidity after overeating is advised to take an antacid. Which chemical property and compound combination represents the safest and most effective mechanism for relief?

A) Strong base like Sodium hydroxide (NaOH) to rapidly react with stomach acid.
B) Weak base like Magnesium hydroxide [$Mg(OH)_2$] to mildly neutralise excess hydrochloric acid.
C) Strong acid like Dilute Nitric acid (HNO_3) to compete with stomach fluids.
D) Neutral salt like Sodium chloride (NaCl) to dilute the concentration of gastric juice.

Answer: (B)

31. Four students measured the pH of four unknown solutions P, Q, R, and S and recorded the values as 2, 7, 10, and 14 respectively. Which solution contains the highest concentration of hydronium ions (H_3O^+)?

A) Solution P
B) Solution Q
C) Solution R
D) Solution S

Answer: (A)

32. A solid compound ‘X’ reacts vigorously with dilute hydrochloric acid to evolve a gas ‘Y’. When gas ‘Y’ is passed through lime water, the solution turns milky. However, passing excess gas ‘Y’ causes the milkiness to completely disappear. Identify ‘X’ and ‘Y’.

A) X =Calcium oxide, Y=Oxygen
B) X=Calcium carbonate, Y=Carbon dioxide
C) X=Sodium chloride, Y=Hydrogen chloride
D) X=Sodium hydroxide, Y=Hydrogen

Answer: (B)

33. Which of the following salts is formed by the combination of a weak acid and a strong base, and what will be the nature of its aqueous solution?

A) Ammonium chloride (NH_4Cl); Acidic solution

B) Sodium acetate (CH_3COONa); Basic solution

C) Sodium chloride (NaCl); Neutral solution

D) Ammonium carbonate [$(NH_4)_2CO_3$); Amphoteric solution

Answer: (B)

34. A chemical compound 'Z' is extensively used in the textile industry for bleaching cotton and linen, as well as a disinfectant in water treatment plants to make water free of pathogens. Identify the compound 'Z' and its chemical formula.

(A) Washing soda, $Na_2CO_3.10H_2O$

(B) Bleaching powder, $CaOCl_2$

(C) Baking soda, $NaHCO_3$

(D) Plaster of Paris, $CaSO_4$. ½ H_2O

Answer: (B)

35. The pH of a human mouth decreases below 5.5 after meals due to the action of bacteria on residual food particles. What physical damage does this cause, and how can it be prevented based on chemical principles?

(A) It causes tooth decay by corroding the calcium phosphate tooth enamel; it can be prevented by using basic toothpaste.

(B) It sharpens tooth enamel by dissolving soft plaque; no treatment is necessary.

(C) It alters the biological taste buds permanently; it can be prevented by consuming citric fruits.

(D) It turns the saliva into a highly volatile organic liquid; it can be prevented by avoiding water.

Answer: (A)

36. Baking powder is a common ingredient used to make cakes soft and spongy. It is a mixture of baking soda (sodium hydrogen carbonate) and a mild edible acid like tartaric acid. What is the fundamental purpose of adding tartaric acid to this mixture?

(A) To speed up the thermal decomposition of sodium hydrogen carbonate.

(B) To neutralize the bitter-tasting sodium carbonate formed during heating.

(C) To bleach the flour and give the cake a bright white appearance.

(D) To preserve the cake and prevent bacterial growth over time.

Answer: (B)

37. When small pieces of zinc metal are added to a test tube containing a dilute solution of sodium hydroxide and heated, a gas is evolved. What is the identity of this gas, and how is it safely confirmed in a laboratory?

(A) Oxygen gas (O_2), which rekindles a glowing wooden splinter.

(B) Carbon dioxide gas (CO_2), which turns lime water milky.

(C) Hydrogen gas (H_2), which burns with a characteristic 'pop' sound when a burning matchstick is brought near.

(D) Nitrogen dioxide gas (NO_2), which is recognized by its characteristic brown fumes.

Answer: (C)

38. In the industrial 'Chlor-alkali process', the electrolysis of an aqueous solution of sodium chloride (brine) yields three highly valuable products. Which row in the options correctly maps the products formed at the anode, cathode, and within the electrolytic solution?

A) Anode: Hydrogen; Cathode: Chlorine; Solution: Sodium carbonate

B) Anode: Chlorine; Cathode: Hydrogen; Solution: Sodium hydroxide

C) Anode: Oxygen; Cathode: Sodium; Solution: Hydrochloric acid

D) Anode: Chlorine; Cathode: Oxygen; Solution: Bleaching powder

Answer: (B)

39. Which of the following is a natural source of citric acid

(A) Spinach

(B) Apple

(C) Lemon

(D) Tomato
Answer: (C)
40. Which of the following is acidic in nature?
(A) Human blood
(B) Lime juice
(C) Antacid
(D) Lime water
Answer: (B)
41. The ability of metals to be drawn into thin wire is known as
(A) ductility
(B) malleability
(C) sonority
(D) conductivity
Answer: (A)
42. A metal X reacts with oxygen to form an amphoteric oxide. What could X must likely be
(A) Sodium
(B) Aluminium
(C) Magnesium
(D) Iron
Answer: (B)
43. Cinnabar is an ore of
(A) Mercury
(B) Zinc
(C) Copper
(D) Lead
Answer: (A)
44. Which of the following methods is suitable for preventing an iron frying pan from rusting?
(A) Applying grease.
(B) Applying paint.
(C) Applying a coating of zinc
(D) Applying a coat of Lead
Answer: (C)
45. Which of the following used for dissolution of gold?
(A) Hydrochloric acid
(B) Sulphur acid
(C) Nitric acid
(D) Aqua- regia
Answer: (D)
46. An elements' positioning in the reactivity series governs its natural occurrence. Which of the following pairs of metals can coexist seamlessly in nature in their native or elemental metallic state?
(A) Sodium and Potassium
(B) Copper and Iron
(C) Gold and Platinum
(D) Magnesium and Aluminium
Answer: (C)
47. Which of the following metals do not react with cold as well as hot water?
(A) sodium
(B) calcium
(C) magnesium
(D) iron
Answer: (D)
48. Thermite is a mixture of iron (III) oxide and
(A) zinc powder
(B) sodium
(C) potassium
(D) aluminium powder
Answer: (D)
49. The highly reactive metals like Sodium, Potassium and Magnesium, etc. are extracted by the
(A) electrolysis of their molten chloride
(B) electrolysis of their molten oxides
(C) reduction by aluminium
(D) reduction by carbon
Answer: (A)
50. Which of the following non-metal is lustrous?
(A) Sulphur
(B) Oxygen
(C) nitrogen
(D) Iodine
Answer: (D)
51. Stainless steel is a very useful material for our life. In stainless steel iron is mixed with
(A) Ni and Cr
(B) Cu and Cr
(C) Ni and Cu
(D) Cu and Au
Answer: (A)
52. A non- metal which is stored in water is
(A) sulphur
(B) silicon
(C) phosphorus
(D) carbon
Answer: (C)
53. The metal that is not malleable at room temperature is
(A) copper
(B) zinc
(C) lead
(D) tin
Answer: (B)

54. To prevent accidental fires inside laboratory storage cabinets, highly reactive elements must be completely isolated from ambient air and atmospheric humidity. Which of the following fluids is safely used to submerge raw Sodium metal?
(A) Distilled water
(B) Concentrated alcohol
(C) Kerosene oil
(D) Liquid nitrogen
Answer: (C)

55. Metal oxides are generally classified by their chemical behavior when interacting with aqueous solutions. However, oxides of Aluminium (Al_2O_3) and Zinc (ZnO) show a specific dual nature. What term is used to describe such oxides?
(A) Acidic oxides
(B) Basic oxides
(C) Amphoteric oxides
(D) Neutral oxides
Answer: (C)

56. A production jeweler mixes copper with pure 24-carat gold to formulate 22-carat gold ornaments. What mechanical and structural improvement does this mixing process provide to the final jewelry piece?
(A) Decreases the overall density to make it lightweight
(B) Enhances structural hardness to make it resistant to bending
(C) Sharpens the melting point to make melting easier
(D) Significantly elevates electrical conductivity
Answer: (B)

57. In the electrolytic refining of copper the electrolyte used is
(A) CuO
(B) $CuCl_2$
(C) acidified $CuSO_4(aq)$
(D) $CuSO_4(s)$
Answer: (C)

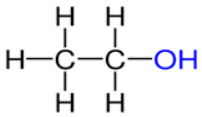
58. An alloy used for making electrical heating elements is
(A) Solder
(B) Brass
(C) Nichrome
(D) Bronze
Answer: (C)

59. Ionic compounds conduct electricity in:
(A) Solid state
(B) Molten state
(C) Solid and dry state
(D) Solid only
Answer: (B)

60. Brass is an alloy of
(A) Copper and Tin
(B) Iron and Carbon
(C) Copper and Zinc
(D) Aluminium and Copper
Answer: (C)

61. Which of the following metals are obtained by electrolysis of their chlorides in molten state
(A) Mg
(B) Ag
(C) Zn
(D) Cu
Answer: (A)

62. Name the below compound from its structure:



(A) Ethane
(B) Ethanol
(C) Ethene
(D) Propanol
Answer: (B)

63. Which amongst the following is not a free state of carbon?
(A) diamond
(B) graphite
(C) petrol
(D) coke
Answer: (C)

64. Covalent compounds generally have:
(A) High melting point
(B) Low melting and boiling points
(C) High electrical conductivity
(D) Hard crystalline structure
Answer: (B)

65. Carbon forms large molecules due to:
(A) Catenation
(B) Allotropy
(C) Valency
(D) Reactivity
Answer: (A)

66. Organic compounds having the same molecular formula but different structural formulae are called
(A) Allotropes

(B) Isomers
(C) Isobars
(D) Isotopes
Answer: (B)

67. The functional group –COOH belongs to:
(A) Alcohol
(B) Aldehyde
(C) Carboxylic acid
(D) Ketone
Answer: (C)

68. Hard water reduces the effectiveness of:
(A) Detergents
(B) Soap
(C) Acids
(D) Alcohol
Answer: (B)

69. A hydrocarbon which does not belong to the same homologous series of carbon compounds is
(A) C_4H_{10}
(B) C_6H_{14}
(C) C_7H_{14}
(D) $C_{10}H_{22}$
Answer: (C)

70. Amongst C_3H_8, C_4H_{10}, C_5H_{12} and C_5H_{10} the homologues are:
(A) C_4H_{10} and C_5H_{12} only
(B) C_3H_8 and C_4H_{10} only
(C) C_5H_{10} and C_5H_{12} only
(D) C_3H_8, C_4H_{10} and C_5H_{12} only
Answer: (D)

71. In graphite, each carbon atom is bonded to three other carbon atoms in the same plane. What happens to the fourth valence electron?
(A) It forms an extra ionic bond with a neighbouring layer.
(B) It is completely lost to form a carbon free radical.
(C) It remains free/delocalised, allowing graphite to conduct electricity.
(D) It forms a localized triple bond between alternate carbon pairs.
Answer: (C)

72. Industrial hydrogenated vegetable ghee is manufactured from liquid vegetable oils using a nickel catalyst. This reaction is categorized as a/an:
(A) Substitution reaction
(B) Displacement reaction
(C) Addition reaction
(D) Dehydration reaction
Answer: (C)

73. An ester with a sweet, fruity fragrance is boiled with an aqueous sodium hydroxide (NaOH) solution. This specific process is widely utilised in factories to manufacture:
(A) Industrial synthetic petrol
(B) Domestic soaps
(C) Commercial vinegar
(D) Artificial polymers
Answer: (B)

74. Ordinary laundry soaps fail to clean clothes efficiently when mixed with hard municipal water because:
(A) Hard water degrades the hydrocarbon chains into gas.
(B) Calcium and magnesium ions react with soap to form an insoluble sticky scum.
(C) Soaps turn hard water highly acidic, neutralising the active ingredients.
(D) The soap molecules completely dissolve into water clusters and cannot trap dirt.
Answer: (B)

75. Pure ethanoic acid readily freezes into a solid white crystalline mass in cold winter climates. This property is the direct historical basis for calling this substance:
(A) Commercial Vinegar
(B) Glacial Acetic Acid
(C) Ethanol Solvent
(D) Saturated Soap Matrix
Answer: (B)

76. A chef notices that the exterior bases of her shiny steel pans are turning black and dusty over a gas stove. What evaluation should she make?
(A) The gas is premium and has too much fuel energy.
(B) The air inlets of the gas stove are clogged, causing wasteful incomplete combustion.
(C) The steel metal is undergoing an internal substitution reaction.
(D) This is a standard clean combustion behaviour for saturated LPG gas.
Answer: (B)

77. Methane and chlorine gases are mixed together in a clear flask. Under which specific experimental condition will a substitution reaction take place?

(A) Storing the flask in a dark underground locker.
(B) Exposing the flask to bright, active sunlight.
(C) Adding high amounts of liquid hard water.
(D) Keeping the flask in ice at exactly 0 degrees Celsius.

Answer: (B)

78. What is the official IUPAC name of the compound CH_3-CH_2-CHO?
(A) Propanone
(B) Propanol
(C) Propanal
(D) Propanoic acid

Answer: (C)

79. Carboxylic acids are obtained from alcohols by
(A) pyrolysis
(B) hydrolysis
(C) reduction
(D) oxidation

Answer: (D)

80. Which catalyst is used in hydrogenation of vegetable oils?
(A) Copper
(B) Zinc
(C) Nickel
(D) Iron

Answer: (C)

Direction (81 to 100): Two statements are given – one labelled Assertion (A)and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements A and R.

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

81. **Assertion** (A): Photosynthesis taking place in green plants is classified as an endothermic reaction.
Reason (R): Chlorophyll-bearing plants absorb radiant solar energy to convert carbon dioxide and water into chemical energy (glucose).

Answer: (A)

82. **Assertion** (A): Quicklime (CaO) reacts violently with water to produce slaked lime, making it a distinctly endothermic process.
Reason (R): Chemical reactions that result in a measurable release of thermal energy into the surroundings are designated as exothermic reactions.

Answer: (D)

83. **Assertion** (A): Packed food formulations rich in lipids and oils experience a drastic deterioration in smell and taste when exposed to open atmospheric air over prolonged durations.
Reason (R): Unsaturated and saturated fatty acids undergo direct chemical oxidation upon exposure to ambient air, forming volatile, malodorous compounds through rancidity.

Answer: (A)

84. **Assertion** (A): Adding dilute hydrochloric acid to active zinc granules causes rapid effervescence, turning blue litmus paper red by the evolved gas.
Reason (R): Zinc is positioned higher than hydrogen in the electrochemical activity series, allowing it to displace hydrogen from dilute mineral acids.

Answer: (D)

85. **Assertion** (A): Respiration is considered an exothermic reaction.
Reason (R): Energy is released during respiration in the form of heat.

Answer: (A)

86. **Assertion** (A): Acids have sour taste.
Reason (R): Acids release H^+ ions.

Answer: (A)

87. **Assertion** (A): Concentrated acids are diluted by adding water to acid.
Reason (R): Dilution of concentrated acid is a highly exothermic process.

Answer: (D)

88. **Assertion** (A): Onion and clove oil can be used as olfactory indicators.
Reason (R): Their smell changes in acidic and basic medium.

Answer: (A)

89. **Assertion** (A): Bases change red litmus solution into blue litmus solution.

Reason (R): Bases give hydroxide ions in aqueous solution.

Answer: (B)

90. **Assertion** (A): Plaster of Paris should be stored in a moisture proof container.
Reason (R): Plaster of Paris is a powdery mass that absorbs water to form a hard solid mass, gypsum.

Answer: (A)

91. **Assertion** (A): Ionic compounds like Sodium Chloride (NaCl) act as highly efficient conductors of electricity when dissolved in water or maintained in a molten state, yet fail to conduct electricity in their solid crystalline state.
Reason (R): The application of heat or a solvent breaks down the strong inter-ionic forces, allowing the ions to move freely toward electrodes.

Answer: (A)

92. **Assertion** (A): Copper does not react with dilute HCl.
Reason (R): Copper is more reactive than hydrogen.

Answer: (C)

93. **Assertion** (A): Aluminium is used to make aircraft bodies.
Reason (R): Anodising makes aluminium corrosion resistant.

Answer: (B)

94. **Assertion** (A): Zinc reacts with steam to form zinc oxide and hydrogen.
Reason (R): Zinc is more reactive than iron.

Answer: (B)

95. **Assertion**(A):Galvanisation prevents iron from rusting.
Reason (R):Zinc is more reactive than iron.

Answer: (A)

96. **Assertion** (A): Carbon forms a large number of compounds.
Reason (R): Carbon has the unique ability to form bonds with other carbon atom.

Answer: (A)

97. **Assertion** (A): Diamond is a bad conductor of electricity.
Reason (R): In diamond, each carbon atom is bonded to four other carbon atoms.

Answer: (A)

98. **Assertion** (A): Ethane is a saturated hydrocarbon.
Reason (R): Ethane contains a double bond between carbon atoms.

Answer: (C)

99. **Assertion** (A): Carbon compounds burn with a yellow sooty flame.
Reason (R): Saturated carbon compounds burn with a clean flame.

Answer: (D)

100. **Assertion** (A): Ethanoic acid reacts with ethanol in presence of conc. sulphuric acid to form ester.
Reason (R): Esters have a fruity smell and are used in perfumes.

Answer: (B)

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Multiple Choice Questions (MCQ) [BIOLOGY]

1. Bile juice is stored in
(A) liver
(B) pancreas
(C) gall bladder
(D) kidney
Answer: (C)

2. Which of the following statements about autotrophs is incorrect?
(A) They synthesise carbohydrates from carbon dioxide and water in the presence of sunlight and chlorophyll.
(B) They store carbohydrate in the form of starch.
(C) They convert carbon dioxide and water into carbohydrates in the absence of sunlight.
(D) They constitute the first trophic level in food chain.
Answer: (C)

3. Alveoli are found in
(A) lungs
(B) heart
(C) kidney
(D) stomach
Answer: (A)

4. Saliva contains an enzyme called
(A) amylase
(B) lipase
(C) pepsin
(D) trypsin
Answer: (A)

5. The normal Systolic Pressure is about
(A) 120 mm of Hg
(B) 100 mm of Hg
(C) 115 mm of Hg
(D) 125 mm of Hg
Answer: (A)

6. The kidneys in human beings are apart of the system for
(A) Nutrition
(B) Respiration
(C) Excretion
(D) Transportation
Answer: (C)

7. The breakdown of pyruvate to give carbon-dioxide, water and energy take place in
(A) Cytoplasm
(B) Mitochondria
(C) Nucleus
(D) Chloroplast
Answer: (B)

8. The function of bile is to:
(A) Digest proteins
(B) Digest carbohydrates
(C) Emulsify fats
(D) Absorb water
Answer: (C)

9. The digestion of proteins begins in the:
(A) Mouth
(B) Stomach
(C) Small intestine
(D) Large intestine
Answer: (B)

10. The opening and closing of stomata is controlled by:
(A) Guard cells
(B) Epidermal cells
(C) Xylem
(D) Phloem
Answer: (A)

11. The balanced equation for photosynthesis is:
(A) $CO_2 + O_2 \rightarrow$ Glucose
(B) $CO_2 + H_2O \rightarrow$ Glucose + O_2
(C) $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$
(D) Glucose + $O_2 \rightarrow CO_2 + H_2O$
Answer: (C)

12. Which enzyme digests proteins in the stomach?
(A) Amylase
(B) Pepsin
(C) Lipase
(D) Maltase
Answer: (B)

13. The energy released during cellular respiration is used to synthesise
(A) Ribosome
(B) RBC
(C) ATP
(D) Mitochondria.
Answer: (C)

14. The end product of anaerobic respiration in yeast is:
(A) Lactic acid
(B) Ethanol and carbon dioxide
(C) Oxygen
(D) Water
Answer: (B)

15. Which of the following is not a part of the human respiratory system?
(A) Trachea
(B) Lungs
(C) Bronchi

(D) Nephron
Answer: (D)
16. The function of the lining of mucus in the nasal passage of human beings is to
(A) increase the temperature of the inhaled air
(B) move the air in and out
(C) filter the air that we breathe in
(D) absorb oxygen from the air.
Answer: (C)
17. The first step of respiration takes place in the:
(A) Cytoplasm
(B) Mitochondria
(C) Nucleus
(D) Chloroplast
Answer: (A)
18. The red colour of blood is due to:
(A) Plasma
(B) Platelets
(C) Haemoglobin
(D) WBCs
Answer: (C)
19. The most common gas liberated during aerobic respiration, anaerobic respiration and fermentation is
(A) carbon monoxide
(B) carbon dioxide
(C) oxygen
(D) water vapour
Answer: (B)
20. The pumping organ of the human circulatory system is:
(A) Lungs
(B) Kidney
(C) Heart
(D) Brain
Answer: (C)
21. Which chamber of the heart receives oxygenated blood from the lungs?
(A) Right atrium
(B) Right ventricle
(C) Left atrium
(D) Left ventricle
Answer: (C)
22. Which part of the plant mainly loses water during transpiration?
(A) Roots
(B) Stem
(C) Leaves
(D) Flowers
Answer: (C)
23. The process by which food is transported in plants is called:
(A) Diffusion
(B) Osmosis
(C) Translocation
(D) Absorption
Answer: (C)
24. The functional unit of the kidney is:
(A) Neuron
(B) Nephron
(C) Alveoli
(D) Artery
Answer: (B)
25. Artificial kidney is used in the process called:
(A) Transpiration
(B) Dialysis
(C) Respiration
(D) Photosynthesis
Answer: (B)
26. Which of the following is an excretory product of plants?
(A) Resin
(B) Gum
(C) Latex
(D) All of these
Answer: (D)
27. Which part of the nephron reabsorbs useful substances like glucose and water?
(A) Glomerulus
(B) Bowman’s capsule
(C) Renal tubule
(D) Ureter
Answer: (C)
28. Which part of the excretory system stores urine?
(A) Kidney
(B) Ureter
(C) Urinary bladder
(D) Urethra
Answer: (C)
29. Which part of the neuron receives signals?
(A) Axon
(B) Dendrite
(C) Cell body
(D) Nucleus
Answer: (B)
30. Reflex actions are controlled by:
(A) Brain
(B) Spinal cord
(C) Nerves
(D) Muscles
Answer: (B)

31. The chemical substance released at synapse is:
(A) Hormone
(B) Neurotransmitter
(C) Enzyme
(D) Protein
Answer: (B)
32. Motor neurons carry impulses from:
(A) Receptor to brain
(B) Brain to muscles
(C) Brain to sensory nerves
(D) Spinal cord to brain
Answer: (B)
33. The long part of a neuron that carries impulses away is:
(A) Dendrite
(B) Axon
(C) Cell body
(D) Nucleus
Answer: (B)
34. Folding of leaves in Mimosa pudica is an example of:
(A) Tropic movement
(B) Growth movement
(C) Nastic movement
(D) Phototropism
Answer: (C)
35. Which hormone regulates carbohydrate, protein and fat metabolism?
(A) Insulin
(B) Glucagon
(C) Thyroxin
(D) Adrenaline
Answer: (C)
36. Which plant hormone promotes cell division?
(A) Cytokinin
(B) Auxin
(C) Ethylene
(D) Abscisic acid
Answer: (A)
37. Which hormone is called the "emergency hormone"?
(A) Thyroxine
(B) Insulin
(C) Adrenaline
(D) Testosterone
Answer: (C)
38. Diabetes is caused due to deficiency of:
(A) Thyroxine
(B) Insulin
(C) Adrenaline
(D) Estrogen
Answer: (B)
39. Which hormone is responsible for male secondary sexual characters?
(A) Estrogen
(B) Progesterone
(C) Testosterone
(D) Insulin
Answer: (C)
40. Hormones are transported through:
(A) Nerves
(B) Blood
(C) Lymph only
(D) Muscles
Answer: (B)
41. Which of the following is a plant hormone?
(A) Insulin
(B) Thyroxin
(C) Oestrogen
(D) Cytokinin
Answer: (D)
42. The gap between two neurons is called a
(A) Axon
(B) Synapse
(C) Dendrite
(D) Cell body
Answer: (B)
43. The main organ for control and co-ordination in animals
(A) Nerve
(B) Muscle tissue
(C) Brain
(D) Blood
Answer: (C)
44. Iodine is necessary for the synthesis of which hormone?
(A) Adrenaline
(B) Thyroxine
(C) Auxin
(D) Insulin
Answer: (B)
45. In a neuron, conversion of electrical signal to a chemical signal occurs at/ in
(A) Cell body.
(B) Axonal end.
(C) Dendrite end.
(D) Axon
Answer: (B)
46. Electrical impulse travels in a neuron from

(A) Dendrite→ axon→ axonal end→ cell body
(B) Cell body→ Dendrite → axon→ axonal end
(C) Dendrite →Cell body→ axon→ axonal end
(D) Axonal end→ axon → Cell body → Dendrite

Answer: (C)

47. Which of the following statements is correct about receptors?
(A) Gustatory receptor detect taste while olfactory receptors detect smell.
(B) Both Gustatory and olfactory receptors detect smell
(C) Auditory receptor detect smell and olfactory receptors detect taste.
(D) Olfactory receptor detect taste and Gustatory receptors detect smell.

Answer: (A)

48. The main function of abscisic acid in plants is to
(A) Increase the length of cells
(B) Promote cell division
(C) Inhibit growth
(D) Promote of stem growth

Answer: (C)

49. The growth of pollen tubes towards ovule is due to
(A) Hydrotropism
(B) Chemotropism
(C) Geotropism
(D) Phototropism

Answer: (B)

50. Seeds in plants are formed after
(A) Germination
(B) Fertilisation
(C) Pollination
(D) Growth

Answer: (B)

51. Binary fission in Amoeba occurs in:
(A) Any plane
(B) Longitudinal plane
(C) Transverse plane
(D) Fixed plane

Answer: (A)

52. The regeneration ability is seen in:
(A) Amoeba
(B) Planaria
(C) Paramecium
(D) Euglena

Answer: (B)

53. The fertilised egg is called:
(A) Foetus
(B) Zygote
(C) Embryo
(D) Ovule

Answer: (B)

54. What provides oxygen and nutrition to the developing embryo in the female body?
(A) Fallopian tube
(B) Ovary
(C) Uterus
(D) Placenta

Answer: (D)

55. In a flower, the parts that produce male and female gametes (germ cells) are
(A) stamen and anther
(B) filament and stigma
(C) anther and ovary
(D) stamen and style

Answer: (C)

56. Which of the following is the correct sequence of events of sexual reproduction in a flower?
(A) pollination, fertilisation, seedling, embryo
(B) seedling, embryo, fertilisation, pollination
(C) pollination, fertilisation, embryo, seedling
(D) embryo, seedling, pollination, fertilization

Answer: (C)

57. In Spirogyra, asexual reproduction takes place by
(A) breaking up of filaments into smaller bits
(B) division of a cell into two cells
(C) division of a cell into many cells
(D) formation of young cells from older cells.

Answer: (A)

58. The correct sequence of reproductive stages seen in flowering plants is
(A) gametes, zygote, embryo, seedling
(B) zygote, gametes, embryo, seedling
(C) seedling, embryo, zygote, gametes
(D) gametes, embryo, zygote, seedling

Answer: (A)

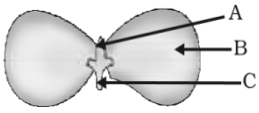
59. Vegetative propagation refers to formation of new plants from
(A) stem, roots and flowers
(B) stem, roots and leaves
(C) stem, flowers and fruits
(D) stem, leaves and flowers

Answer: (B)

60. Factors responsible for the rapid spread of bread mould on slices of bread are
    (i) large number of spores
    (ii) availability of moisture and nutrients in bread
    (iii) presence of tubular branched hyphae
    (iv) formation of round shaped sporangia
(A) (i) and(iii)
(B) (ii) and (iv)
(C) (i) and(ii)
(D) (iii) and(iv)
Answer: (C)

61. Which of the following statements are true for flowers?
    (i) Flowers are always bisexual
    (ii) They are the sexual reproductive organs
    (iii) They are produced in all groups of plants
    (iv) After fertilisation they give rise to fruits
(A) (i) and(iv)
(B) (ii) and(iii)
(C) (i) and(iii)
(D) (ii) and (iv)
Answer: (D)

62. In Figure, the parts A, B and C are sequentially



(A) cotyledon, plumule and radicle
(B) plumule, radical and cotyledon
(C) plumule, cotyledon and radicle
(D) radicle, cotyledon and plumule
Answer: (C)

63. In human females, an event that reflects onset of reproductive phase is
(A) growth of body
(B) changes in hair pattern
(C) change in voice
(D) menstruation
Answer: (D)

64. Embryo sac is found in
(A) endosperm
(B) embryo
(C) ovule
(D) seed
Answer: (C)

65. Which is NOT a Mendelian ratio?
(A) 3:1
(B) 1:2:1
(C) 9:3:3:1
(d) 2:2
Answer: (D)

66. Genetic variation is maximum in:
(A) Asexual reproduction
(B) Sexual reproduction
(C) Cloning
(D) Mitosis
Answer: (B)

67. A dominant trait is one which:
(A) Appears only in homozygous condition
(B) Masks the recessive trait
(C) Disappears in F_1 generation
(D) Never appears
Answer: (B)

68. The basic unit of heredity is:
(A) Cell
(B) Gene
(C) Tissue
(D) Chromosome
Answer: (B)

69. If a round, green seeded plant (RR yy) is crossed with wrinkled, yellow seeded pea plant (rr YY) the seeds produced in F_1 generation are:
(A) Round and yellow
(B) Round and green
(C) Wrinkled and green
(D) Wrinkled and yellow
Answer: (A)

70. Characters transmitted from parents to offspring are present in
(A) cytoplasm
(B) ribosome
(C) golgi bodies
(D) genes
Answer: (D)

71. Offspring formed as a result of sexual reproduction exhibit more Variations because
(A) sexual reproduction is a lengthy process
(B) genetic material comes from two parents of the same species
(C) genetic material comes from two parents of different species
(d) genetic material comes from many parents
Answer: (B)

72. Reproduction is essential for living

organisms in order to
(A) keep the individual organism alive
(B) fulfil their energy requirement
(C) maintain growth
(D) continue the species generation after generation

Answer: (D)

73. During adolescence, several changes occur in the human body. Mark one change associated with sexual maturation in boys
(A) loss of milk teeth
(B) increases in height
(C) cracking of voice
(d) weight gain

Answer: (C)

74. A cross between a tall plant (TT) and short pea plant(tt) resulted in progeny that were all tall plants because
(A) tallness is the dominant trait
(B) shortness is the dominant trait
(C) tallness is the recessive trait
(D) height of pea plant is not governed by gene 'T' or 't'

Answer: (A)

75. Which organisms break down dead plants and animals?
(A) Producers
(B) Decomposers
(C) Consumers
(D) Herbivores

Answer: (B)

76. The interconnected food chains form
(A) Trophic level
(B) Ecosystem
(C) Food web
(D) Biosphere

Answer: (C)

77. Increase in concentration of harmful chemicals in higher trophic levels is called:
(A) Decomposition
(B) Bio-magnification
(C) Photosynthesis
(D) Respiration

Answer: (B)

78. Which of the following best explains, why food chains are short?
(A) Producers are few
(B) Energy transfer efficiency is low
(C) Carnivores cannot digest plants
(D) Decomposers consume most organisms

Answer: (B)

79. Which waste management practice involves reuse of materials after processing?
(A) Incineration
(B) Recycling
(C) Landfill
(D) Dumping

Answer: (B)

80. A basket of vegetables contains carrot, potato, radish and tomato. Which of them represent the correct homologous structures?
(A) Carrot and potato
(B) Carrot and tomato
(C) Radish and carrot
(D) Radish and potato

Answer: (C)

81. In which trophic level autotrophs are placed?
(A) First
(B) Second
(C) Third
(D) Last

Answer: (A)

82. Which of the following constitute food chain?
(A) Grass, Wheat and Mango
(B) Grass, Goat and human
(C) Grass, Cow and Elephant
(D) Grass, Fish and Goat

Answer: (B)

83. Which of the following are Environment Friendly Practices?
(A) Carrying cloth bags to put purchases in while shopping
(B) Switching off unnecessary lights and fans
(C) Walking to school instead of getting your mother to drop you on her scooter.
(D) All of the above

Answer: (D)

84. Biotic components of an ecosystem consist of:
(A) Producers
(B) consumers
(C) decomposers
(D) All of the above

Answer: (D)

85. Depletion of ozone is mainly due to
(A) chlorofluoro carbon
(B) carbon monoxide
(C) methane

(D) pesticides

Answer: (A)

86. An eco-system includes

(A) all living organisms

(B) non-living organisms.

(C) both living and non-living organisms.

(D) sometimes living organisms and sometimes non-living organisms.

Answer: (C)

87. In a food chain, the third trophic level is always occupied by:

(A) carnivores

(B) herbivores

(C) decomposers

(D) producers

Answer: (A)

88. Which one of the following is an artificial ecosystem?

(A) Ocean

(B) crop field

(C) lake

(D) forest

Answer: (B)

Direction: In the following Questions (89 to 100), the Assertion and Reason have been put forward. Read the statements carefully and choose the correct alternative from the following:

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

(B) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

(C) Assertion is true but the Reason is false.

(D) Assertion is false but the reason is true

89. **Assertion:** When air is blown through lime water, it turns milky.
Reason: Air contains 78% nitrogen and 21% oxygen.

Answer: (B)

90. **Assertion:** Veins have thin walls to collect blood from different organs.
Reason: Blood in veins are not under pressure.

Answer: (A)

91. **Assertion:** All proteins in our food are digested in small intestine only.
Reason: The protein digesting enzymes are released into small intestine and stomach.

Answer: (D)

92. **Assertion:** Brain is a delicate organ which is protected from injury.
Reason: Only the bony box protects the brain from any shock.

Answer: (C)

93. **Assertion:** Plants do have a nervous system for control and coordination.
Reason: Plants use electro chemical means to convey information from cell to cell.

Answer: (D)

94. **Assertion:** Reflex arc works faster than thinking process of brain.
Reason: Reflex arc works in case of those animals that do not have thinking process.

Answer: (C)

95. **Assertion:** Amoeba reproduces by binary fission.
Reason: All unicellular organisms reproduce by asexual method.

Answer: (A)

96. **Assertion:** In human beings, the female plays a major role in determining the sex of the offspring.
Reason: Women have two X chromosomes.

Answer: (D)

97. **Assertion:** A bisexual flower produces ova as well as the pollen.
Reason: Ova and pollen are produced in the carpel.

Answer: (C)

98. **Assertion:** Variation is high in sexually reproducing organisms compared to asexually reproducing organisms.
Reason: Inaccuracies during DNA copying give rise to variation.

Answer: (B)

99. **Assertion:** Vegetarian food habit is more beneficial to organisms.
Reasons: Only 10% energy is available as food from one trophic level to the next.

Answer: (A)

100. **Assertion:** Decomposers act as cleaning agents of environment.
Reason: The decomposers recycle waste material in hydrosphere.

Answer: (C)

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Multiple Choice Questions (MCQ) [PHYSICS]

1. The refractive index of water is approximately:
(A) 1.0
(B) 1.33
(C) 2.0
(D) 0.5
Answer: (B)

2. A lens that converges parallel rays of light is:
(A) Concave lens
(B) Convex lens
(C) Cylindrical lens
(D) Plane lens
Answer: (B)

3. A concave lens always forms an image that is:
(A) Real and inverted
(B) Virtual and erect
(C) Real and erect
(D) None
Answer: (B)

4. The distance of image from a plane mirror is:
(A) Greater than object distance
(B) Less than object distance
(C) Equal to object distance
(D) Zero
Answer: (C)

5. The phenomenon in which left appears right and right appears left in a mirror is called:
(A) Reflection
(B) Lateral inversion
(C) Refraction
(D) Dispersion
Answer: (B)

6. Mirrors used in vehicles as rear-view mirrors are:
(A) Plane mirrors
(B) Concave mirrors
(C) Convex mirrors
(D) Cylindrical mirrors
Answer: (C)

7. If refractive index = 1.5, speed of light in material is:
(A) 1.5×10^8 m/s
(B) 2×10^8 m/s
(C) 3×10^8 m/s
(D) 2×10^7 m/s
Answer: (B)

8. The cause of refraction is:
(A) Change in speed of light
(B) Change in direction of light
(C) Change in wavelength
(D) None
Answer: (A)

9. What will be the nature of the image if the object is placed beyond C (concave mirror):
(A) Real, diminished, inverted
(B) Virtual, diminished, erect
(C) Real, erect, magnified
(D) Virtual, magnified, inverted
Answer: (A)

10. Which of the following lenses would you prefer to use while reading small letters found in a dictionary?
(A) A convex lens of focal length 50 cm.
(B) A concave lens of focal length 50 cm.
(C) A convex lens of focal length 5 cm.
(D) A concave lens of focal length 5 cm.
Answer: (C)

11. The bending of light when it passes from one medium to another is called:
(A) Reflection
(B) Dispersion
(C) Refraction
(D) Diffraction
Answer: (C)

12. Object placed at focus of converging lens gives image:
(A) At infinity
(B) Virtual and erect
(C) Real and inverted
(D) At focal point
Answer: (A)

13. In order to obtain large images of the teeth of patients, the dentist holds the concave mirror in such a manner that the teeth are positioned:
(A) at the focus of mirror
(B) between pole and focus of the mirror
(C) between focus and the centre of curvature of the mirror
(D) at the centre of curvature of the mirror
Answer: (B)

14. A full-length image of a distant tall building can definitely be seen by using
(A) A concave mirror.
(B) A convex mirror.
(C) A plane mirror

(D) Both concave as well as plane mirror
Answer: (B)

15. Which of the following materials cannot be used to make a lens?
(A) Water
(B) Glass
(C) Plastic
(D) Clay.
Answer: (D)

16. When the image is virtual, erect and of the same size as the object, then, magnification is
(A) +1
(B) –1
(C) 0
(D) +2
Answer: (A)

17. The unit of power of a lens is
(A) Meter
(B) Centimetre
(C) Diopter
(D) Millimetre
Answer: (C)

18. The laws of reflection hold good for
(A) Plane mirror only
(B) Concave mirror only
(C) Convex mirror only
(D) All mirrors irrespective of their shape.
Answer: (D)

19. Magnification produced by a rear-view mirror fitted in vehicles is
(A) Less than one
(B) More than
(C) Equal to 1
(D) Can be more or less than 1 depending on the position of the object in front of it
Answer: (A)

20. The radius of curvature of a spherical mirror is 3 cm. What is its focal length?
(A) 1.5 cm
(B) 3 cm
(C) 4.5 cm
(D) 6 cm
Answer: (A)

21. The speed of light in air is
(A) 3×10^{8} m/s
(B) 3×10^{-8} m/s
(C) 3×10^{18} m/s
(D) 3×10^{3} m/s
Answer: (A)

22. An object is placed in front of a concave lens. For all positions of the object, the image formed is always
(A) Real, diminished and inverted
(B) Virtual, diminished and erect
(C) Real, enlarged and erect.
(D) Virtual, enlarged and erect.
Answer: (B)

23. A light ray travels from a denser to a rarer medium. The speed of light ray
(A) Decreases and bends towards the normal.
(B) Increases and bends away from the normal.
(C) Decreases and bends away from the normal.
(D) Increases and bends towards the
Answer: (B)

24. A material medium having the lowest optical density is
(A) Water
(B) Air
(C) Glass
(D) Diamond
Answer: (B)

25. If the power of a lens is -4.0 D, then it means that the lens is a
(A) Concave lens of focal length + 25 cm
(B) Convex lens of focal length + 25 cm
(C) Concave lens of focal length −25cm.
(D) Convex lens of focal length −25cm.
Answer: (C)

26. Advance sunrise is due to:
(A) Dispersion
(B) Atmospheric refraction
(C) Scattering
(D) Reflection
Answer: (B)

27. The colour of the sun at sunrise appears red due to:
(A) Reflection
(B) Refraction
(C) Scattering
(D) Dispersion
Answer: (C)

28. A myopic person has a far point at 2 m. The power of lens required is:
(A) –0.5 D
(B) +0.5 D
(C) –2 D
(D) +2 D
Answer: (A)

29. Presbyopia occurs due to:
(A) Elongation of eyeball
(B) Weakening of ciliary muscles
(C) Damage to retina
(D) Increase in pupil size
Answer: (B)

30. Twinkling of stars is maximum when:
(A) Stars are overhead
(B) Stars are near horizon
(C) At noon
(D) During rain
Answer: (B)

31. Which of the following parts of the eye is responsible for changing the shape of the lens to focus light onto the retina?
(A) Pupil
(B) Iris
(C) Ciliary muscles
(D) Cornea
Answer: (C)

32. The band of the colored components of a light beam is called its
(A) Spectrum
(B) Dispersion
(C) Reflection
(D) Refraction
Answer: (A)

33. On which part of the human eye, the image of an object is formed?
(A) Retina
(B) Cornea
(C) Eyeball
(D) Iris
Answer: (A)

34. The least distance of distinct vision for a young adult with normal vision, is about
(A) 25 m
(B) 2.5 m
(C) 2.5 cm
(D) 25 cm
Answer: (D)

35. The human eye can focus on objects at different distances by adjusting the focal length of the eye lens. This is due to
(A) Accommodation
(B) Presbyopia
(C) Near sightedness
(D) Far sightedness
Answer: (A)

36. The time difference between actual sunset and the apparent sunset is about
(A) 2 minutes
(B) 3 minutes
(C) 4 minutes
(D) 5 minutes.
Answer: (A)

37. Person suffering from cataract has
(A) Elongated eyeball
(B) Excessive curvature of eye lens
(C) Weakened ciliary muscles
(D) Opaque eye lens
Answer: (D)

38. A normal eye can see objects clearly that are between
(A) Our eye and infinity
(B) 25 cm and infinity
(C) 50 cm and infinity
(D) 100 cm and infinity
Answer: (B)

39. The danger signals installed at the top of tall buildings are red in colour. These can be easily seen from a distance because among all other colours, the red light
(A) Is scattered the most by smoke or fog
(B) Is scattered the least by smoke or fog
(C) Is absorbed the most by smoke or fog
(D) Moves fastest in air.
Answer: (B)

40. The focal length of the eye lens increases when eye muscles
(A) Are relaxed and lens becomes thinner
(B) Contract and lens become thicker
(C) Are relaxed and lens becomes thicker
(D) Contract and lens become thinner
Answer: (A)

41. Two resistors of 2 Ω and 4 Ω are connected in parallel. Equivalent resistance is:
(A) 3.13 Ω
(B) 1.33 Ω
(C) 2 Ω
(D) 3 Ω
Answer: (B)

42. A wire is stretched to double its length. Its resistance becomes:
(A) Same
(B) Double
(C) Four times
(D) Half
Answer: (C)

43. A bulb of power 60 W operates at 220V. Current drawn is approximately:
(A) 0.27 A
(B) 2.7 A
(C) 0.5 A
(D) 1 A
Answer: (A)
44. A fuse protects a circuit by:
(A) Increasing current
(B) Decreasing voltage
(C) Melting when current is high
(D) Stopping voltage
Answer: (C)
45. In a parallel circuit, the current is:
(A) Same everywhere
(B) Different in each branch
(C) Zero
(D) Infinite
Answer: (B)
46. If resistance increases, current will:
(A) Increase
(B) Decrease
(C) Remain same
(D) Become zero
Answer: (B)
47. Nichrome wire is used in heating devices because it has:
(A) High conductivity
(B) High resistance
(C) Low resistance
(D) Low melting point
Answer: (B)
48. A wire has resistance 10 Ω. If its length is doubled, the new resistance becomes:
(A) 5 Ω
(B) 10 Ω
(C) 20 Ω
(D) 40 Ω
Answer: (C)
49. In household wiring appliances are connected in:
(A) Series
(B) Parallel
(C) Both
(D) None
Answer: (B)
50. A 220 V supply is connected to a 1100W heater. Current drawn is:
(A) 2 A
(B) 5 A
(C) 10 A
(D) 0.5 A
Answer: (B)
51. Electrical resistivity of a given metallic wire depends upon
(A) Its length
(B) Its thickness
(C) Its shape
(D) Nature of the material
Answer: (D)
52. SI unit of electric charge is:
(A) Watt
(B) Kilowatt
(C) Coulomb
(D) Ampere
Answer: (D)
53. Which of the following terms does not represent electrical power in a circuit?
(A) I^2R
(B) IR^2
(C) VI
(D) $\frac{V^2}{R}$
Answer: (B)
54. Kilowatt-hour is the unit of
(A) Resistivity
(B) Conductivity
(C) Electrical energy
(D) Electrical power
Answer: (C)
55. An electric bulb is rated 220 V and 100W. When it is operated on 110 V, the power consumed will be
(A) 100 W
(B) 75 W
(C) 50 W
(D) 25 W
Answer: (D)
56. The device used to measure the current in a circuit is
(A) Ammeter
(B) Voltmeter
(C) Galvanometer
(D) Battery
Answer: (A)
57. A piece of wire of resistance R is cut into five equal parts and then connected in parallel. If the equivalent resistance of this combination is R, then the ratio R/ R' is
(A) $\frac{1}{25}$
(B) $\frac{1}{5}$
(C) 5
(D) 25

Answer: (D)

58. The conductors of resistance of 10 ohm and 12ohm are connected in series to a 6 V battery. What is the total resistance of the circuit?

(A) 60 ohms
(B) 18 ohms
(C) 16 ohms
(D) 22 ohms

Answer: (D)

59. Which device is used to measure the potential difference between two poles in an electric circuit?

(A) Ammeter
(B) Voltmeter
(C) Galvanometer
(D) Rheostat

Answer: (B)

60. The maximum resistance which can be made using four resistors, each of resistance ½ ohm is

(A) 2 ohms
(B) 1 ohm
(C) 2.5 ohms
(D) 8 ohms

Answer: (A)

61. An electric kettle consumes 1 KW of electric power when operated at 220 V. The minimum rating of the fuse wire to be used for it is

(A) 1 A
(B) 2 A
(C) 4 A
(D) 5 A

Answer: (D)

62. Unit of electric power may be expressed as

(A) Volt Ampere
(B) Kilowatt-hour
(C) Watt second
(D) Joule second

Answer: (A)

63. An electric iron of resistance 20 ohm draws a current of 5 A. The heat developed in the iron in 30 seconds is

(A) 15000 J
(B) 6000 J
(C) 1500 J
(D) 3000 J

Answer: (A)

64. A charge of 100 C flows through a bulb in 5 minutes. How much current is flowing through the bulb?

(A) 500 A
(B) 100 A
(C) 20 A
(D) 0.3 A

Answer: (D)

65. At the time of short circuit, the electric current in the circuit

(A) Vary continuously
(B) Does not change
(C) Reduces substantially
(D) Increases heavily

Answer: (D)

66. In domestic electric circuits the wiring with 15 A current rating is for the electric devices which have

(A) Higher power ratings such as geysers.
(B) Lower power ratings such as fans
(C) Metallic bodies and low power ratings.
(D) Non-metallic bodies and low power ratings

Answer: (A)

67. Which option explains Fleming's left-hand rule?

(A) When a current-carrying conductor is moved with force, it creates a magnetic field.
(B) When a conductor is moved inside a magnetic field, the current is produced in the conductor.
(C) When the magnetic field is moved relative to the conductor, the current is produced in the conductor.
(D) When a current-carrying conductor is placed in a magnetic field, it experiences a force from the magnetic field.

Answer: (D)

68. The front face of a circular loop of a wire is the North Pole, the direction of current in this face of the loop will be:

(A) Clockwise
(B) Anticlockwise
(C) Towards North
(D) Towards South

Answer: (B)

69. In all the electrical appliances, the switches are put in the

(A) Live wire
(B) Earth wire
(C) Neutral wire
(D) All of above

Answer: (A)

70. Appliances that have a metal body are generally connected to the earth wire. What is the reason to earth these wires?
(A) To prevent the excess current
(B) To prevent the leakage of current
(C) To provide extra current to the appliance
(D) To provide high resistance to the appliance
Answer: (B)

71. The strength of magnetic field inside a long current carrying straight solenoid is
(A) More at the ends than at the centre.
(B) Minimum in the middle
(C) Same at all points
(D) Found to increase from one end to the other.
Answer: (C)

72. Which of these devices work due to the magnetic effect of electric current?
(A) LED bulb
(B) Electric bell
(C) Electric heater
(D) Mobile charger
Answer: (B)

73. What is the resistance of a lamp operating at 280V with a current 0.7A?
(A) 400 Ω
(B) 250 Ω
(C) 196 Ω
(D) 150 Ω
Answer: (A)

74. Magnetic effect of current was discovered by
(A) Oersted
(B) Faraday
(C) Bohr
(D) Ampere
Answer: (A)

75. The most important safety device used for protecting the circuits from short circuiting or overloading is
(A) Earth wire
(B) Fuse
(C) Stabilizer
(D) Electric meter
Answer: (B)

76. The magnetic field lines due to a straight wire carrying a current are
(A) Straight
(B) Circular
(C) Parabolic
(D) Elliptical
Answer: (B)

77. Magnetic field due to a current through a straight conductor depends on
(A) Current
(B) Distance from the wire
(C) Both a and b
(D) Cross second sectional area of the wire
Answer: (C)

78. In a horizontal conductor, the direction of current is from east to west. Then, the direction of magnetic field to a point directly above it will be
(A) Clockwise
(B) Anticlockwise
(C) Clockwise, if viewed from East
(D) Anticlockwise, if viewed from East
Answer: (C)

79. To avoid risk of electrical shock, which phenomenon is used?
(A) Overloading
(B) Short circuiting
(C) Earthing
(D) None of these.
Answer: (C)

80. Force on a current carrying conductor in a magnetic field depends on
(A) Direction of current
(B) Direction of Magnetic field
(C) Both (A) and (B)
(D) Length of the wire.
Answer: (C)

The following questions (81 to 100) 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 for A
(B) Both A and R are true but R is not the correct explanation for A
(C) A is true but R is false.
(D) A is false but R is true.

81. **Assertion (A):** Light does not travel in the same direction in all the media.
Reason (R): The speed of light does not change as it enters from one transparent medium to another.

Answer: (C)

82. **Assertion (A):** The height of an object is always considered positive.
Reason (R): An object is always placed above the principal axis in the upward direction.
Answer: (A)

83. **Assertion (A):** Refractive index has no units.
Reason (R): The refractive index is a ratio of two similar quantities.
Answer: (A)

84. **Assertion (A):** Light travels faster in glass than in air.
Reason (R): Glass is denser than air.
Answer: (D)

85. **Assertion (A):** Concave mirrors are used as make-up mirrors.
Reason (R): When the face is held within the focus of a concave mirror, then a diminished image of the face is seen in the concave mirror.
Answer: (C)

86. **Assertion (A):** White light is dispersed into its seven-colour components by a prism.
Reason (R): Different colours of light bend through different angles with respect to the incident ray as they pass through a prism.
Answer: (A)

87. **Assertion (A):** Danger signals are made of red colour.
Reason (R): Velocity of red light in air is maximum, so signals are visible even in dark.
Answer: (C)

88. **Assertion (A):** The rainbow is a natural spectrum of sunlight in the sky.
Reason (R): Rainbow is formed in the sky when the sun is overhead and water droplets are also present in air.
Answer: (C)

89. **Assertion (A):** The sky looks dark and black instead of blue in outer space.
Reason (R): No atmosphere containing air in the outer space to scatter sunlight.
Answer: (A)

90. **Assertion (A):** The phenomenon of scattering of light by the colloidal particles gives rise to the Tyndall effect.
Reason (R): The colour of the scattered light depends on the size of the scattering particles.
Answer: (B)

91. **Assertion (A):** Tungsten metal is used for making filaments of incandescent lamps.
Reason (R): The melting point of Tungsten is very low.
Answer: (C)

92. **Assertion (A):** A cell is a device which converts chemical energy into electrical energy.
Reason (R): Cell maintains a constant potential difference between its terminals for a long time.
Answer: (B)

93. **Assertion (A):** Alloys are commonly used in electrical heating devices like electrical iron, toasters etc.
Reason (R): Alloys do not oxidize (burn) readily at high temperatures.
Answer: (A)

94. **Assertion (A):** Longer wires have greater resistance and the smaller wires have lesser resistance.
Reason (R): Resistance is inversely proportional to the length of the wire.
Answer: (C)

95. **Assertion (A):** One circuit with 15 A current rating is used for appliances such as geysers and air coolers.
Reason (R): Appliances with metallic body are connected to an earth wire with low resistance.
Answer: (B)

96. **Assertion (A):** On changing the direction of flow of current through a straight conductor, the direction of a magnetic field around the conductor is reversed.
Reason (R): The direction of magnetic field around a conductor can be given in accordance with left hand thumb rule.
Answer: (C)

97. **Assertion (A):** On freely suspending a current carrying solenoid, it comes to rest in geographical N-S direction.
Reason (R): One end of current carrying straight solenoid behaves as

a North Pole and the other end as a south Pole, just like a bar magnet.

Answer: (A)

98. **Assertion (A):** Two magnetic field lines around a current carrying straight wire do not intersect each other.
Reason (R): The magnitude of the magnetic field produced at a given point increases as the current through the wire increases.

Answer: (B)

99. **Assertion (A):** Magnetic field lines do not intersect each other.
Reason (R): Magnetic field lines are imaginary lines, the tangent to which at any point gives the direction of the field at that point.

Answer: (A)

100. **Assertion (A):** A compass needle is placed near a current carrying wire. The deflection of the compass needle decreases when the magnitude of an electric current in the wire is increased.
Reason (R): Strength of a magnetic field at a point near the conductor increases on increasing the current.

Answer: (D)

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SECTION B
VERY SHORT ANSWER TYPE QUESTIONS [2 MARKS]

[CHEMISTRY]

1. State two characteristics of the chemical reaction which takes place when dilute sulphuric acid is poured over zinc granules.

Answer:

If dil.H_2SO_4 is poured over Zinc granules then the following characteristics are observed

(i) Rise in temperature.

(ii) Hydrogen gas is released.

2. Balance the following chemical equations:

(i) $NH_3 \rightarrow N_2 + H_2$

(ii) $C + CO_2 \rightarrow CO$

Answer:

(i) $2NH_3 \rightarrow N_2 + 3H_2$

(ii) $C + CO_2 \rightarrow 2CO$

3. (i)What gas is released when zinc reacts with dilute hydrochloric acid?

$Zn + HCl \rightarrow ZnCl_2 + H_2$

(ii) Write the chemical formula of quick lime and slaked lime.

Answer:

(i) Hydrogen gas is released

(ii)Quicklime (CaO); Slaked lime [$Ca(OH)_2$]

4. Why do gold and silver not corrode in moist air?

Answer:

Gold and silver are amongst the least reactive metals. These metals do not react with oxygen (in the air) and water (present as moisture in the air).Therefore, silver and gold do not corrode in moist air

5. A light sensitive compound 'X' of silver is used in photography. On exposure to sunlight it changes to grey. (i) Identify 'X' (ii) Identify the type of chemical reaction

Answer:

(i) Silver chloride

(ii) Decomposition reaction.

6. Rewrite the following equation in a balanced form showing in it that $Al(OH)_3$ is an insoluble product $Al_2(SO_4)_3 + NaOH \rightarrow Al(OH)_3 + Na_2SO_4$

Answer:

$Al_2(SO_4)_3 + 6NaOH \rightarrow 2Al(OH)_3 \downarrow + 3Na_2SO_4$

formation of insoluble product $Al(OH)_3$ is indicated by an arrow pointing downwards.

7. (i)Which term is used to indicate the development of unpleasant smell and taste in fat and oil containing foods due to aerial oxidation (when they are kept exposed for a considerable time)?

(ii)What are anti-oxidants? Why are they added to fat and oil containing foods?

Answer:

(i)Rancidity" is used to indicate the development of foul smell and taste.

(ii)Oxidation preventing substances are called Anti-oxidants. They are added to fats and oils to prevent rancidity.

8. A solution of sodium sulphate is added to barium chloride, a white solid form. Name the solid and classify the type of reaction.

Answer:

Solid formed is barium sulphate. Type of reaction is Double displacement (precipitation)

9. A small amount of ferrous sulphate is heated in a hard glass tube

(i)Write the chemical equation

(ii)What type of reaction is taking place?

Answer:

(i) $2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$

(ii) Thermal decomposition reaction

10. Identify the substances that are oxidised and the substances that are reduced in the following reactions:

(i) $4Na(s) + O_2(g) \rightarrow 2Na_2O(s)$

(ii) $CuO(s) + H_2(g) \rightarrow Cu(s) + H_2O(l)$

Answer:

(i)Substance oxidised is Na and the substance reduced is O_2

(ii)Substance oxidised is H_2 and the substance reduced is CuO

11. What happens when a piece of:

(i) Silver metal is added to a copper

sulphate solution? Also, write the balanced chemical equation if the reaction occurs.
(ii)Aluminium metal is added to dilute hydrochloric acid?

Answer:

(i)Silver metal being less reactive than copper cannot displace copper from copper sulphate solution. Therefore, no reaction occurs.
(ii)Aluminium is a reactive metal, it displaces hydrogen from dilute hydrochloric acid solution producing hydrogen gas.

12. 2g of barium hydroxide is taken in a test tube and added with 1g of ammonium chloride while mixing with the help of a glass rod. As the bottom of the test tube is touched
    (i) How does it feel and why?
    (ii) Name type of reaction.

Answer:

(i) 2g of barium hydroxide when mixed with 1g of ammonium chloride, the test tube feels very cold to the touch due to absorption of heat from its surroundings
(ii)Type of reaction endothermic reaction which is a chemical reaction that absorbs heat

13. What do you mean by decomposition reaction? Give one example.

Answer:

A type of chemical reaction in which a single reactant breaks down to give simpler products is known as decomposition reaction.
e.g.:$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$

14. Fresh milk has a pH of 6. When it changes to curd, will its pH value increase or decrease? Why?

Answer:

Milk when changed to curd, its pH value will decrease, because curd contains acid so H^+ ions increase and thus, pH will decrease.

15. (i)Which gas is usually liberated when an acid reacts with an active metal?
    (ii)Name the acid present in ant sting.

Answer:

Hydrogen gas is liberated when an acid reacts with an active metal.
Formic acid (Methanoic acid) HCOOH is present in ant sting.

16. What is an alkali? Give an example.

Answer:

A base which is soluble in water is known as alkali, for example NaOH, KOH.

17. Write one word for the following:
    (i) Water soluble base
    (ii) A substance which dissociates on dissolving in water to produce hydrogen ions
    (iii) A reaction between an acid with a base to form salt and water.
    (iv) A substance which dissociates on dissolving in water to produce hydroxide ions.

Answer:

(i) Alkali
(ii) Acid
(iii) Neutralisation reaction
(iv) Base

18. Why are pickles and curd not stored in copper and brass vessels?

Answer:

Sour substances like pickles, curd are acidic in nature or have in them acids. Thus, they are not kept in metal containers because when kept in brass or copper vessels they react to form toxic (poisonous) substances which may prove harmful when consumed.

19. A knife which is used to cut fruit is dipped immediately into water containing drops of blue litmus solution. The colour of the solution is changed to red .What inference can be drawn about the nature of the fruit and why?

Answer:

The fruit used is citrus fruit and its juice contains an acid, that is why the traces of acid remained in the knife which when dipped in blue litmus solution turned it to red.

20. Why does bleaching powder smell strongly of chlorine and does not dissolve completely in water?

Answer:

Bleaching powder reacts with carbon dioxide in the air to release chlorine

gas which has a strong pungent odour thus even when stored it continues to decompose giving chlorine smell. Also due to the presence of insoluble components like calcium hydroxide it does not dissolve completely in water.

21. While constructing a house a builder selects marble flooring, marble table tops for the kitchen where vinegar and juice of lemon, tamarind etc are more often used for cooking. Will you agree to this selection and why?

Answer:

No , the substance like vinegar, tamarind etc, contain acids which when accidentally fall on marble will react with the marble causing discoloration etc.

22. How would you distinguish between baking powder and washing soda by heating?

Answer:

The chemical formula of baking powder is sodium hydrogen carbonate ($NaHCO_3$), whereas that of washing soda is sodium carbonate (Na_2CO_3. 10 H_2O).Sodium hydrogen carbonate on heating gives CO_2 gas which will turn limewater milky whereas no such gas is obtained from sodium carbonate.

23. A salt solution conducts electricity but distilled water does not.

Answer:

A salt solution conducts electricity because dissolving salt releases free moving charged particles called ions. Distilled water lacks these ions, hence, cannot conduct electricity.

24. Why is sodium kept immersed in kerosene oil?

Answer:

Sodium is a highly reactive metal reacts vigorously with oxygen and moisture in the air and may catch fire. In order to prevent sodium from reacting with oxygen, it is kept immersed in kerosene oil.

25. What are the conditions necessary for rusting?

Answer:

The conditions necessary for rusting are:

i) presence of oxygen (air)

ii) presence of water (moisture)

26. Define the following terms:

(a) minerals

(b) ores

Answer:

a) Minerals: minerals are naturally occurring compounds of a metal mixed with earthly impurities.

b) Ores: Ores are minerals from which metals can be extracted profitably.

27. What is roasting?

Answer:

Roasting is the process of heating sulphide ore in the presence of excess air to convert it into oxide.

Example:

$2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$

28. What is calcination?

Answer:

Calcination is the process of heating carbonate ore in the absence or limited supply of air to form oxide.

Example:

$ZnCO_3 \rightarrow ZnO + CO_2$

29. Name two metals which will displace hydrogen from dilute acids and two metals which will not.

Answer:

Two metals which will displace hydrogen from dilute acids are magnesium and Zinc. Two metals which will not displace hydrogen from dilute acids are silver and gold.

30. What are hydrocarbons? Name the simplest hydrocarbon.

Answer:

Compounds of carbon in which their molecules are composed of only carbon and hydrogen atoms are called hydrocarbons. The simplest hydrocarbon is methane, CH_4.

31. Why are covalent compounds generally poor conductors of electricity?

Answer:

It is because the covalent compounds do not have positive ions or negative ions in their fused state. Thus, when electric potential is applied no ions

migrate to the opposite poles and hence no conduction of electric current takes place.

32. Define the terms:
    (a) catenation
    (b) isomerism

Answer:

a) Catenation: The property of carbon to link with other carbon atoms or the atoms of other elements with single double or triple covalent bonds so as to form a large number of compounds is called catenation.

b) Isomerism: The phenomenon due to which there exists two or more organic compounds having the same molecular formula but different structural formula and hence different physical and chemical properties is called isomerism.

33. What is meant by the term functional group? Write the names of the functional groups present in
    (a) ethanol
    (b) ethanoic acid

Answer:

A functional group in an organic compound is an atom or a group of atoms that is usually the site of chemical reactivity of an organic molecule. The functional group present in ethanol is alcohol (-OH). The functional group present in ethanoic acid is carboxylic acid (-COOH).

34. What is vinegar? Write its chemical formula and chemical name.

Answer:

5-8% solution of acetic acid in water is called vinegar. The chemical formula is CH_3COOH. The chemical name is ethanoic acid.

35. What is denatured alcohol? What is the need to denature alcohol?

Answer:

Ethanol when mixed with poisonous substances like methanol and pyridine makes it unfit for human consumption and is called denatured alcohol. Ethanol is an important industrial solvent. To prevent the misuse of ethanol produced for industrial use, it is made unfit for drinking by making it denatured alcohol.

36. People use a variety of methods to wash clothes. Usually after adding the soap, they 'beat' the clothes on a stone, or beat it with a paddle, scrub with a brush or the mixture is agitated in a washing machine. Why is agitation necessary to get clean clothes?

Answer:

A soap molecule has two parts namely hydrophobic and hydrophilic. With the help of these, it attaches to the grease or dirt particle and forms a cluster called micelle. These micelles remain suspended as a colloid. To remove these micelles, it is necessary to agitate clothes.

37. What is rust? State two ways to prevent rusting of iron.

Answer:

When iron is exposed to moist air for a long time acquires a coating of a brown flaky substance called rust. Rusting of iron can be prevented by painting, oiling, greasing, galvanisation, chrome plating, anodising or making alloys (any two).

38. Give the two important uses of Baking Soda.

Answer:

The uses of Baking Soda are:

i) Sodium hydrogen carbonate is also, an ingredient in antacids. Being alkaline, it neutralises excess acid in the stomach and provides relief.

ii)It is also used in soda-acid fire extinguishers.

39. What is the common name of the compound $CaOCl_2$? Give its two uses.

Answer:

The common name of the compound $CaOCl_2$is Bleaching Powder. The uses of Bleaching Powder are as follows:

a) To make drinking water free from germs.

b) As an oxidising agent in many chemical industries.

40. Why do ionic compounds have high melting points?

Answer:

The ionic compounds are made up of positive and negative ions which have the strong force of attraction between opposite charged ions. So, a lot of heat energy is required to break this force of attraction or ionic bond. That is why ionic compounds have high melting points.

41. What is hydrogenation? What is its industrial application?

Answer:

The addition of hydrogen to an unsaturated compound in the presence of nickel or palladium catalyst to obtain a saturated compound is called hydrogenation. Hydrogenation is used in industry to prepare vegetable ghee from vegetable oils.

42. Why detergents are better cleansing agents than Soap? Explain.

Answer:

Detergent is preferred over soaps due to the following reasons:

a) Detergent can be used in hard water for washing whereas soaps cannot be used in hard water as soaps form scums that stick to the fabric and make the cleaning difficult.

b) Detergent can be used in acidic solution but soaps decompose in acidic solution and forms free fatty acids.

43. A gas is evolved when ethanol reacts with sodium. Name the gas evolved and also write the balanced chemical equation of the reaction involved.

Answer:

When ethanol reacts with sodium, then hydrogen gas is evolved. This reaction can be given by following equation:

$2Na + 2CH_3CH_2OH \rightarrow 2CH_3CH_2ONa + H_2$

44. Why is ethanol added to petrol?

Answer:

Ethanol is added to petrol because it burns completely and gives rise to only carbon dioxide and water on burning in sufficient air. This combination reduces the emission of unburnt hydrocarbons making it eco-friendly.

45. Why is zinc applied to iron objects? What property of zinc is used here?

Answer:

Zinc coating is applied on iron objects to protect it from rusting.

Zinc when exposed to the air forms zinc oxide which is stable and adherent thus protects iron when used in galvanisation.

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VERY SHORT ANSWER TYPE QUESTIONS [2 MARKS] [BIOLOGY]

46. What is nutrition? Why is it necessary for living organisms?

Answer:

Nutrition is the process of intake and utilisation of food by an organism. It is necessary for energy, growth, repair and maintenance of the body.

47. What is the difference between autotrophic and heterotrophic nutrition?

Answer:

Autotrophic nutrition: Organisms make their own food from simple substances like CO_2 and water (e.g., green plants).

Heterotrophic nutrition: Organisms depend on others for food (e.g., humans, animals).

48. Write the balanced chemical equation for photosynthesis.

Answer:

$6CO_2+12H_2O \rightarrow C_6H_{12}O_6+6H_2O+6O_2$ (in presence of sunlight and chlorophyll)

49. What is the role of chlorophyll in photosynthesis?

Answer:

Chlorophyll traps sunlight and converts light energy into chemical energy required for photosynthesis.

50. What is holozoic nutrition? Give one example.

Answer:

Holozoic nutrition involves ingestion, digestion, absorption, assimilation and egestion of food.

For example: human beings.

51. What is the function of saliva in digestion?

Answer:

Saliva contains salivary amylase which breaks down starch into maltose and makes food soft for swallowing.

52. How is the wall of the small intestine adapted for performing the function of absorption of food?

Answer:

The walls of the small intestine contain numerous finger like projections called villi present in the inner lining. These villi are covered with a large number of blood capillaries which helps in the quick absorption of food.

53. How is oxygen and carbon dioxide transported in human beings?

Answer:

When we breathe in, the oxygen rich air reaches the alveoli which are surrounded by thin blood vessels. The oxygen diffuses from the alveoli walls into the blood vessels which is then transported to the different parts of the body with the help of haemoglobin. Carbon dioxide produced as a waste diffuses into the blood from the different cells in the body which enters the alveoli and is removed from the lungs through the nostrils.

54. How are the lungs designed in human beings to maximise the area for exchange of gases?

Answer:

In the lungs, there are special structures called alveoli or air sacs. This provides maximum surface area for the exchange of gases. The alveoli have very thin walls which are richly supplied with blood vessels to help with the exchange of gases.

55. Give reasons for the following:

(i) The lung alveoli are covered with blood capillaries.

(ii) The wall of the trachea is supported by cartilage rings.

Answer:

(i) The gaseous exchange in the alveoli occurs by the process of diffusion. The alveolar air is very rich in oxygen. The blood takes up oxygen from the alveolar air and releases carbon dioxide to the alveolar air. The blood capillaries around the alveoli helps in the process of diffusion of oxygen from higher concentration in the alveoli to the blood.

ii)The rings of cartilage around the

trachea gives support to the trachea and also ensures that the air passage does not collapse allowing maximum amount of air to pass through the trachea.

56. Write down the functions of the two upper chambers of the heart.

Answer:

The two upper chambers of the heart are the right and left auricle or atrium. The functions are:

(i) The right auricle receives deoxygenated blood from the body and transfers it to the right ventricle.

(ii) The left auricle receives oxygenated blood from the lungs and transfers it to the left ventricle.

57. Write two differences between arteries and veins.

Answer:

The differences between arteries and veins are:

Arteries	Veins
(i) carry blood from the heart to the different body parts.	(i) carry blood from the different body parts to the heart.
ii) blood flows under high speed and under high pressure.	ii) blood flows with low speed and under lower pressure.

58. Which mechanism plays an important role in transportation of water in plants?

i) During daytime

ii) At night.

Answer:

(i) During daytime, transpiration pull plays an important role in transportation of water in plants.

ii) At night, root pressure plays an important role in transportation of water in plants.

59. What is the advantage of having a four chambered heart?

Answer:

Presence of four chambered heart serves two purposes. First, it ensures complete separation of oxygenated and deoxygenated blood. Second, blood is received by the upper chambers and is pumped out by the lower chambers. This increases the efficiency of the heart and is useful in animals having high energy needs such as birds and mammals.

60. What is the functional unit of a kidney? Explain its structure.

Answer:

The functional unit of the kidney is the nephron. A nephron has a cup shaped upper end called Bowman's capsule. This contains a bundle of blood capillaries called glomerulus. The cup opens into a tubule which remains coiled, twisted, folded and has a U-turn. It opens into a collecting duct that connects to the ureter.

61. What are the two vital functions of the kidneys?

Answer:

The two vital functions of the kidneys are:

(i) Maintaining the amount of water in the body that is osmoregulation.

(ii)Removing nitrogenous wastes from the blood in the form of urine.

62. Why is it said that kidneys help in the process of osmoregulation? Explain.

Answer:

Osmoregulation is the process of maintenance of optimum concentration of water and salts in the body fluid. Since, reabsorption of water from the filtrate occurs in the kidney tubule which maintains the water balance and thus helps in osmoregulation.

63. How do leaves of plants help in excretion?

Answer:

Leaves of plants have tiny openings on their surface called stomata from where gaseous wastes are removed. Excess amount of water is also lost from the plant through the stomata by the process called transpiration. Some waste materials are also stored in the leaves and are removed when the old leaves fall off.

64. What happens at the synapse between two neurons?

Answer:

At the end of the axon, the electrical impulse sets off the release of some chemicals, which cross the synapse and start a similar electrical impulse in the dendrite of the next neuron. A synapse actually acts like a one-way valve because the chemical substance is present only at one side of the gap.

65. What is the role of the brain in reflex action?

Answer:

The brain has a limited role to play in reflex action. Reflex action is a quick response which does not involve the action of the brain. This action is coordinated by the spinal cord.

66. What is the function of receptors in the body

Answer:

The receptors collect information about changes in the environment around us. The receptors then pass the same information in the form of a nerve impulse to the central nervous system with the help of the nerves.

67. Plants also perform chemical coordination. Explain.

Answer:

Plants perform chemical coordination for various activities with the help of hormones. These are the chemical compounds released by stimulated cells that diffuse to various locations in plants, performing different activities.

68. Where are auxins synthesised, and what is the main function?

Answer:

Auxins are plant hormones and are synthesised at the tips of the shoots. The main function is to help the stem grow longer.

69. How does our body respond when adrenaline is secreted into the blood?

Answer:

During stress or danger, when adrenaline is secreted into the blood, there is an increase in the rate of heartbeat to supply more oxygen to the muscles. Due to this, breathing rate and sugar level increase.

70. Name the gland and one main action of the following hormones:
i) Insulin. ii)Thyroxin.

Answer:

i) Insulin- this is secreted by the pancreas and one main function is to lower the blood sugar level.

ii) Thyroxin- this is secreted by the thyroid gland and one main function is to help regulate carbohydrate, protein and fat metabolism.

71. How do Plasmodium and Leishmania reproduce? Give one difference in their mode of reproduction.

Answer:

Plasmodium and Leishmania reproduce through fission, an asexual mode of reproduction.

Plasmodium reproduces through multiple fission, whereas Leishmania reproduces through binary fission.

72. Name an organism which reproduces by spore formation. List three conditions favourable for spores to germinate and grow.

Answer:

Rhizopus reproduces by spore formation.

Conditions favourable for spore formation are:

i) Cool place
ii) Moist place
iii) Dark place.

73. Define pollination. Name the two types of pollination.

Answer:

The transfer of pollen grains from the anther to the stigma of the same or different flower is called pollination. The two types of pollination are Self-Pollination and Cross-Pollination.

74. Name two diseases each caused by STDs due to bacterial infection and viral infection.

Answer:

Bacterial infection: - Gonorrhoea and Syphilis.

Viral infection: - AIDS and Genital Warts.

75. What is DNA copying?

Answer:

DNA in the cell nucleus is the information source for making proteins, and different proteins lead to different body designs. During reproduction, a similar copy of DNA is generated, and the process is called DNA copying.

76. Give two advantages of vegetative propagation.

Answer:

i) It is a cheaper, easier and more rapid method of propagation in plants than growing plants from their seeds.

ii) Better quality of the plants can be maintained by this method.

77. What is fertilisation? Where does it occur in humans?

Answer:

Fertilisation is the fusion of a male gamete with a female gamete to form a zygote. In humans, it occurs in the fallopian tube (oviduct).

78. What is fertilisation in plants? What happens to the ovary after fertilisation?

Answer:

Fertilisation is the fusion of a male gamete from pollen with a female gamete in the ovule, forming a zygote. The ovary develops into a fruit, and the ovule develops into a seed.

79. Mention two sources of variation.

Answer:

(i) Errors in DNA copying.

(ii) Random fertilisation.

80. Who is known as the "Father of Genetics"? Name the plant on which he performed his experiments.

Answer:

Gregor Johann Mendel. He performed his experiments on the Garden Pea Plant.

81. Define the term heredity.

Answer:

The transmission of characters from one generation to another or from parents to offspring through their genes. For example, dogs give birth to puppies, whereas cats produce kittens.

82. What is DNA?

Answer:

Deoxyribonucleic Acid (DNA) is a molecule which carries the hereditary characters or traits in a coded form from one generation to the next and all the organisms.

83. "The sex of the children is determined by what they inherit from their father and not their mother." Justify.

Answer:

It is because a child who inherits an X chromosome from the father will be a girl, and one who inherits a Y chromosome from the father will be a boy. But all children will inherit an X chromosome from their mother, regardless if they are boys or girls.

84. What do you understand by the term inherited traits and acquired traits?

Answer:

Inherited Traits	Acquired Traits
1) These are the characteristics that an individual inherits from his parents and can be passed into the next generation.	1) These are the characteristics that an individual develops during his life time and cannot be passed into the next generation.
2) These characteristics include eye colour, skin complexion, hair colour etc.	2) These characteristics include skills, knowledge, development of muscles etc.

85. Which type of reproduction is best survival? Why?

Answer:

Sexual reproduction produces a new combination of genes in the offspring that may enable them to survive in the changing environment and help in the survival of the species.

86. If all the waste we generate is biodegradable, will this have no impact on the environment?

Answer:

Biodegradable wastes can also affect the environment. During the process of decomposition, these wastes can be led to negative impacts like smell and possibility of sparking an

epidemic, if they are dumped near a residential area.

87. Why is the use of iodised salt advisable?

Answer.

Iodine is essential for the synthesis of thyroxin hormone in the thyroid gland. The thyroxin, in turn regulates carbohydrates, proteins and fat metabolism in the body for growth. Deficiency of iodine results in goiter. Thus, use of iodised salt is advisable to prevent iodine deficiency in the body.

88. What is the function of medulla oblongata?

Answer.

Medulla oblongata controls rate of heart beat, breathing movements, expansion and contraction of blood vessels to regulate blood pressure, swallowing, coughing, sneezing, vomiting etc.

89. How is the energy released during respiration stored in the body?

Answer:

The energy released during respiration is used to make ATP (Adenosine Triphosphate) molecules from ADP (Adenosine Diphosphate) and inorganic phosphate. ATP acts as the energy currency of the cell to fuel all the endothermic reactions that take place in the cell.

90. A student has been growing plants in two pots. One pot is placed in sunlight and the other in complete darkness. After a few days, he observes that the plant in the dark bends towards one side. Why?

Answer:

The plant in the dark bends toward light due to phototropism, which is controlled by auxins. Auxins accumulate on the shaded side of the plant, promoting cell elongation and causing the plant to bend toward the light source.

91. Why do veins have valves while arteries do not?

Answer:

Veins carry blood at low pressure and often against gravity, so valves are needed to prevent backflow. Arteries carry blood under high pressure from the heart, so valves are not required.

92. What are villi? What is their function?

Answer:

Villi are finger-like projections in the small intestine. They increase surface area for absorption of digested food.

93. A man with blood group A marries a woman with blood group O and their daughter has blood group O. Is this information enough to tell you which of the traits blood group A or O is dominant? Why or why not?

Answer:

No, this information is not sufficient to determine which of the traits blood group A or O is dominant. This is because we do not know about the blood group of all the progeny as blood group A can be genotypically AA or AO, which is incomplete to draw any such conclusion.

94. What are the advantages of cloth bags over plastic bags during shopping?

Answer:

The advantages of cloth bags are as follows:

i) capable of carrying more things
ii) made of biodegradable material
iii) does not pollute the environment
iv) can be reused

95. What are trophic levels? Give an example of a food chain and state the different trophic levels in it.

Answer:

The various levels or steps in a food chain at which the transfer of food and energy takes place are called trophic levels.

An example of a food chain:

Plants–>grasshopper–->frog–>snake—>hawk

In this example, plants are eaten by a grasshopper (First Trophic level), which is then eaten by the frog (Second Trophic level), which in turn is eaten by the snake (Third Trophic level). The snake is then

eaten by the hawk (Fourth Trophic level).

96. What are decomposers? Write the role of decomposers in the environment.

Answer:

Decomposers are microorganisms that derive their nutrition from dead remains and waste products of organisms. They play a vital role in our environment by breaking down complex organic substances into simple inorganic substances, which are made available for plants and other organisms. Hence, they act as scavengers and not only keep the environment clean but also replenish the minerals.

97. Give any two ways in which biodegradable substances would affect the environment?

Answer:

Biodegradable substances affect the environment

100. Primarily by being broken down by microorganisms, which helps recycle nutrients back into the soil to enhance fertility.

(ii) However, their decomposition can also cause negative effects, such as producing foul smells and acting as breeding grounds for disease-carrying insects.

98. What is the ozone layer? What causes ozone depletion?

Answer:

The ozone layer is a layer of ozone gas in the atmosphere that protects Earth from harmful ultraviolet radiation. Ozone depletion is mainly caused by chemicals such as chlorofluorocarbons (CFCs).

99. (a)Why is it necessary to conserve our environment?

(b) State the importance of green and blue dustbins in the safe disposal of household waste

Answer:

(a) The ecosystem provides many useful things for our survival. We get food, shelter and the air we breathe through the ecosystem. Hence, it is necessary to conserve our environment and the ecosystem.

(b) There are two types of waste produced in our homes. These are biodegradable and non-biodegradable wastes. These wastes are dumped into different bins. Biodegradable wastes are dumped in the green bins while non-biodegradable wastes are dumped in blue bins.

100. "Is it possible that a trait is inherited but may not be expressed?" Give a suitable example to justify this statement.

Answer:

Yes, it is possible.

For example- When pure tall pea plants are crossed with pure dwarf pea plants, only tall pea plants are obtained in the F_1 generation. On selfing tall plants of the F_1 generation, both tall and dwarf plants are obtained in the F_2 generation in the ratio 3:1. The reappearance of the dwarf character shows it was present but could not express itself in the F_1 generation because of the dominant character of the tall pea plant.

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VERY SHORT ANSWER TYPE QUESTIONS [2 MARKS] [PHYSICS]

101. A lens has power –2 D. Calculate its focal length and identify the type of lens.

Answer:

Given, Power(P) $= \frac{1}{f}$

or, $-2 = \frac{1}{f}$

or, $f = \frac{-1}{2}$

$\therefore f = -0.5m.$

Type of lens: Negative focal length indicates a concave lens.

102. The refractive index of a material medium is 1.33. Calculate the speed of light in the medium.

Answer:

Given, $n = 1.33$

$c = 3x10^8\ m/s$

Using, $n = \frac{c}{v}$

or, $v = \frac{c}{n}$

or, $v = \frac{3x10^8}{1.33}$

$\therefore v = 2.25x10^8\ m/s$

103. State the laws of reflection of light.

Answer:

The laws of reflection are:

i) The angle of incidence is equal to the angle of reflection.

ii) At the point of incidence, the incident ray, the reflected ray and the normal lie in the same plane.

104. What is the difference between a real image and a virtual image? (Any 2 points)

Answer:

Real Image	Virtual Image
1. Light rays actually meet to form a real image.	1. Light rays do not actually meet to form a virtual image.
2. The image is generally inverted.	2. The image is generally erect.
3.Image can be obtained on the screen.	3. Image cannot be obtained on the screen.
4. The image is in front of mirror and behind the lens.	4. The image is behind the mirror and in front of the lens.

.105. State the laws of refraction of light.

Answer:

The laws of refraction are:

i) The incident ray, the refracted ray and the normal to the surface of the separation of the two media at the point of incidence, all lie in the same plane.

ii) The ratio of the sine of angle of incidence to the sine of angle of refraction is a constant, for the light of given colour, for the given pair of media.

106. Why do we prefer a convex mirror as a rear-view mirror in vehicles? Give two reasons.

Answer:

The reasons are:

i) A convex mirror always gives an erect, virtual, full size diminished image of distant objects.

ii) It can cover a wider field of view. Thus, it enables the driver to view a larger area than would be possible with a plane mirror.

107. Define power of lens. Write the mathematical expression. State the SI unit of power of a lens.

Answer:

Power of a lens is defined as the reciprocal of focal length in meters.

Mathematically, $P = \frac{1}{f}$; where f is in meters.

The SI unit of a lens is called dioptre.

108. State any 2 uses of a concave mirror.

Answer:

(i)It is used as a shaving mirror. The reason being that when the face of a person is between the pole and the principal focus of a concave mirror, an erect, enlarged and virtual image is formed behind the mirror.

(ii)It is used as a reflector in the headlights of automobiles. The bulb is placed close to the principal focus of the concave mirror when a powerful parallel beam of light is placed.

109. (a)Write the mirror formula and explain the meaning of each term.

(b) Name a mirror that can give an erect and enlarged image of an object

Answer:

(a) Mirror formula: $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$. Where f = focal length, v = image distance, u = object distance.

(b) A concave mirror produces an erect and enlarged image of an object.

110. (a)A boy standing in front of a spherical mirror finds his image having a small face, big tummy and legs of normal size. What are the shapes of three parts of the mirror?

(b) You are given kerosene, turpentine and water. In which of these does the light travel fastest?

Answer:

(a) The upper part of the mirror showing a small face must be convex. The middle part of the mirror showing a big tummy must be concave and the lower part of the mirror showing normal legs must be plane.

(b) Light travels fastest in water.

111. (a)Find the focal length of a convex mirror whose radius of curvature is 32 cm.

(b)A ray of light travelling in air enters obliquely into water. Does the light ray bend towards the normal or away from the normal?

Answer:

(a) Given,

Radius of curvature, R = 32 cm

Focal length, f =?

We know, R = 2f

$$f = \frac{R}{2} = \frac{32}{2}$$

= 16 cm

(b) The ray of light bends towards the normal.

112. The refractive index of diamond is 2.42. What is the meaning of this statement?

Answer:

It means that light travels 2.42 times slower in diamond than in vacuum. It also means diamond is optically very dense and bends light significantly.

113. A lens of power –4.5 D is required by a person to correct his vision. State the defect of vision he is suffering from, calculate the focal length and name the corrective lens.

Answer:

The vision defect is myopia or short-sightedness.

Focal length = $\frac{1}{\text{power}}$ = $\frac{100}{-4.5}$cm

= -22.2 cm

The person has to use a concave lens to correct the vision.

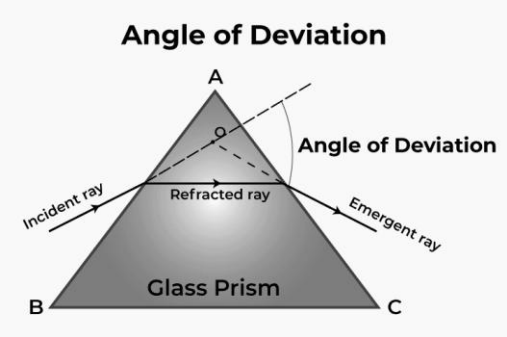
114. Why does the sun appear reddish at sunrise and sunset?

Answer:

At sunrise or sunset, sunlight travels a longer path through the atmosphere. Most blue light (shorter wavelengths) is scattered away, and only red light (longer wavelengths) reaches our eyes. Hence, the sun appears reddish at sunrise and sunset.

115. Draw a ray diagram to show the refraction of light through a glass prism. Mark on it (a) the incident ray, (b) the emergent ray and (c) the angle of deviation.

Answer:



116. What is the cause of dispersion of white light through a prism?

Answer:

Dispersion occurs because different colours (wavelength) of light travel at different speeds in a prism. As a result, they bend by different angles, causing white light to spread into its constituent seven colours (VIBGYOR).

117. What is the Tyndall effect? Explain with an example.

Answer:

The phenomenon of scattering of a beam of light by colloidal particles is called the Tyndall effect.

For example: Tyndall effect can be observed when sunlight passes through a canopy of a dense forest.

Here, tiny water droplets in the mist scatter light.

118. (a)What is meant by dispersion of white light?
(b)Why are danger signal lights red in colour?

Answer:

(a) The splitting of white light into its component colours is called dispersion of light.
(b) Danger signal lights are red in colour because the red coloured light having longer wavelength is scattered the least by fog or smoke. Hence, it can be seen clearly from a distance.

119. White light is passed through a prism to yield a spectrum.
(a)Which colour will show
(i) maximum and (ii) minimum angle of deviation?
(b) A blue-coloured ray is passed through a glass prism. What will be the colour of the emergent ray? Justify your answer.

Answer:

(a)(i)Violet colour will show maximum angle of deviation.
(ii) Red colour will show minimum angle of deviation.
(b) The emergent ray will be blue in colour. Since blue colour ray cannot be split any further it will pass through the prism undispersed.

120. What is Presbyopia? How is the defect corrected?

Answer:

The power of accommodation of the eye usually decreases with ageing. For most people, the near point gradually recedes away. They find it difficult to see nearby objects comfortably and distinctly without corrective eye-glasses. This defect is called Presbyopia. This defect can be corrected by using convex lens of proper focal length.

121. Why are heating elements made of alloys instead of pure metals?

Answer:

Alloys are used because:
i) they have higher resistivity and hence produce more heat
ii) they have high melting point and hence don't melt easily
iii) they do not oxidize easily and hence have longer life

122. Three resistors of 2 Ω, 3 Ω, and 5 Ω are connected in series. Find:
(a) Total resistance
(b) Current if 10 V is applied

Answer:

(a) Total resistance:

$$R = R_1 + R_2 + R_3$$

$\Rightarrow R=2+3+5=10\ \Omega$

(b) Current:

$$I = \frac{V}{R} = \frac{10}{10} = 1\ A$$

123. Why are household appliances connected in parallel?

Answer:

They are connected in parallel due to the following reasons:
(a) Each appliance gets same voltage (220V)
(b)They can be operated independently.
(c) Failure of one does not affect others.

124. Two resistors of 4 Ω and 6 Ω are connected in parallel. Find equivalent resistance.

Answer:

Using, $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$

$$\frac{1}{R} = \frac{1}{4} + \frac{1}{6} = \frac{3+2}{12}$$

$$\Rightarrow \frac{1}{R} = \frac{5}{12}$$

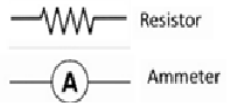
$$R = \frac{12}{5} = 2.4\ \Omega$$

125. (i)What is meant by the statement 'The potential difference between two points is l volt'?
(ii)Draw the symbol of resistor and ammeter.

Answer:

(i) Potential difference of 1 volt means the amount of work done when a unit charge moves from one point to the other point in an electric field.

ii)



126. Why does the cord of an electric heater not glow while the heating element does?

Answer:

The cord of an electric heater is made of thick copper wire and has much lower resistance than its element. For the same current (I) flowing through the cord and the element, heat produced (I^2Rt) in the element is much more than that produced in the cord. Consequently, the element becomes very hot and glows whereas the cord does not become hot and as such does not glow.

127. (i) Write the function of the Voltmeter in an electric circuit.
(ii) Should the resistance of a Voltmeter be low or high? Give a reason.

Answer:

(i) To measure potential difference across two points.
(ii)The resistance of a voltmeter should be high so that it takes a negligible current from the circuit.

128. Two wires A and B of the same material, having the same lengths and diameters 0.2 mm and 0.3 mm respectively, are connected one by one in a circuit. Which one of these two wires will offer more resistance to the flow of current in the circuit? Justify your answer.

Answer:

Wire A will offer more resistance to the flow of current in the circuit. This is because resistance is inversely proportional to the area of cross-section.

129. Define resistivity of a material. Write the mathematical formula of resistivity.

Answer:

Resistivity is defined as the resistance offered to current flow by a conductor of unit length having unit area of cross-section.

The mathematical formula of resistivity is $\rho = \frac{RA}{l}$, where ρ is the resistivity, R is the resistance, A is the area of cross- section and l is the length of the conductor.

130. Name the factors which determine the resistance of a conductor.

Answer:

The factors which determine the resistance of a conductor are
i) Length of the conductor,
ii) Area of cross-section of the conductor,
iii) Nature of the material of the conductor, and
iv)Temperature of the conductor.

131. Two wires of equal length, one of copper and the other of manganin (an alloy) have the same thickness. Which one can be used for (i) electrical transmission lines (ii) electrical heating devices? Why?

Answer:

(i) Copper wire can be used for electrical transmission lines because copper has very low resistivity and hence it is a very good conductor of electricity.
(ii) Manganin can be used for electrical heating devices because the resistivity of manganin is about 25 times more than that of copper and hence it produces a lot of heat on passage of current through it.

132. (a) Define electric work.
(b) How much work is done in moving a charge of 2C across two points having a potential difference of 12 V?

Answer:

(a) Electric work is the amount of energy transferred or used when an electric charge moves through a potential difference in an electric circuit.
(b) Given, Charge (Q) = 2C
Potential difference (V) = 12 V
Work done (W) =?
Using, W = V × Q
= 12 × 2
= 24 J

133. One of the major causes of fire in office buildings is short-circuiting.

State one reason, which may lead to a short-circuit. How can it be prevented?

Answer:

One possible reason for short-circuiting of an electrical circuit is either the installation of electrical wiring is damaged or appliance of high-power rating is being run on an electrical line of lower power rating,

Short-circuiting can be prevented by the use of an electrical fuse of appropriate capacity.

134. What is the pattern of magnetic field lines for a current-carrying circular loop? State any two factors affecting its strength.

Answer:

A circular loop produces magnetic field lines that are circular near the wire and become parallel at the center.

The strength of the magnetic field depends on current, number of turns, and radius of the loop.

135. List two properties of magnetic field lines.

Answer:

The properties are:

i) Magnetic field lines are closed curves.

ii) Two magnetic field lines never intersect each other.

136. List two methods of producing magnetic fields.

Answer:

Following are the methods of producing magnetic fields:

i) By using a permanent magnet, we can produce a magnetic field.

ii)A current carrying straight conductor produces a magnetic field.

137. Why does a compass needle get deflected when brought near a bar magnet?

Answer:

The magnetic field of the magnet exerts force on both the poles of the compass needle. The forces experienced by the two poles are equal and opposite. These two forces form a couple and deflect the compass needle.

138. State Right-Hand Thumb Rule.

Answer:

It states that, if you hold the current carrying straight wire in the grip of your right hand in such a way that the thumb points in the direction of current, then the direction of the curl of the fingers will give the direction of the magnetic field.

139. A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the centre of it. He sprinkles some iron filings uniformly around the bar magnet. Then he taps the drawing board gently and observes that iron filings arrange themselves in a particular pattern.

(i) What does the crowding of iron filings at the ends of the magnet indicate?

(ii) What do the lines, along which the iron filings align, represent?

Answer:

(i) Crowding of iron filings indicates that the magnetic field in that region is strong.

(ii) They represent the magnetic field lines.

140. When does an electric short circuit occur?

Answer:

In a domestic circuit, short - circuit occurs when live and neutral wire comes in direct contact with each other. In this situation, the resistance of the circuit becomes zero and excessive current starts to flow through it.

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SECTION C
SHORT ANSWER TYPE QUESTIONS
(3 marks)
[CHEMISTRY]

1. What is the chemical name of baking soda? Write down its chemical formula. How is it produced? (Give relevant chemical equation)

Answer:

The Chemical name of baking Soda is Sodium hydrogen carbonate. Its chemical formula is $NaHCO_3$. It is produced by passing carbon dioxide through ammonical brine.

$NaCl+H_2O+NH_3+CO_2 \rightarrow NH_4Cl+NaHCO_3$

2. Explain why iron rusts more quickly in the presence of water and air. Name the compound formed during rusting and write the chemical formula.

Answer:

Rusting is faster due to the presence of moisture and oxygen. The compound formed is hydrated iron (III) oxide.

Chemical Formula: $Fe_2O_3.xH_2O$.

3. Solid calcium oxide was taken in a container and water was added slowly to it.
(i) State the two observations made in the experiment
(ii) Write the name and the chemical formula of the product formed.

Answer:

(i) Two observations made calcium oxide react vigorously. A large amount of heat is produced and the beaker becomes warm.

(ii)Product is slaked lime (or calcium hydroxide) $Ca(OH)_2$.

4. What is an oxidation reaction? Give an example of oxidation reaction. Is oxidation an exothermic or endothermic reaction?

Answer:

Oxidation reaction is the reaction which involves addition of oxygen and removal of hydrogen

$2Cu + O_2 \rightarrow 2CuO$

Oxidation reaction is an endothermic reaction.

5. Zinc reacts with dilute hydrochloric acid. Write the chemical equation and name the type of reaction. Also mention the gas evolved and how would you test it.

Answer:

$Zn + 2HCl \rightarrow ZnCl_2 + H_2$

The type of reaction is a single displacement reaction.

Hydrogen gas burns with a pop sound when tested by bringing a burning splinter near it.

6. Crystals of copper sulphate are heated in a test tube for sometime
(i) What is the colour of copper sulphate crystals before and after heating?
(ii) What is the source of liquid droplets seen on the upper side of the test tube during the heating process?

Answer:

(i) The colour of copper sulphate crystals is blue before heating and turns white after heating.

(ii) Water of crystallisation from hydrated copper sulphate $CuSO_4.5H_2O$, on heating gives water droplets.

$CuSO_4.5H_2O \rightarrow CuSO_4 + 5H_2O$

7. In the electrolysis of water
(i) Name the gas collected at cathode and anode respectively.
(ii)Why is the volume of one gas collected at one electrode is double of another.
(iii) Why are few drops of dil. sulphuric acid added to water prior to electrolysis?

Answer:

(i) In the electrolysis of water, hydrogen gas (H_2) is collected at the cathode (negative electrode)
and Oxygen gas (O_2) at the anode (positive electrode).

(ii) The volume of hydrogen is double that of oxygen because water (H_2O) contains two parts hydrogen to one part oxygen by volume.

According to the chemical equation of electrolysis, the decomposition of water produces two molecules of

hydrogen for every one molecule of oxygen.

(iii) Pure water is a poor conductor of electricity. The addition of a few drops of dilute sulphuric acid dissociates into ions, making the water a good conductor. Dilute sulphuric acid is added to increase the electrical conductivity of pure water.

8. During the reaction of some metals with dilute hydrochloric acid following observations were made

(i) Silver metal does not show any change.

(ii)The temperature of the reaction mixture rises when aluminium is added.

(iii)The reaction of sodium metal is found to be highly explosive.

Answer:

(i) Silver is a very less reactive metal (as it is placed below hydrogen in reactivity series). Thus, it does not react with dil. HCl.

(ii) The reaction of Al with dil. HCl is exothermic, i.e. heat is produced in the reaction and hence the temperature of the reaction mixture rises.

(iii) Sodium is a very reactive metal. It reacts vigorously with the evolution of heat too.

9. Explain giving one example, why do oxidation and reduction proceed side by side?

Answer:

Oxidation and reduction proceed side by side (redox reactions) because they are mutually dependent processes involving electron transfer. Oxidation is the loss of electrons, while reduction is the gain of electrons. For a substance to lose electrons (oxidation) there must be another substance available to gain them (reduction).

For example:

Reaction between Zinc and Copper Sulphate: When a piece of zinc (Zn) is placed in a copper sulphate solution.

Oxidation: Zinc loses two electrons to become a positive ion

$Zn \rightarrow Zn^{2+} + 2e^-$

Reduction: The copper ions in the solution accept these two electrons to become neutral copper

$Cu^{2+} + 2e^- \rightarrow Cu$

Therefore, the electrons released by the oxidation of zinc are immediately consumed by the reduction of copper ions.

10. A student dropped a few pieces of marble in dil. hydrochloric acid contained in a test tube. The evolved gas was passed through lime water. What change would be observed in lime water? Write a balanced chemical equation for both the changes observed.

Answer:

Lime water would turn milky because of the formation of calcium carbonate by evolved carbon dioxide gas.

i) $CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$ (marble)

ii) $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

11. Explain how an antacid works.

Answer:

The acidity produced due to excess hydrochloric acid in the stomach which causes indigestion and acute pain and irritation. Milk of Magnesia commonly called (Magnesium hydroxide) is used as an antacid. Since it is basic in nature, it reacts with excess hydrochloric acid present in the stomach and neutralises it.

12. (i) What are the main products of the chlor-alkali process?

(ii)Why is the chlor-alkali process important in industry?

Answer:

(i) Chlorine gas (Cl_2), Sodium hydroxide (NaOH), and hydrogen gas (H_2)

(ii) Produces key chemicals like chlorine, sodium hydroxide, and hydrogen, which are used in various industrial processes, including water purification, manufacturing of soaps and detergents.

13. Write the molecular formula of bleaching powder. How is bleaching powder prepared?

Answer:

The molecular formula of bleaching powder is $CaOCl_2$.

Bleaching powder is synthesized by the action of Chlorine gas (produced from the chlor-alkaliprocess) on dry slaked lime, $Ca(OH)_2$. The chemical equation is as follows:

$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

14. (i) The pH of a sample of tomato juice is 4.6. How is this juice likely to be in taste? Give reason to justify your answer.

(ii) How do we differentiate between strong and weak acids and bases in terms of ion formation in aqueous solution?

(iii)Why do HCl, HNO_3 etc. show acidic characters in aqueous solutions while solutions of compounds like alcohol and glucose do not show acidic character.

Answer:

(i) The tomato juice with a pH of4.6 is considered to be an acid and therefore will taste sour.

(ii)The strength of acids and bases depends on the number of H^+ ions and OH^- ions produced respectively.

(iii) HCl, HNO_3, etc. show acidic nature because they get dissolved in the aqueous solution and produce the hydrogen ions. The hydrogen ions are responsible for the acidic nature of the compounds.

15. Illustrate three chemical properties of acids with examples

Answer:

(i) They react with metals to give out hydrogen gas for example

$Zn + HCl \rightarrow ZnCl_2 + H_2$

(ii) They react with bases to form salt and water for example

$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

(iii) They react with carbonates to give carbon dioxide

$Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$

16. A yellow powder 'A' gives a pungent smell when left open. It is a good oxidising agent and is used for bleaching cotton and linen in textile industries. Identify 'A' and give its method of preparation. What is the commercial name?

Answer:

The given compound 'A' is calcium oxychloride because it is an oxidising agent and in open, it reacts with carbon dioxide to give pungent smelling chlorine gas.

$CaOCl_2 + CO_2 \rightarrow CaCO_3 + Cl_2$

It is prepared by the action of dry slaked lime with chlorine gas.

$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

Calcium oxychloride is commercially known as bleaching powder.

17. (a) Why do metals produce hydrogen gas with acids?

(b)Why is hydrogen gas not evolved when a metal reacts with nitric acid?

Answer:

(a) Metals displace hydrogen from acids because they are more reactive than hydrogen

Example:

Zinc + Sulphuric acid →

Zinc sulphate + Hydrogen

$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

(b) Hydrogen gas is not evolved when a metal reacts with nitric acid because nitric acid is a strong oxidizing agent it oxidizes the hydrogen produced to water and itself gets reduced to any of the nitrogen oxides.

18. Write three differences between calcination and roasting calcination.

Answer:

Roasting	Calcination
1. Ore is heated in excess of air	1. Ore is heated in the absence or limited supply of air
2. This is used for sulphide ores	2. This is used for carbonate ores
3. SO_2 is produced along with metal oxide	3. CO_2 is produced along with metal oxide

19. Differentiate between metals and non-metals on the basis of their chemical properties.

Answer:

Metals	Non-metals
1. Metals are electropositive and form cations	1. Non-metals are electronegative and form anions
2. Metals are reducing agents	2. Non-metals are oxidizing agents
3. Metals form basic or amphoteric oxides	3. Non-metals form acidic or neutral oxides

20. The galvanized article is protected from rusting even if the zinc coating is broken. Give reasons.

Answer:

Zinc is more reactive than iron and hence zinc reacts in preference to iron when they are present side by side.

If there is a scratch in the galvanized iron only zinc will be attacked by moist air and will get oxidized in preference to iron; the oxidation of iron does not take place in presence of zinc.

21. What is Aqua regia? Write its characteristics.

Answer:

Aqua regia is a freshly prepared mixture of concentrated hydrochloric acid and concentrated nitric acid in the ratio of 3:1.

Aqua regia has the following characteristics:

(i) It is a highly corrosive fuming liquid

(ii) It can dissolve gold and platinum even though neither of these acids can do so alone.

22. Write chemical equations for reactions taking place when

(i)Cinnabar is heated in air

(ii) Calcium metal reacts with water

Answer:

(i) Cinnabar is heated in air

First step:

$2HgS + 3O_2 \rightarrow 2HgO + 2SO_2$

Second step:

$2HgO \rightarrow 2Hg + O_2$

(ii) Calcium metal reacts with water

$Ca(s)+2H_2O(l) \rightarrow Ca(OH)_2(aq)+H_2(g)$

23. Why are Carbon and its compounds used as fuels for most applications?

Answer:

Carbon and its compounds are widely used as fuels because

(i) They have high calorific values and release a large amount of heat when they are burnt in air

(ii) They burn with a clean flame without leaving smoke (especially saturated hydrocarbons)

(iii) They are easy to handle and the combustion can be controlled.

24. Draw the structures of the following compounds:

(i) ethanoic acid

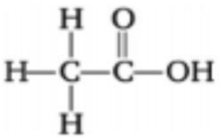
(ii) bromopentane

(iii) butanone

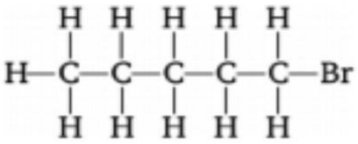
(iv) hexanal

Answer:

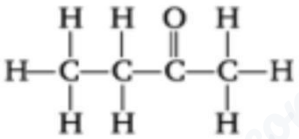
(*i*) Ethanoic acid CH_3COOH



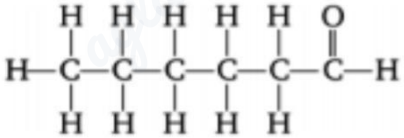
(*ii*) Bromopentane $C_5H_{11}Br$



(*iii*) Butanone $C_2H_5COCH_3$



(*iv*) Hexanal $[C_5H_{11}CHO]$



25. a) What is a homologous series? Explain with an example.

b) Why do we not see any gradation in the chemical properties of the homologous series of compounds?

Answer:

a) A homologous series is the family of organic compounds having the

same functional group, similar chemical properties but the successive (adjacent) members of the series differ by a -CH_2 unit or 14 mass units.

For example, the alkane series has the general formula C_nH_{2n+2}.

The first member of the homologous series of alkane is methane, i.e., CH_4.

The second member of the homologous series of alkane is ethane, i.e., C_2H_6.

The successive members differ by a CH_2 group.

b) There is no gradation in the chemical properties of compounds in a homologous series because their properties are determined solely by their functional group, which remains constant.

26. How can ethanol and ethanoic acid be differentiated on the basis of the physical and chemical properties?

Answer:

Physical properties:

Ethanol and ethanoic acid can be differentiated on the basis of the following physical properties

i) Smell: ethanol has a pleasant smell whereas ethanoic acid has a pungent smell.

ii) Melting point: the melting point of ethanol is much lower than that of ethanoic acid. In winter ethanoic acid freezes to form glacier-like crystals while ethanol remains as a liquid.

Chemical properties:

i) Action of sodium carbonate or bicarbonate: Ethanoic acid produces brisk effervescence due to the evolution of carbon dioxide gas but ethanol does not.

$2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + CO_2 + H_2O$

ii) Action on litmus: Ethanol is a neutral compound and has no action on litmus paper. In contrast, ethanoic acid is acidic in nature and turns blue litmus red.

27. (a) Give a test that can be used to differentiate between saturated and unsaturated hydrocarbons.

(b) Which of the following hydrocarbons undergo addition reactions: C_2H_6, C_3H_8, C_3H_6, C_2H_2 and CH_4?

Answer:

(a) Alkenes and alkynes are examples of unsaturated hydrocarbons. The bromine water test is used to distinguish between these and other saturated compounds. When an unsaturated compound is mixed with bromine water, the unsaturated hydrocarbon will decolorise bromine water; saturated hydrocarbons or alkanes on the other hand, do not decolorise bromine water.

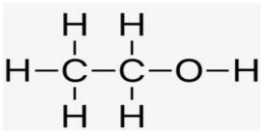
(b) Unsaturated hydrocarbons undergo addition reactions. C_3H_6 and C_2H_2 are unsaturated hydrocarbons that undergo addition reactions.

28. An organic compound A is an essential constituent of wine and beer. Oxidation of A yields an organic acid B which is present in vinegar. Name the compounds A and B and write their structural formula. What happens Write the chemical equation for the reaction, when A and B react in the presence of an acid catalyst.

Answer:

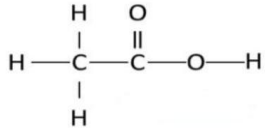
The compound A is ethanol

Structural formula of ethanol:



The compound B is ethanoic acid.

Structural formula of ethanoic acid:



$$\underset{\text{Ethanoic acid}}{CH_3COOH} + \underset{\text{Ethanol}}{C_2H_5OH} \xrightarrow{\text{conc. } H_2SO_4} \underset{\text{Ethyl ethanoate}}{CH_3COOC_2H_5} + \underset{\text{water}}{H_2O}$$

29. (a) What do you observe when methane is exposed to chlorine in the presence of sunlight? Write the relevant balanced equation.

(b) Why is ethanol added to petrol?

Answer:

(a) When methane is exposed to chlorine in the presence of sunlight a substitution reaction occurs. In this reaction one or more hydrogen atoms in methane are replaced by chlorine atoms.

$CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$

(b) Ethanol is added to petrol because it burns completely and gives rise to only carbon dioxide and water on burning in sufficient air. This combination reduces the emission of unburnt hydrocarbons making it eco-friendly.

30. Explain in brief the mechanism of cleansing action of soap.

Answer:

Soaps are molecules in which the two ends have different properties, one is hydrophilic, that is it interacts with water and the other end is hydrophobic, that is it interacts with hydrocarbons. When soap is dissolved in water, its hydrophobic ends attach themselves to the dirt. Then the molecules of themselves in micelle formation and trap the dirt at the centre of the cluster. Soap in the form of micelle is therefore able to clean because of this unique orientation. The micelles stay in solution and the dirt particles are then easily rinsed away by water.

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SHORT ANSWER TYPE QUESTIONS
(3 marks)
[BIOLOGY]

31. Name the glands present in the walls of the stomach. What enzyme does it produce? Give two functions of HCl produced in the stomach.

Answer:

The glands present in the walls of the stomach are the gastric glands. It produces the enzyme, Pepsin.

Two functions of HCl are:-

(i) It creates an acidic medium which facilitates the action of the enzyme Pepsin

(ii) It kills the germs that might have entered the stomach along with the food.

32. Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?

Answer:

It is necessary to separate oxygenated and deoxygenated blood in mammals and birds because of the following reasons:

(i) Mammals and birds are warm blooded animals that constantly need to maintain their body temperature.

(ii) These organisms need a large amount of oxygen for cellular respiration to bring out more energy to maintain their body temperature.

33. What is a reflex action? Trace the sequence of events which occur when a bright light is focused on your eyes.

Answer:

Reflex action is a rapid automatic response to a stimulus.

When light is focuses in our eyes, the receptor relay impulses via sensory nerves to the central nervous system (CNS) and the CNS transmits message (in the form of impulses) to the effectors(muscles in the eye). These muscles reduce the size of the pupil and activate muscles to close the eyes.

34. Give three advantages of vegetative propagation.

Answer:

The three advantages of vegetative propagation are:

(i) Plants raised by vegetative propagation can bear flowers and fruits earlier than those produced from seeds.

ii) It makes possible the propagation of plants such as banana, orange, rose and jasmine that have lost the capacity to produce seeds.

iii) All plants produced are genetically similar enough to the parent plant to have all its characteristics.

35. What is fission? Differentiate between binary fission and multiple fission.

Answer:

Fission is a mode of asexual reproduction in which unicellular organisms divide to create new individuals.

Binary fission is a type of fission where the organism simply split into two equal halves during cell division e.g. Amoeba.

Multiple fission is a type of fission where the organism divides into many daughter cells simultaneously, e.g. Plasmodium.

36. How is ozone produced in the environment? What causes its depletion?

Answer:

The UV radiation from the sun splits apart some molecular Oxygen (O_2) into oxygen atoms (O).

The atoms then combine with molecular oxygen to form ozone

$O_2 \rightarrow O + O$

$O + O_2 \rightarrow O_3$

(Ozone)

Its depletion is caused by synthetic chemicals like chlorofluorocarbon (CFC) which are used in refrigerants and in fire extinguisher.

37. Explain how cells that are not in direct contact with nerves receive information?

Answer:

The cells that are not directly connected to nerves receive

information through hormones secreted by endocrine glands. The endocrine glands release hormones directly into the blood stream. These hormones travel all over the body. Not all cells respond, only cells that have the means to detect this compound using special molecules on their surfaces recognise the information and transmit it. This process is slow but it can potentially reach all the cells of the body regardless of nervous connections.

38. A person goes paragliding for the first time and experiences fear and excitement. Which hormone is released in this situation and what are its effects on the body?

Answer:

When a person goes paragliding for the first time they may feel fear, excitement or nervousness.

In such a situation the body produces adrenaline, a hormone secreted by the adrenal gland.

The effects of adrenaline are:

(i) Increased heartbeat and breathing rate to supply more oxygen to muscles

ii) Increased blood flow to muscles. The blood to the digestive system and skin is reduced and redirected to the arms and legs for action.

39. What do you mean by emulsification of fat? Why is this required?

Answer:

Large fat globules are broken down into smaller uniformly distributed fat particles by the action of bile salts present in the bile juice secreted by the liver. This process is known as emulsification of fat. The pancreatic enzyme lipase can act on the emulsified fat and convert it to fatty acid and glycerol.

40. Why is transpiration important for plants?

Answer:

Transpiration through stomata creates a transpiration pull in the underlying vascular tissue. This helps in pulling the water column and thus facilitates ascent of sap in plants. Furthermore, transpiration is a way through which plants get rid of excess water. It also helps in temperature regulation in plants and is the major driving force in the movement of water in the xylem.

41. A signal is traveling from one neuron to another in the human body.

a) What is the junction between two neurons called?

b) How is the signal transmitted across this junction?

c) What is the role of dendrites?

Answers:

a) Synapse

b) Through chemicals called neurotransmitters

c) Dendrites receive incoming signals.

42. How is the movement of leaves of the sensitive plant touch-me-not different from the movement of shoot towards light?

Answer:

Differences between movements of leaves of touch-me-not plant and movement of shoots towards light are:

Movement of leaves of touch-me-not plant	Movement of shoots towards light
(i) This movement is independent of growth	(i) This movement is dependent on growth
(ii) stimulus is touch	(ii) stimulus is light
(iii) stimulus is touch	(iii) movement is directional

43. (i) Name the endocrine gland associated with the brain and the hormone secreted by it.

(ii) Name the endocrine gland present only in females and the hormone produced by it

(iii) Name the endocrine gland present only in males and the hormone produced by it.

Answer:

(i) The endocrine gland associated with the brain is the pituitary gland and the hormone secreted is the growth hormone

(ii) The endocrine gland present only in females are the ovaries and the hormone produced is oestrogen and progesterone

(iii) The endocrine gland present only in males are the testes and the hormone produced is Testosterone.

44. What happens when

(a) Planaria gets cut into two pieces?

(b) A mature Spirogyra filament attains considerable length?

(c) On maturation Sporangia burst?

Answer:

(a) When Planaria gets cut into two pieces each piece grows into a complete organism.

(b) A mature spirogyra on attaining considerable length breaks up into two or more small pieces and each piece then grows into a new individual.

(c) When sporangia bursts, spores are released and each one of them develops into a new individual.

45. Why is variation beneficial for the species, but not necessarily for the individual?

Answer:

Accumulation of variation in a species enables them to adapt according to the changes and the new needs. This provides survival advantage to the species. But an individual does not get any advantage due to variation that takes place on him. Thus, variation is beneficial for a species, but not necessarily for the individual.

46. What were the three steps used by Mendel in his breeding experiments?

Answer:

Mendel's experimental techniques involved three steps:

(a) Selection of "pure line" plants.

(b)Production of first generation (F1 generation) plants by cross breeding.

(c) Raising of second generation (F2 generation) plants by self fertilization of hybrids.

47. A gas 'X' is found in the upper layer of the atmosphere. It is a deadly poison, but still essential for all life forms on earth.

(a) Identify the gas and state the main factor for its depletion in the atmosphere.

(b) How is this gas formed in the upper atmosphere?

Answer:

(a) The gas 'X' is ozone (O_3). It is getting depleted mainly due to synthetic chemicals like chlorofluorocarbons (CFCs) used in refrigerants and fire extinguishers.

(b) In the upper atmosphere, ozone is formed when ultraviolet (UV) radiations split some molecules of oxygen (O_2) into free oxygen atoms (O), which then combine with molecular oxygen to form ozone (O_3).

48. An experimenter seals a green potted plant in an airtight glass bell jar along with a watch-glass containing potassium hydroxide (KOH) and places it in sunlight. Predict the effect on starch production in the leaves and explain why.

Answer:

Starch production in the plant's leaves will drop drastically or cease altogether because potassium hydroxide (KOH) actively absorbs all available carbon dioxide within the sealed bell jar. Carbon dioxide is a critical inorganic raw material necessary for the reduction phase of photosynthesis to synthesise glucose. Without carbon dioxide, the plant cannot manufacture carbohydrates, and since no excess glucose is formed, no new internal energy reserves can be stored as starch.

49. During a high-intensity sprint, a runner suddenly experiences agonizing muscle cramps. Explain the biochemical shift that occurred in their muscle cells and the product responsible for this condition.

Answer:

During sudden, rigorous physical activity, the oxygen demand of the runner's muscle cells exceeds the available supply, creating a localized lack of oxygen. To continue generating energy, the muscle cells

temporarily switch to an alternative anaerobic metabolic pathway to break down pyruvate. Instead of completing aerobic respiration in the mitochondria, the three-carbon pyruvate is converted directly into lactic acid in the cytoplasm, and its accumulation triggers muscle cramps.

50. Why are the muscular walls of the ventricles noticeably thicker and more robust than the walls of the atria in a human heart?

Answer:

The atria are the upper chambers of the heart whose primary role is to merely collect incoming blood from the body or lungs and transfer it downwards into the adjacent lower chambers.

In contrast, the ventricles are the powerful pumping chambers responsible for forcibly squeezing and pushing blood out into various external organs across long distances.

Because the ventricles must withstand and generate significantly higher pressure to drive systemic and pulmonary blood flow, they require much thicker muscular walls.

51. Contrast the underlying mechanisms driving the transport of water in the xylem during the night versus during a bright, sunny afternoon.

Answer:

At night, when stomata are largely closed and no active photosynthesis or transpiration occurs, the upward movement of water is driven primarily by "root pressure". This is created when root cells actively pump ions from the soil, causing water to follow due to concentration differences.

On a bright, sunny afternoon, the stomata are wide open, leading to massive evaporation of water molecules from the leaf cells into the air. This rapid evaporation creates a powerful upward "transpiration pull" or suction, which supersedes root pressure and becomes the primary force pulling water columns to the top of the plant.

52. Give three differences between aerobic and anaerobic respiration.

Answer:

The three differences between aerobic and anaerobic respiration are:

Aerobic Respiration	Anaerobic Respiration
1. Occur in the presence of oxygen	1.Occur in the absence of oxygen
2. Large amount of energy is released	2. Less energy is released
3. End products are carbon dioxide and water	3.End products are lactic acid (in muscles) or alcohol and carbon dioxide (in yeast)

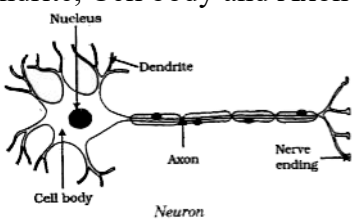
53. Describe double circulation in human beings. Why is it necessary?

Answer:

In humans and other mammals, the blood passes twice through the heart before completing a full circuit of the body. Blood is pumped from the heart to the lungs and returns to the heart from where it is distributed to the other organs in the body. This type of circulation is called double circulation.

It is necessary because humans and all mammals require a highly efficient supply of oxygen to the body as these animals have high energy needs to maintain their internal body temperature. Double circulation keeps the oxygenated blood separate from the deoxygenated blood and fulfills the requirement of oxygen in the body.

54. Draw the diagram of a neuron and label the following on it: Nucleus, Dendrite, Cell body and Axon



Neuron

54. List four categories of contraceptive methods. State one advantage of adopting such preventive methods.

Answer:

Four methods of contraception used by humans are:

(i) Mechanical barrier.
(ii) Chemical method.
(iii) Copper-T.
(iv) Surgical method.

One advantage is that it helps in avoiding unwanted pregnancy.

55. List two differences in tabular form between dominant and recessive traits. What percentage of the plants in the F_2 generation were round, in Mendel's cross between round and wrinkled pea plants?

Answer:

Dominant Trait	Recessive Trait
1. When both dominant and recessive traits are inherited, the dominant trait gets expressed	1.When both dominant and recessive traits are inherited, the recessive trait does not get expressed
2. A single copy of dominant is enough to get it expressed.	2. Both the copies of a trait should be recessive to get it expressed.

75% of the plants in F_2 generation were round in Mendel's cross between round and wrinkled pea plants.

56. Why did Mendel select pea plants for conducting his experiments on inheritance?

Answer:

Mendel selected pea plant for his experiments because:

(a)It has distinct, easily detectable contrasting characters.
(b)It has a short life cycle.
(c)Self fertilisation occurs but cross fertilization can also be carried out easily.

57. Give three important features of the mechanism of inheritance.

Answer:

The three important features of the mechanism of inheritance are:

(a) Characters (traits) are controlled by genes, and each gene controls one character.
(b) There may be two or more forms (alleles) of the gene.
(c) One form may be dominant over the other.

58. Why is damage to the ozone layer a cause for concern? Mention two steps that can be taken to limit this damage?

Answer:

Ozone depletion, allows more harmful UV radiation to reach the Earth's surface.

Consequences include higher risks of skin cancer and damage to phytoplankton and other organisms that form the base of many food chains, which can affect global ecosystems.

The steps taken to limit the damage are:

(i) The release of CFCs and other ozone-depleting substances has been reduced and controlled.
(ii)CFC-based refrigerants and foam-blowing agents have been replaced with environmentally safer alternatives, and better industrial practices have been adopted to limit emissions.

59. (a) What is an ecosystem? List its two main components.
(b) We do not clean ponds or lakes, but an aquarium needs to be cleaned regularly. Explain.

Answer:

(a) All the interacting organisms in an area, together with the non-living constituents of the environment, form an ecosystem.

An ecosystem includes both living (biotic) and non-living (abiotic) components.

(b) We do not clean ponds as we do in an aquarium because the waste generated in a pond is acted upon by the decomposers, whereas in an aquarium, the waste gets mixed with water and is left untreated due to the absence of decomposers.

60. How do Food chains get shortened? How does shortening of food chain affect the biosphere?

Answer:

Undesirable activities of man eliminate growth of organisms

belonging to one or more trophic levels in a food chain. Thus, the food chain gets shortened, e.g. hunting tigers for their skin, etc.

It causes imbalance in the functioning of ecosystem and biosphere. If organisms of one trophic level are eliminated, the organisms prior to that trophic level will flourish and increase in number. Also, the organisms of the subsequent trophic level will sharply decrease, thereby creating an imbalance.

61. What is the difference between self pollination and cross pollination? Why is cross pollination generally more beneficial for genetic diversity?

Answer:

Self-pollination is the transfer of pollen grains from anther to the stigma of the same flower or another flower on the same plant. Whereas, cross pollination is the transfer of pollen grains between flowers of entirely different plants of the same species.

Cross pollination creates genetic diversity because it mixes the genes of two different parent plants. This mixing creates unique offsprings with new traits, better adaptation to environmental changes, diseases and pests.

62. What are the advantages of a nervous system?

Answer:

i) The nervous system in our body keeps us informed about the outside world through the sense organs.

ii) It enables us to remember, to think and to reason out.

iii) It controls and harmonises all our voluntary and involuntary activities.

63. Suggest three ways to maintain a balance between environment and development to survive.

Answer:

(i) Judicious use of natural resources and replenishing such resources (e.g.$CO2/O_2$) by growing of trees.

(ii) Protecting the wildlife by preserving their natural habitats and banning of hunting of wild animals.

(iii) Managing the wastes by decomposition and recycling of many such substances.

64. What is puberty? Name the hormones responsible for production of secondary sexual characters in human beings.

Answer:

The age at which the human males and females become sexually mature is called Puberty. Their reproductive parts become functional and their gonads start producing gametes at puberty.

The hormone responsible for producing secondary sexual characters in males is testosterone and in females is oestrogen.

65. In one of his experiments with pea plants, Mendel observed that when a pure tall pea plant is crossed with a pure dwarf plant, in the first generation (F_1) only tall plants appear.

(i)What happens to the trait of dwarfness in this case?

(ii)When the F_1 generation plants were self fertilized, he observed that in the plants of the second generation, F_2 both the tall and dwarf plants were present. Why did it happen? Explain briefly.

Answer:

(i) In the F_1 generation, the trait of dwarfness is recessive.

(ii) Both parents contribute equally in sexual reproduction. So each pea plant inherited genes of both tallness and dwarfness in the F_1 generation. But only the dominant trait, tallness got expressed. When F_1 plants are crossed, in the F_2 generation, there are some plants (25%) which carry only the dwarfness character and hence the same got expressed in the F_2 generation.

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SHORT ANSWER TYPE QUESTIONS (3 marks) [PHYSICS]

66. An object 4 cm in height is placed at 15 cm in front of a concave mirror of focal length 10cm. At what distance from the mirror should a screen be placed to obtain a sharp image of the object? Calculate the height of the image.

Answer:

Given, h_o = +4cm, f = -10cm,
u = -15cm, v=?,h_i= ?
Using the mirror equation.

$$\frac{1}{v}+\frac{1}{u}=\frac{1}{f}$$

$$\Rightarrow \quad \frac{1}{v}+\frac{1}{-15}=\frac{1}{-10}$$

$$\Rightarrow \quad \frac{1}{v}=\frac{1}{-10}+\frac{1}{15}$$

$$\Rightarrow \quad \frac{1}{v}=\frac{(-15+10)}{150}$$

$$\Rightarrow \quad \frac{1}{v}=\frac{-5}{150}$$

$\therefore v = -30cm$

Thus, to obtain a sharp image of the object the screen should be placed in front of the mirror at a distance of 30 cm from the mirror.

Using magnification formula,

$$\Rightarrow \quad \frac{h_i}{h_o}=\frac{-v}{u}$$

$$\text{or,} \quad h_i = \frac{-v}{u} \times h_o$$

$$\Rightarrow \quad h_i = -\left[\frac{-30}{-15}\right] \times 4$$

$$\text{or,} \quad h_i = -2 \times 4 = -8\ \text{cm}$$

$$\therefore \quad h_i = -8cm$$

The image height will be 8cm.

67. (a)What is the basic cause of refraction?
(b) A coin in a glass beaker appears to rise as the beaker is slowly filled with water. Why?

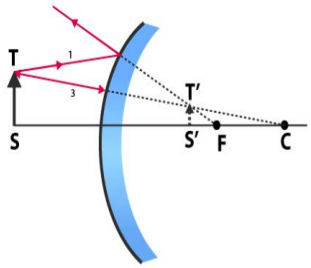
Answer:

(a) The basic cause of refraction is the change in the speed of light in going from one medium to another.
(b) It happens on account of refraction of light. A ray of light starting from the coin goes from water to air and bends away from the normal. Therefore, the bottom of the beaker on which the coin lies appears to be raised.

68. (a) If the image formed by the mirror for all positions of the object placed in front of it is always virtual and diminished, state the type of the mirror.
(b) Draw a ray diagram in support of your answer.
(c) Where are such mirrors commonly used and why?

Answer:

(a) Convex mirror
(b) Ray diagram



(c) Use of convex mirror: As rear view mirrors in vehicles because it gives a wider field of view.

69. (a) What is optical density?
(b)Light enters from air to glass having refractive index 1.50.What is the speed of light in the glass?

Answer:

(a) The ability of a medium to refract light is known as optical density.
(b) Given, Refractive index of glass, n = 1.50
Using the expression,

$$n=\frac{Speed\ of\ light\ in\ vacuum\ (c)}{speed\ of\ light\ in\ medium\ (v)}$$

$$V = \frac{c}{n}$$

$$= \frac{3 \times 10^8}{1.5}$$

$$= 2 \times 10^8\ \text{m/s}$$

70. (a) Define 1 dioptre of power of a lens.
(b) A doctor has prescribed a corrective lens of power + 1.5 D. Find the focal length of the lens. Is the lens converging or diverging?

Answer:

(a) 1 dioptre is the power of a lens whose focal length is 1m.
(b) Given, Power (P) = +1.5 D
Using the expression,

$$P = \frac{1}{f}$$

$$f = \frac{1}{P}$$

$$f = \frac{1}{1.5}$$

$$f = 0.66 \text{ m}$$

The lens is a converging lens

71. Distinguish between concave and convex lenses (State any 3 points).

Answer:

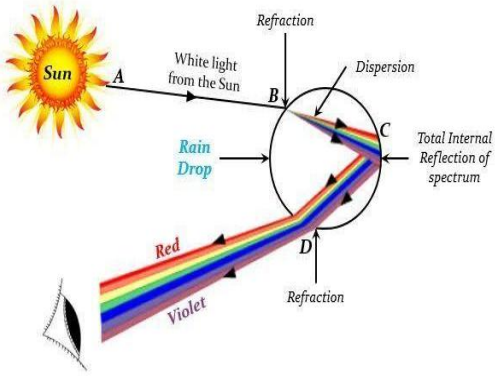
Concave lens	Convex lens
(i) It is called diverging lens	(i) It is called converging lens.
(ii) This lens is thinner in the centre than at its edges	(ii) This lens is thicker at the centre than at its edges
(iii) The principal focus is virtual	(iii) The principal focus is real.
(iv) The focal length is negative	(iv) The focal length is positive.
(v) This lens is used to correct myopia	(v) This lens can be used to correct hypermetropia.

72. What is a rainbow? With the help of a diagram, explain the formation of a rainbow.

Answer:

A rainbow is a natural spectrum appearing in the sky after a rain shower.

A rainbow is caused by dispersion of sunlight by tiny water droplets present in the atmosphere. The water droplets act like small prisms. They refract and disperse the incident sunlight, then reflect it internally, and finally refract it again when it comes out of the raindrop.



73. A person cannot see nearby objects clearly but can see distant objects properly.
a) Name this defect of vision.
b) State one cause of this defect.
c) Which type of lens is used to correct it?

Answer:

a) Hypermetropia (long-sightedness).
b) Eyeball too short or insufficient curvature of eye lens
c) Convex (converging) lens.

74. A student observes that the Sun appears reddish during sunrise and sunset.
a) Name the phenomenon responsible for this.
b) Explain why the Sun appears red at that time.
c) Which colour has the maximum scattering in the atmosphere?

Answer:

a) Atmospheric scattering of light.
b) Sunlight travels a longer distance in the atmosphere; shorter wavelengths scatter away leaving mostly red light.
c) Violet/blue light.

75. (a)What is the far point and near point of the human eye with normal vision?
(b)A student has difficulty reading the blackboard while sitting in the last row. What could be the defect the child is suffering from? How can it be corrected?

Answer:

(a) The near point of the eye is the minimum distance of the object from the eye, which can be seen distinctly without strain. For a normal human eye, this distance is 25 cm.
The far point of the eye is the maximum distance to which the eye can see objects clearly. The far point of the normal eye is infinity.
(b) The child is suffering from myopia. This is defect is corrected by using spectacles fitted with concave lenses.

76. What is meant by scattering of light? Use this phenomenon to explain why the clear sky appears blue.

Answer:

The phenomenon, in which a part of the light incident on a particle is redirected in different directions, is called the scattering of light.

The blue colour of the sky is due to the scattering of sunlight by the molecules of the atmosphere.

The light of shorter wavelength (blue) of the visible spectrum is scattered more than the light of longer wavelength by the atmospheric particles. When we look at the sky, the scattered light enters our eyes, which majorly contains blue colour and hence the sky appears blue.

77. What is atmospheric refraction? Explain the reason as to why stars appear to twinkle.

Answer:

The refraction of light caused by the earth's atmosphere due to change in the refractive indices of different layers is known as atmospheric refraction.

Stars are distant point sized sources of light. The path of the rays of light coming from the star goes on varying slightly due to the atmospheric refraction. Thus, the apparent position of the stars fluctuates and the amount of star light entering the eye flickers, giving the twinkling effect.

78. Why are electrical appliances connected in parallel in homes? Give three reasons.

Answer:

Electrical appliances are connected in parallel in homes due to the following advantages:

1. Same voltage across all appliances.
2. Independent operation.
3. If one device fails, others still work.

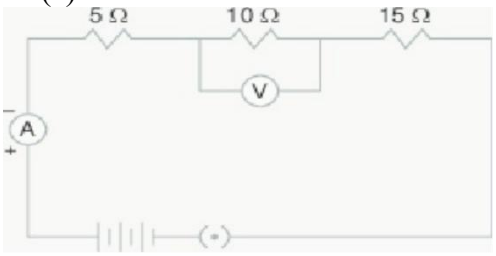
79. Three resistors of 5Ω, 10Ω and 15Ω are connected in series and the combination is connected to a battery of 30 V. An ammeter and a voltmeter are also connected in the circuit.

(a) Draw a circuit diagram to connect all the devices in proper correct order.

(b) What is the current flowing through the circuit?

Answer:

(a)



(b) Given, V = 30 v

$R_s = R_1+R_2+R_3 = 5 + 10 + 15 = 30\ \Omega$

$$\text{So, } I = \frac{V}{R_s} = \frac{30}{30} = 1A$$

80. A wire of length l and area of cross-section A was drawn into a wire of double its length by melting it. If its original resistivity and resistance were ρ and R respectively what will be its new resistivity and resistance?

Answer:

We know, $R = \rho\frac{l}{A}$

When wire is doubled by melting, its length would become double (2l) and area of cross-section would be $\frac{A}{2}$.

Thus, the new resistance is

$$R' = \frac{2\rho l}{\frac{A}{2}} = \frac{4\rho l}{A} = 4R$$

(Since, $= \rho\frac{l}{A}$)

Therefore, the new resistance of the wire is 4 times the original resistance. As resistivity of a material is the characteristic of a given material, hence it remains unchanged.

81. (a) Name and define S.I. unit of resistance.

(b)Calculate the resistance of a resistor if the current flowing through it is 200 mA when the applied potential difference is 0.8 V.

Answer:

(a) The SI unit of resistance is ohm.

Definition: 1 Ohm is the resistance offered by conductor when the current passing through it is one

ampere and the potential difference across its ends is one volt.

(b) Given,

Current (I) = 200 mA= 200×10^{-3}A

= 0.2 A

Potential Difference (V) = 0.8 V

By Ohm's law, V= IR

$\Rightarrow R = \frac{V}{I}$

$\Rightarrow R = \frac{0.8}{0.2} = \frac{8}{2} = 4\Omega$

82. (a) State Ohm's law. Write the mathematical expression.

(b) When a 12 V battery is connected across an unknown resistor, there is a current of 2.5 mA in the circuit. Find the value of the resistance of the resistor.

Answer:

(a) Ohm's law: "The potential difference, V, across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it, provided its temperature remains the same".

The mathematical expression is

V = IR, where V is the potential difference, I is the current and R is the resistance of the conductor.

(b) Given,

Potential difference (V) = 12 V

Current (I) = 2.5 mA = 2.5×10^{-3} A

Resistance (R)=?

Using, V = IR

$R = \frac{V}{I}$

$R = \frac{12}{2.5\times10^{-3}}$

$R = 4800$ ohm

83. Why is Tungsten used almost exclusively for filament of electric lamps?

Answer:

Tungsten is used for making filament of electric bulbs due to the following reasons:

i) It has a high melting point.

ii) It has high resistivity

iii)It does not oxidize easily even at high temperatures.

84. Name the rule to determine the direction of a (i) magnetic field produced around a straight conductor carrying current

(ii) force experienced by a current carrying straight conductor placed in a magnetic field which is perpendicular to it and also state the rule.

Answer:

(i) Right- Hand Thumb Rule

(ii)Fleming's Left- Hand Rule

Fleming's Left- Hand Rule states that: Stretch the forefinger, central finger and the thumb of your hand mutually perpendicular to each other. If the forefinger indicates the direction of magnetic field and the central finger indicates the direction of current, then the thumb gives the direction of the force acting on the conductor.

85. What is the purpose of the soft iron core used in making an electromagnet? Give one use.

Answer:

The purpose of soft iron core used in making an electromagnet is that

(i) It loses all its magnetic property, i.e., magnetism immediately when the current in the solenoid is switched off

(ii)It increases the magnetic field strength of an electromagnet.

Use: It is used to magnetise steel bars.

86. What is the role of magnetism in medicine?

Answer:

In our body, small electric current travels along the nerve cells due to ions. This current produces a very weak magnetic field (about one billionth time weaker than the earth's magnetic field). Heart and brain are two main organs where the magnetic field produced is significant. The magnetic field in our body enables us to obtain the images of different body parts. This is done using a technique called Magnetic Resonance Imaging (MRI). Analysis of these images helps in medical diagnosis. Thus, magnetism has got important uses in medicine.

87. What is earthing? Why is earthing of electrical appliances necessary?

Answer:

When the body of an electrical device is connected to the earth (zero potential) by a wire, it is called earthing.

The metallic body of appliances is connected to the earth wire, which provides a low resistance conducting path for the current. Thus, it ensures that any leakage of current to the metallic body keeps its potential to that of the earth and the user may not get a severe electric shock.

88. (a)Of what substance is a fuse wire made of and why is it made?
(b)What is the capacity of an electric fuse used in lighting circuits and power circuits?

Answer:

(a) It is made of lead (75%) and tin (25%) alloy. It is made of tin- lead alloy because it has a low melting point.

(b) Lighting circuit- 5 A.
Power circuit- 15 A.

89. What is meant by solenoid? How does a current carrying solenoid behave?

Answer:

A coil of many circular turns of insulated copper wire wound on a cylindrical insulating body, such that its length is greater than its diameter is called solenoid.

When current is flowing through the solenoid, the magnetic field lines pattern resembles exactly those of a bar magnet with the fixed polarity North and South pole at its ends and it acquires the directive and attractive properties similar to bar magnet. Hence, the current carrying solenoid behaves like a bar magnet.

90. During an experiment with a concave mirror, a student finds a position where no distinct image can be obtained on a screen held in front of the mirror, but an enlarged image can be seen by looking directly inside the mirror. Identify the object's position and explain why it behaves this way.

Answer:

The object is placed between the pole (‘P’) and the principal focus (‘F’) of the concave mirror. When an object is placed between ‘P’ and ‘F’, the reflected rays diverge and never meet in front of the mirror, meaning a real image cannot be cast on a screen. Instead, the rays appear to diverge from a point behind the mirror, creating a virtual, erect, and enlarged image that can only be seen by looking into the mirror itself.

91. An astronaut standing on the surface of the Moon looks up at the sky during daytime. Explain what colour the sky will appear to them and why, contrasting this with an observer on Earth.

Answer:

The sky will appear pitch black to the astronaut on the Moon, even during the daytime.

The blue colour of Earth's sky is due to atmospheric refraction and the scattering of sunlight by gas molecules and fine particles in the atmosphere. Since the Moon has no atmosphere, there are no particles to scatter light. Without the scattering of shorter wavelengths (blue light), the sky appears dark, similar to what high-altitude passengers or astronauts experience.

92. How do ciliary muscles dynamically alter the focal length of the eye lens when you switch from looking at a distant bird in the sky to reading a text message on your mobile phone?

Answer:

When viewing distant objects, the ciliary muscles are relaxed. This causes the eye lens to become thin, which increases its focal length and allows parallel light rays from afar to focus precisely on the retina.

When shifting to a nearby object, the ciliary muscles contract. This action increases the curvature of the eye lens, making it thicker. Consequently, the focal length decreases, allowing the highly diverging rays from the nearby

phone to successfully focus on the retina.

93. A student connects too many high-power electrical appliances to a single extension socket in a domestic circuit. Explain the physical phenomenon that will occur in the circuit, its immediate hazard, and how a safety device prevents damage.

Answer:

Connecting too many appliances to a single socket causes overloading. The total current drawn from the mains drastically increases as appliances in a domestic circuit are connected in parallel.

The exceptionally high current causes excessive heating in the copper connecting wires, which can melt their insulation covers and potentially trigger a fire.

An electric fuse connected in series will safeguard the circuit. The excessive current heats the fuse wire beyond its melting point, causing it to melt and break the circuit, instantly stopping the flow of dangerous current.

94. A student notes that the absolute refractive index of kerosene is 1.44 and that of water is 1.33. Yet, when kerosene is poured into water, it floats on top. How can you explain this discrepancy between optical density and mass density?

Answer:

Optical density and mass density are two distinct concepts and do not necessarily depend on each other. Kerosene floats on water because its mass density is less than that of water.

However, a medium with a larger refractive index is considered an optically denser medium. Since the refractive index of kerosene (1.44) is higher than that of water (1.33), kerosene is optically denser than water despite being lighter in terms of mass density.

95. Explain why the physical duration of daylight on Earth is roughly 4 minutes longer than it would be if Earth had no atmosphere.

Answer:

Due to atmospheric refraction, starlight and sunlight bend towards the normal as they pass through layers of gradually increasing refractive index. This allows the Sun to be visible to us about 2 minutes before it actually crosses the horizon (advanced sunrise) and keeps it visible for about 2 minutes after it has physically set below the horizon (delayed sunset). Adding these two segments yields an extra 4 minutes of daylight.

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SECTION D
LONG ANSWER TYPE QUESTIONS
(4 marks)
[CHEMISTRY]

1 (i) List four observations that help us to determine whether a chemical reaction has taken place.
(ii) State one basic difference between a physical change and a chemical change.

Answer:

(i) Four observations are:
(a) Evolution of gas.
(b) Change in temperature.
(c) Change in state.
(d) Change in colour.
(ii) In physical change, no new substance is formed, whereas in a chemical change, new substance(s) is/are formed.

2 (i) What is the role of an oxidising agent in a reaction?
(ii)Why is a combustion reaction an oxidation reaction?
(iii)Why are food particles preferably packed in aluminium foil?

Answer:

(i) The role of oxidising agent in a reaction is that it supplies the oxygen or removes the hydrogen in the reaction.
(ii) A combustion reaction is also an oxidation reaction because oxygen is added to the substance during burning.
(iii) Food particles are preferably packed in aluminium foil because it does not corrode in the atmosphere. A protective coating of aluminium oxide is formed on the surface of the foil and it stops any further reaction of the metal with air and water so even if it is kept for a long-time food particles do not get spoiled.

3. (i) Why do silver articles turn black when kept in the open for a few days. The article when rubbed with toothpaste again starts shining.
(ii) Name the black substance Formed and write its chemical formula.

Answer:

(i) Metals such as silver are attacked by air, moisture, acids, gases etc. present in air and form undesirable compounds on their surfaces. Silver tarnishes and gets black coating. This process is called corrosion.
(ii) The black substance is formed because silver reacts with H_2S present in air to form silver sulphide (Ag_2S). Toothpaste generally contains traces of hydrogen peroxide as one of the constituents. It reacts with black Ag_2S formed on the surface and restores whiteness.

4. (i) Why do we store silver chloride in dark coloured bottles? Explain in brief.
(ii) Write the balanced chemical equation for the following reaction and write the name of the reaction
$BaCl_2+Al_2(SO_4)_3 \rightarrow BaSO_4+AlCl_3$

Answer:

(i) Silver chloride on exposure to sunlight may decompose as per the following reaction:
$2AgCl \rightarrow 2Ag + Cl_2$.
Therefore, it is stored in dark-coloured bottles.
(ii)
$3BaCl_2+Al_2(SO_4)_3 \rightarrow 3BaSO_4+2AlCl_3$
It is a double displacement reaction.

5. Aluminium reacts with hydrochloric acid to form aluminium chloride and hydrogen gas
(i) Write the balanced chemical equation for the reaction
(ii) Identify the type of reaction
(iii) Explain why this reaction is also a redox reaction
(iv) What happens if dilute hydrochloric acid is replaced with concentrated acid

Answer:

(i) $2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$
(ii) Type of reaction: single displacement reaction, also a redox reaction
(iii) Aluminium loses electrons (oxidation) $Al \rightarrow Al^{3+}$. Hydrogen ions gain electrons (reduction) $H^+ \rightarrow H_2$. So, oxidation and reduction happen together.
(iv) the reaction becomes vigorous. More hydrogen gas is released quickly. It may also produce more heat (exothermic reaction)

6. Give reasons why:

(i) Tap water conducts electricity whereas distilled water does not.
(ii) Dry hydrogen chloride gas does not turn blue litmus red whereas dilute hydrochloric acid does.
(iii) During summer season a milkman usually adds a very small amount of baking soda to fresh milk.
(iv) Ammonia is a base but does not contain hydroxyl groups.

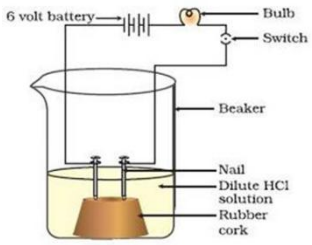
Answer:

(i) Tap water contains ions which conduct electricity whereas distilled water does not contain ions.
(ii) Dry HCl does not form ions but HCl in aqueous solution ionizes to form H^+ and Cl^-.
(iii) Baking soda is basic. It neutralizes lactic acid formed in milk, so milk does not turn sour quickly.
(iv) Ammonia dissolves in water to form OH^-. Therefore, it is basic.

7. (i) Which element is common to all acids?
(ii) Compounds such as alcohol and glucose also contain hydrogen but are not categorised as acids. Describe an activity to prove it.

Answer:

(i) Hydrogen is the common element present in all acids
(ii) Experiment – Two nails are fitted on a cork and are kept in a 100 ml beaker. The nails are then connected to the two terminals of a 6-volt battery through a bulb and a switch. Now pour some dilute HCl in the beaker and the current is switched on. The same experiment is then performed with glucose solution and alcohol solution.



Observations: It will be observed that the bulb glows in the HCl solution and does not glow in the glucose solution and alcohol solution.
Result: HCl dissociates into H^+ and Cl^- ions. These ions conduct electricity in the solution resulting in the glowing of the bulb. On the other hand, the glucose and alcohol solution does not dissociate into ions. Therefore, it does not conduct electricity.
Conclusion: From this activity, it can be concluded that all acids contain hydrogen but not all compounds containing hydrogen are acids. That is why, although alcohols and glucose contain hydrogen, they are not categorised as acids

8. Three substances are tested solid NaCl, molten NaCl and aqueous NaCl
(i) Which of these will conduct electricity and why?
(ii) Why does solid NaCl not conduct electricity?
(iii) Compare molten and aqueous states in terms of ion movement.
(iv) What general conclusion can you draw about conduction in compounds?

Answer:

(i) Molten and aqueous NaCl conduct electricity
(ii) In solid state ions are fixed in lattice (fixed regular arrangement of particles ions or atoms in a solid) showing no movement
(iii) Molten ions move freely in liquid. Aqueous ions are dissociated and mobile in solution
(iv) Electrical conduction requires free ions, not just presence of ions.

9. Explain the term "amphoteric oxides" and provide examples. Write the balanced chemical equation for the reaction of aluminium oxide with sodium hydroxide and hydrochloric acid.

Answer:

Amphoteric oxides are oxides that can exhibit both acidic and basic properties. They can react with both acids and bases to form salts and water.
Examples of Amphoteric Oxides: Aluminium oxide (Al_2O_3) and zinc oxide (ZnO).
Reaction with Acid: Amphoteric oxides react with acids to form salts

and water. For example, aluminium oxide reacts with hydrochloric acid to produce aluminum chloride and water.

Balanced Chemical Equation for Reaction with Acid:

$Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$

Reaction with Base: Amphoteric oxides also react with bases to form salts and water. For instance, aluminium oxide reacts with sodium hydroxide to produce sodium aluminate and water.

Balanced Chemical Equation for Reaction with Base:

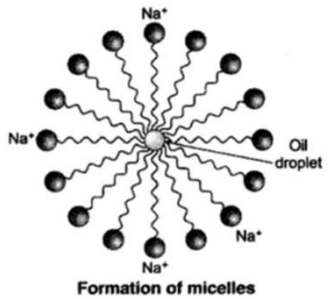
$Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + 2H_2O$

10. (a) Explain the mechanism of the cleansing action of soap.
(b) Why are detergents better cleansing agents than soaps?

Answer:

(a) A soap molecule has two parts:
(i) Ionic part (hydrophilic)
(ii) Long hydrocarbon chain part (hydrophobic)

Most dirt is oily in nature and oil does not dissolve in water. The ionic end of soap interacts with water while the carbon chain interacts with oil. The soap molecules thus form structures called micelles where one end of the molecule is towards the oil droplet while the ionic end faces outside. This forms an emulsion in water. The soap micelle thus helps in pulling out the dirt in water and we can wash our clothes clean.



Formation of micelles

(b) Detergents can be used in hard water for washing as they do not form insoluble precipitates with calcium and magnesium ions present in hard water. Soaps form scums that stick to the fabric and makes cleaning difficult and a lot of soap is wasted. Hence, soaps are not effective cleansing agents in hard water.

11. (a) What is saponification? Write the reaction involved in this process.
(b) Why is the conversion of ethanol to ethanoic acid an oxidation reaction?

Answer:

(a) Alkaline hydrolysis of an ester to give the salt of the corresponding acid and the alcohol is called saponification. It is the reverse of esterification reaction.

$CH_3COOC_2H_5 + NaOH \rightarrow C_2H_5OH + CH_3COONa$

(b) The reaction showing the conversion of ethanol to ethanoic acid is shown below:

$$CH_3 - CH_2OH \xrightarrow[\text{Or acidified } K_2Cr_2O_7 + \text{Heat}]{\text{Alkaline } KMnO_4 + \text{Heat}} CH_3COOH$$

A molecule of ethanol contains one oxygen atom while that of ethanoic acid contains two oxygen atoms. Since oxidation involves addition of oxygen there for conversion of ethanol to ethanoic acid is an oxidation reaction.

12. Catenation is the ability of an atom to form bonds with other atoms of the same element. Both Carbon and silicon exhibit it. Compare the ability of catenation of the two elements. Give reasons.

Answer:

Catenation is the ability of an atom to bond with other atoms of the same element. Both carbon and silicon demonstrate this property, but there are key differences in their abilities:

Reactivity: Silicon compounds tend to be more reactive compared to those of carbon.

Stability: Carbon forms very strong bonds, making its organic compounds more stable than silicon compounds.

Catenation Strength: Overall, carbon exhibits better catenation due to its ability to form stable, long chains. In summary, while both elements can catenate, carbon's stronger bonds lead to greater stability in its compounds.

13. Under what conditions an oxidation reaction can be called a combustion reaction? Illustrate your answer with examples.

Answer:

When complete oxidation of fuel takes place with the release of a high amount of heat and light, it is called a combustion reaction. It is highly exothermic and generally accompanied by evolution of heat and light.

Examples – Burning of coal

$C + O_2 \rightarrow CO_2 + heat + light$

Burning of the rocket fuel (liquid H_2)

$2H_2 + O_2 \rightarrow 2H_2O + heat + light$

Burning of acetylene used in welding torches.

$2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O + heat + light$

14. (a) You have three unlabelled test tubes containing ethanol, ethanoic acid and soap solution.

Explain the method you would use to identify the compounds in different test tubes by chemical tests using litmus paper and sodium metal.

(b) Give the reason for the formation of scum when soaps are used with hard water.

Answer:

(a) Ethanol will not be affected by blue litmus as well as red litmus paper.

Ethanoic acid will turn blue litmus red whereas red litmus will remain as it is.

Soap solution will turn red litmus blue but blue litmus will remain as it is.

Sodium metal will liberate hydrogen gas with ethanol as well as ethanoic acid.

Soap solution will not react with sodium metal.

(b) It is because soap will react with Ca^{2+} and Mg^{2+} ions present in hard water to form calcium salts of fatty acids which are insoluble and called scum.

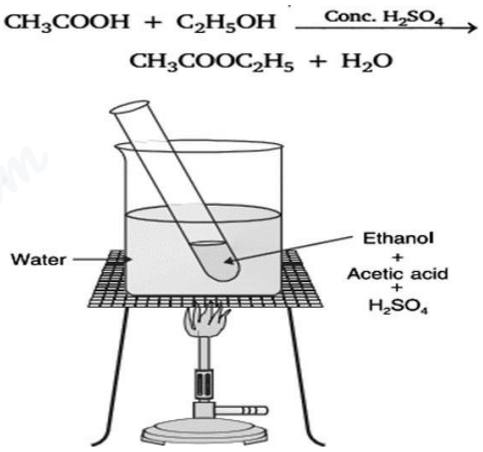
15. Esters are sweet smelling substances and are used in the making of perfumes. Suggest some activity and the reaction involved for the preparation of an ester with neat labelled diagram?

Answer:

The following activity can be used for the preparation of Ester:

Let us take 10ml absolute ethanol(100%) and10ml absolute glacial acetic acid (100%) along with few drops of sulphuric acid in a test tube. The mixture is to be warmed in a water-bath for five minutes. The mixture is poured into a beaker containing 20-50ml of water and smelling the resulting mixture. A fruity smell will be detected due to the formation of an ester

$CH_3COOH + CH_3CH_2OH \rightarrow CH_3COOC_2H_5 + H_2O$



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LONG ANSWER TYPE QUESTIONS
(4 marks)
[BIOLOGY]

16. Write two different ways in which glucose is oxidised to provide energy in human body. Write the products formed and mention the amount of energy in the form of ATP in each case.

Answer:

(i) In the presence of oxygen (aerobic respiration)

$$\text{Glucose} \xrightarrow[\text{(In cytoplasm)}]{} \text{Pyruvate} + \text{Energy}$$

$$\xrightarrow[\text{(In mitochondria)}]{\text{(Presence of oxygen)}} 6CO_2 + 6H_2O + \text{Energy}$$

(ii) In the lack of oxygen (lactic acid fermentation)

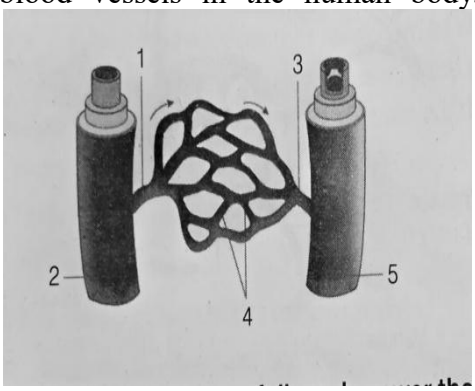
$$\text{Glucose} \longrightarrow \text{Pyruvate} + \text{Energy}$$

$$\xrightarrow[\text{(In muscle cells)}]{\text{(Lack of oxygen)}} \underset{\text{(2 molecules)}}{\text{Lactic acid}} + \text{Energy}$$

Glucose is utilized in our body depending on oxygen availability.

In aerobic respiration, 38 ATP molecules of energy from one molecule of glucose is generated while 2 ATP molecules of energy released in lactic acid fermentation.

17. Given below is the diagrammatic representation of certain types of blood vessels in the human body.



Observe the diagram carefully and answer the questions on the basis of understanding of the diagram and related studied concepts.

i) What do the parts labelled as 1 – 5 state about the types of blood vessels?

ii)What will happen if arteries are superficially located?

Answer:

(i) 1. Arteriole 2.Artery 3.Venule 4.Capillaries 5. Vein

(ii) If the arteries are located superficially then there will be high possibility of their damage that could lead to a lot of blood loss. To prevent this possible damage and blood loss, arteries are deep-seated in the body.

18. How is the mode of action of heart beat different from reflex action? Give any four points.

Answer:

Beating of heart	Reflex action
1. It is an involuntary action which is not controlled by our will.	Reflex action is the sudden action in response to something.
2. It does not need any kind of stimulus to work.	It requires a stimulus for its action.
3. Its actions are regulated by the brain.	This action is regulated by the spinal cord.
4. It does not involve skeletal muscles.	It involves skeletal muscles.
5. This action is performed throughout one's life.	This action is produced in response to an event of emergency.
6. This action may be quick or slow.	Reflex action is always quick.

19. Why do we call pituitary gland as "the master gland"? Where is it located and what is its function?

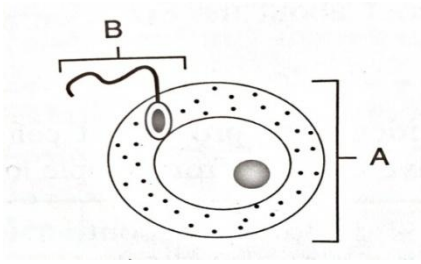
Answer:

The pituitary gland secretes a number of hormones that regulate various functions of the body.

It also controls the functioning of the other endocrine glands, hence called the master gland.

Pituitary gland is located just below the hypothalamus at the base of the brain. Pituitary gland secretes growth hormone which stimulates growth in all organism.

20. The diagram below represents two reproductive cells A and B. Study the same and then answer the questions that follow:

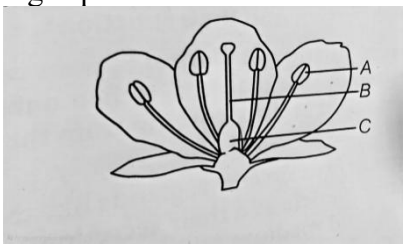


i) Identify the reproductive cells A and B.
ii) Name the specific part of the reproductive system where the above cells are produced.
iii) Where in the female reproductive system do these cells unite?
iv) Name the main hormones by a male reproductive organ and a female reproductive organ.

Answer:

i) A is Egg or Ovum and B is sperm.
ii) Ovary produces egg and Testis produces sperm.
iii) In the fallopian tube.
iv)Testis produces testosterone hormone and ovary produces oestrogen hormone.

21. i) Name the parts A,B and C shown in the following diagram and state one function of each.
ii) What is the role of petals in an angiospermic flower?



Answer:

i) A is anther. Its function is to produce pollen grains which contain the male gametes.
B is style. It connects the stigma and the ovary.
C is ovary. It contains ovules which develop into seeds while ovary forms the fruit.
ii) The primary function of the petals is to attract pollinators such as bees, butterflies, birds and bats to facilitate plant reproduction.

22. A trait may be inherited, but may not be expressed. Justify the statement with the help of a suitable example.

Answer:

Let us take the following example to justify the above statement. Mendel crossed tall pea plants with dwarf pea plants.
Pure Tall plant(TT) × pure dwarf plant(tt) ——> TtTtTtTt (F1 – generation)
Selfing of F1, Tt × Tt——>TTTtTttt (F2 – generation).
Mendel observed that F1 generation contained all tall plants with genotype Tt where 'T' represents a dominant trait and 't' represents a recessive trait.
When F1 generation underwent selfing, the trait that was unexpressed (dwarf) in F1 generation was observed in some F2 progeny. Thus, both traits, tall and dwarf were expressed in F2 generation in the phenotypic ratio of 3:1.

23. State the function of renal artery, kidney, ureter and urinary bladder

Answer:

Renal artery – Afferent arterioles of renal artery supplies blood containing body waste to glomerulus for filtration.
Kidney – produces urine
Ureter – passes the urine from kidney to urinary blood
Urinary bladder — stores the urine until the pressure of the expanded bladder leads to the urge
to pass it out through the urethra

24. (a) Name two excretory products other than oxygen and carbon dioxide in plants
(b)Why do the walls of a trachea not collapse when there is less air in it?
(c) How are the lungs designed in human beings to maximise the area for exchange of gases?

Answer:

(a) Resins, Gums.
(b) The walls of trachea do not collapse when there is less air in it as it is supported by rings of soft bones of cartilage.
(c) In the lungs, the air passage divides into smaller tubes called bronchi which forms bronchioles.

The bronchioles terminate in balloons like structures called alveoli. The alveoli present in the lungs provides maximum surface for exchange of gases. The alveoli have very thin walls and contain an extensive network of blood vessels to facilitate exchange of gases.

25. What different strategies plants use for excretion?

Answer:

i) Oxygen is eliminated mainly through stomata during the day by diffusion

ii) They get rid of excess water by transpiration

iii) Water products may be stored in leaves that fall off

iv) Some waste products are stored as raisins and gums especially in old xylem

v) Plants also excrete some waste substances into the soil around them

26. (a) How is the process of transpiration useful to plants

(b) Which mechanism plays an important role in transportation of water in plants

(i) during day time

(ii) at night

Answer:

(a)Transpiration, the process of water evaporation from plants, is useful to plants

i) because it helps in the absorption and upward movement of water and dissolved minerals from roots to leaves, cools the plant, and provides turgidity to soft plant parts.

ii) It also aids in the distribution of water and nutrients throughout the plant and helps in regulating temperature of leaves.

(b) (i) During daytime, suction pressure created by transpiration (evaporation of water)helps in the absorption and upward movement of water and minerals dissolved in it from roots to the leaves up to the top of the plant.

ii) At night, the effect of root pressure (created by the movement of water from the soil to the xylem of roots) in transport of water plays a more significant role.

27. Why are budding, fragmentation and regeneration considered as asexual type of reproduction? With neat diagram explain the process of regeneration in Planaria.

Answer:

Reproduction by which off spring arise from a single celled organism, and inherit the genes of that parent only, and does not involve fusion of gametes is known as a sexual reproduction.

Budding, fragmentation and regeneration are considered as asexual types of reproduction because all of them involve only single parent unlike sexual reproduction and no formation of gametes.

Regeneration in Planaria:



Here the body of Planaria cut into pieces and each piece has the ability to grow into new organism. In the figure above Planaria body is cut into three pieces which regenerates into three individual cells. The cells proliferate (multiplying or increasing in number) and make large number of cells. The mass of cells formed, different cells undergo changes to become various cell types and tissues. These changes take place in an organised sequence referred to as development

28. In the following crosses write the characteristics of the progeny:

Cross	Progeny
i) RRYY X RRYY Round yellow Round yellow	?
(ii) RrYy X RrYy Round yellow Round yellow	?
(iii)rryy X rryy Wrinkled green wrinkled green	?
(iv) RRYY X rryy Round yellow wrinkled green	?

Answer:

(i) Round yellow
(ii) Round yellow, round green, wrinkled yellow, wrinkled green
(iii) Wrinkled green.
(iv) Round yellow.

29. What are decomposers? What will be the consequence of their absence in an ecosystem?

Answer:

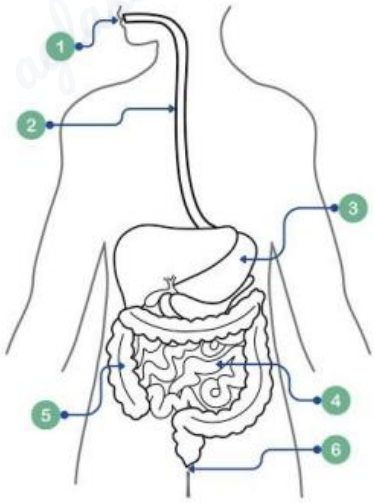
Decomposers are micro-organisms such as bacteria and fungi that obtain nutrients by breaking down the remains of dead plants and animals.
In the absence of decomposers recycling of materials will not take place which would lead to the accumulation of dead plants and animals in the environment. Additionally, the environment would be finally sapped of all its resources which are needed to maintain and sustain life.

30. Write one important function for each of the following in the human respiratory system:
i) Rings of cartilage
ii) Alveoli
iii) Haemoglobin
iv) lining of mucus.

Answer:

i) The rings of cartilage ensure that the trachea does not collapse.
ii) Alveoli or the air sacs increase the surface area for exchange of gases in the lungs.
iii) Haemoglobin is the respiratory pigment present in the red blood cells which take up oxygen from the air in the lungs and carries it to all the other cells in the body.
iv) Mucus along with the fine hair are present in the nostrils which help to clean the air that enters the lungs.

31. a) Label the parts in the diagram given below

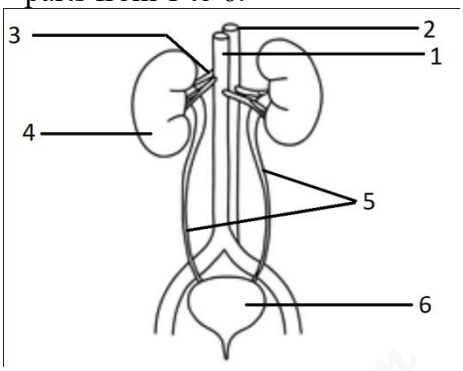


b) Name the substance that is secreted from the liver and give its function.

Answer:

a) 1 - mouth, 2- oesophagus, 3-stomach, 4-small intestine, 5- large intestine, 6-anus.
b) The substance that is secreted from the liver is bile juice and the function is emulsification of fat and making the medium alkaline.

32. (a) In the given diagram name the parts from 1 to 6.



(b) Name the two major components of normal human urine

Answer:

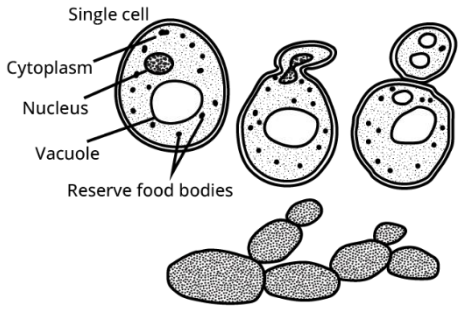
a) 1- vena cava, 2- aorta, 3- renal vein, 4- kidney, 5- ureters, 6- urinary bladder.
b) The two major components of normal human urine are water and nitrogenous wastes.

33. Describe budding in yeast, a fungus.

Answer:

Organisms such as yeast use asexual reproduction processes known as budding to reproduce new cells. In this process a bud develops as an outgrowth on the parent organism

due to single cell division. The bud gradually grows in size and gets detached from the parent when fully matured and develops into an adult organism, similar to the parent.



34. A blue-coloured flower plant denoted by BB is cross bred with that of white coloured flower plant denoted by bb.
(i) State the colour of flower you would expect in their F_1 generation plants.
(ii) What must be the percentage of white flower plants in F_2 generation if flowers of F_1 plants are self-pollinated?
(iii) What must be the percentage of blue flower plants in F_2 generation if flowers of F_1 plants are self-pollinated?
(iv) State the expected ratio of the genotypes BB and Bb in the F_2 generation.

Answer:

(i)The colour of all the flowers in the F1 generation will be blue.
(ii)The percentage of white flower plants in F_2 generation will be 25
(iii)The percentage of blue flower plants in F_2 generation will be 75.
(iv)The ratio of genotypes BB and Bb in F_2 progeny will be 1:2.

35. (A) In a class of 40 students, a survey was conducted to find out the eating habits of the students. It was found that 27 students are vegetarians and 13 are non-vegetarians. In terms of energy, which students are at an advantageous position (vegetarian or non-vegetarian)?
(B) Categorise the following organisms into producers, herbivores, carnivores and decomposers. Create a three-step food chain from the given organisms. Tree, vulture, grasshopper, bacteria, rabbit, lion, eagle, deer, frog, grass, fungi.
(C) What is the significance of a food chain?

Answer:

A) Vegetarians are generally at a more advantageous position in terms of energy efficiency because they consume food directly from plants, which are primary producers in the food chain. Plants convert solar energy into food, storing the highest amount of energy.
Herbivores (and humans eating plants) consume this energy directly. When humans eat animals (who ate plants), they only receive about 10% of the energy stored by the animal, as most is lost as heat between trophic levels.

B) Producers: Tree, grass
Herbivores: Grasshopper, rabbit, deer
Carnivores: Vulture, lion, eagle, frog
Decomposers: Bacteria, fungi
A three step food chain can be:
Grass → Grasshopper → Frog
or,
Grass →Deer →Lion

C) Food chains are the pathways through which energy and nutrients flow through an ecosystem. They dictate the transfer of sunlight-derived energy from producers (plants) to various levels of consumers, and ultimately to decomposers.

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LONG ANSWER TYPE QUESTIONS
(4 marks)
[PHYSICS]

36. Name the type of mirror used in the following situations:
a) Headlights of a car
b) Rear view Mirror of a vehicle.
c) Solar furnace.
d) Makeup mirror.
Support your answer with suitable reason.

Answer:

(a) For headlights of a car, we use a concave mirror. The light source is held at the focus of the mirror. On reflection, a strong parallel beam of light emerges.
(b) A convex mirror is used as a rear-view mirror, because its field of view is larger, and it forms virtual, erect and diminished images of objects behind.
(c) For a solar furnace, we use a concave mirror. Light from the sun, on reflection from the mirror, is concentrated at the focus of the mirror, producing heat.
(d) A concave mirror is used as a make-up mirror, as it can form an erect and magnified image of the face.

37. (a) What is lateral inversion?
(b) State four characteristics of an image formed by a plane mirror.
(c) Which of the two mirrors is converging: concave or convex?

Answer:

(a) The left side of the object appears as the right side of the image and vice versa in a plane mirror. This phenomenon is called lateral inversion.
(b) The characteristics are:
i) The image formed by a plane mirror is always virtual and erect.
ii) The size of the image is equal to that of the object.
iii)The image formed is as far behind the mirror as the object is in front of it.
iv)The image is laterally inverted.
(c) A concave mirror is a converging mirror.

38. Rishi went to a palmist to show his palm. The palmist used a special lens for this purpose.
(i) State the nature of the lens and reason for its use.
(ii) If the focal length of this lens is 10 cm and the lens is held at a distance of 5 cm from the palm, use lens formula to find the position and size of the image.

Answer:

(i) A palmist uses convex lens to see the magnified image of palm lines.
(ii) Given,
Focal length, f = 10 cm
object distance u = - 5 cm
From lens formula,

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{v} = \frac{1}{10} + \frac{1}{-5}$$

$$\frac{1}{v} = \frac{1}{10} - \frac{1}{5}$$

$$v = -10 \text{ cm}$$

Hence, the magnification

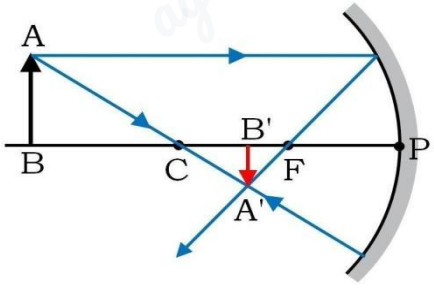
$$m = \frac{v}{u} = -\frac{10}{-5} = 2$$

Hence, the image is on the same side of the lens as the object (palm) and it is virtual, erect and magnified.

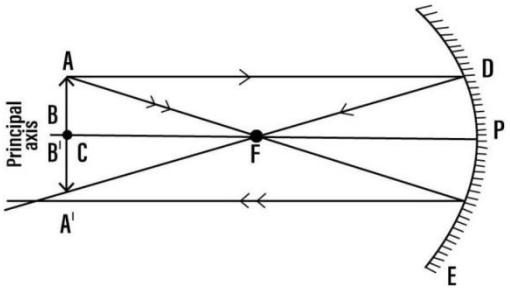
39. Draw a ray diagram to show the formation of image when the object is placed (i) beyond the centre of curvature and (ii) at the centre of curvature of a concave mirror.

Answer:

(i) Position of Object: Beyond C



(ii) Position of Object: At C



40. (a)What is meant by the power of accommodation of an eye?
(b) A person needs a lens of power −5.5 diopters for correcting his distant vision. For correcting his near vision, he needs a lens of power +1.5 diopter. What is the focal length of the lens and the nature of the lens required for correcting (i) distant vision and (ii) near vision?

Answer:

(a) Power of accommodation: The ability of the eye lens to change its focal length to see objects at different distances.
(b) (i) Distant vision (Myopia) requires a concave lens.

$$f = \frac{1}{P}$$

$$f = \frac{1}{-5.5}$$

f = -0.1818 m = -18.18cm

(ii)Near vision (Hypermetropia) \ requires a convex lens.

$$f = \frac{1}{P}$$

$$f = \frac{1}{+1.5}$$

f = +0.6667 m = +66.67 cm

41. A person suffering from cataract has blurred vision.
a) What happens inside the eye in this condition?
b) How does it affect vision?
c) How is this defect corrected?
d) Name the part of the eye involved.

Answer:

a) The eye lens becomes cloudy or opaque.
b) Light cannot pass clearly causing blurred vision.
c) Surgery to remove the cloudy lens and replace it with an artificial lens.
d) Eye lens.

42. During a science experiment, a student passes sunlight through a prism and then recombines the colours using another prism.
a) What does this experiment prove about sunlight?
b) Name the scientist who performed this experiment.
c) What is recombination of light?
d) Write one everyday application of this phenomenon.

Answer:

a) Sunlight is made up of seven colours.
b) Isaac Newton.
c) The separated colours combine again, to form white light.
d) Rainbow formation or spectroscope

43. State the function of the following parts of the eye:
(i) Crystalline lens(ii) Retina (iii) Ciliary muscles (iv) pupil.

Answer:

(i) Crystalline lens- Its function is to focus the images of the objects at different distances clearly on the retina.
(ii) Retina- Its function is to receive the optical image of an object and then convert it into electrical pulses which are finally sent to the brain through the optic nerve.
(iii) Ciliary muscles- Its function is to alter the focal length of the crystalline lens, so that the image of the objects at various distances is clearly focussed on the retina.
(iv) Pupil - The pupil regulates and controls the amount of light entering the eye.

44. Explain the following:
(a) Why are the conductors of electric heating devices such as bread toasters and electric irons made of an alloy rather than a pure metal?
(b)How does the resistance of a wire vary with its cross-sectional area?
(c) Why are copper and aluminium wires usually employed for electricity transmission?
(d) What determines the rate at which energy is delivered by a current?

Answer:

(a) Conductors of electric heating devices are made of alloys because alloys do not oxidise (burn) readily at high temperature. Also, alloys have a greater resistivity as compared to their constituent pure metals.

(b) The resistance of a wire varies inversely as its cross-sectional area ($R \alpha \frac{1}{A}$).

(c) Copper and aluminium wires possess low resistivity and hence are generally used for electricity transmission.

(d) Electric power determines the rate at which energy is delivered by a current.

45. Two conducting wires of the same material and of equal lengths and equal diameters are first connected in series and then in parallel in an electric circuit. What will be the ratio of the heat produced in series and parallel combination?

Answer:

Since both the wires are made of the same materials and have equal lengths and equal diameters, these have the same resistance. Let the resistance be R.

When connected in series, their equivalent resistance is

$R_s = R + R = 2R$

When connected in parallel, their equivalent resistance is

$\frac{1}{R_p} = \frac{1}{R} + \frac{1}{R} = \frac{2}{R}$

$\Rightarrow R_p = \frac{R}{2}$

According to Joules Law of heating,

$H = I^2Rt$

Heat produced in series,

$H_s = I^2R_st$

$= I^2 \times 2R \times t$

Heat produced in parallel, $H_p = I^2R_pt$

$= I^2 \times \frac{R}{2} \times t$

Hence the required ratio is

$$\frac{H_s}{H_p} = \frac{I^2 \times 2R \times t}{I^2 \times \frac{R}{2} \times t}$$

$$\frac{H_s}{H_p} = \frac{I^2 \times 2R \times t \times 2}{I^2 \times R \times t} = \frac{4}{1}$$

$\Rightarrow H_s : H_p = 4 : 1$

46. (a) What is heating effect of electric current?

(b) Name any two devices that work on the heating effect of electric current.

(c) An electric iron of resistance 20 ohm, takes a current of 5A. Calculate the heat developed in 30s.

Answer:

(a) When an electric current is passed through a conductor heat is produced in it. This is known as the heating effect of electric current.

(b) The devices are electric toaster, electric oven, electric kettle, electric heater, electric iron etc. (Any two).

(c)Given,

Resistance (R) = 20 ohm

Current (I) = 5A

Time (t) = 30 s

We know,

Heat developed,

$H = I^2Rt$

$= (5)^2 \times 20 \times 30$

$= 25 \times 20 \times 30 = 15000$ J

Therefore, heat developed in 30 s is 15000J.

47. (a) What is the commercial unit of electrical energy? Represent it in terms of Joules.

(b) Which uses more energy: a 250 W TV set in 1 hour or a 1200 W toaster in 10 minutes?

Answer:

(a) The commercial unit of electrical energy is kilowatt-hour (kWh).

1 KWh = 1000W × 60 s × 60 s

$= 3.6 \times 10^6$ J

(b) Given,

For TV set,

$P_1 = 250$ W, $t_1 = 1h = 3600$ s

For toaster

$P_2 = 1200$ W, $t_2 = 10$ min $= 600$ s

Therefore,

Energy $E_1 = P_1 \times t_1 = 250 \times 3600$

$= 900000$ J

Energy $E_2 = P_2 \times t_2 = 1200 \times 600$

$= 720000$ J

Thus, TV set uses more energy.

48. What are magnetic field lines? Justify the following statements

(a) Two magnetic field lines never intersect each other.
(b) Magnetic field lines are closed curves.

Answer:

Magnetic field line is defined as the path along which the unit North pole (imaginary) tends to move in a magnetic field if free to do so.
(a) The magnetic lines of force do not intersect one another. If they do so then at the point of intersection, two tangents can be drawn at that point indicating there will be two different directions of the same magnetic field, i.e., the compass needle points in two different directions which is not possible.
(b)Magnetic field lines are closed curves. They emerge from the north pole of a bar magnet and go into its south pole. Inside the magnet they move from South Pole to North Pole.

49. (a) What is an electric fuse? How is it connected in a circuit?
(b) What is the direction of the magnetic field at the centre of a circular coil carrying current in
(i) anticlockwise direction and
(ii) clockwise direction?

Answer:

(a) Electric fuse is a safety device that protects our electrical appliances in case of short circuit or overloading. It is made up of pure tin or alloy of copper and tin. It is always connected in series with live wire.
(b) Applying right hand thumb rule
(i) The magnetic field is along the axis of the coil and is acting upward.
(ii)The magnetic field is along the axis of the coil and is acting downward.

50. (a) What is overloading of an electric circuit?
(b) State two conditions that can lead to overloading of a circuit.
(c) How can it be prevented?

Answer:

(a) Overloading of an electrical circuit occurs when the current flowing through the circuit exceeds the maximum capacity that the components in the circuit can handle. This excess current leads to increased heat production due to the resistance in the components, which can potentially damage them.
(b) The conditions are:
i) Connecting multiple appliances to a single socket
ii) Direct contact between live and neutral wire.
(c) Preventive Measures:
i) Too many electrical appliances should not be operated on a single socket.
ii) Too many high power rating electrical appliances should not be switched on at the same time.

51. (a)When does an electric short circuit occur?
(b) An electric oven of 2 kW power rating is operated in a domestic electric circuit (220V) that has a current rating of 5A. What result do you expect? Explain.

Answer:

(a) If the insulation of the live and neutral wire gets damaged, then the two wires touch each other. This touching of the live wire and neutral wire is known as short circuit. In this situation, the resistance of a circuit decreases to a very small value. Due to this, current flowing through the wires becomes very large and heats the wires to a very high temperature, and a fire may be started.
(b) Given,
Power, P = 2 kW = 2000 W
Voltage, V = 220 V
Current, I = ?
We know, $P = V \times I$
$I = \frac{P}{V} = \frac{2000}{220} = 9A$ (approx)
The current drawn by this electric oven is 9A, whereas the fuse in the circuit is only 5A capacity. When a high current of 9A flows through this fuse, the fuse wire will get heated too much and will blow off cutting off the power supply in this circuit.

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Sample Question Paper

(SSLC Examination 2026-27)

SCIENCE

(NCERT Textbook)

By

Meghalaya Board of School Education (MBOSE)

A. The Scheme of Examination

	Maximum Marks	Pass Marks
Theory Examination	80	24
Internal Assessment	20	6
Total	**100**	**30**

B. Scheme of Theory Examination

Section	Type of Questions	Marks for Each Question	No. of questions to be attempted/ No. of questions given	Total Marks
Section-A	Multiple choice Questions (MCQs)	1	30/30	1x30=30
Section-B	Very Short Answer Questions	2	10/14	2x10=20
Section-C	Short Answer Questions	3	6/9	3x6=18
Section-D	Long Answer Questions	4	3/5	4x3=12
80				

C. Scheme of Internal Assessment

Marks for internal assessment can be internally assessed through anyone of the following:

1. Project Work
2. Written Tests
3. Assignments (Class or Home Work)

While assessing, the weightage to different chapters may be given as provided in "D. Content Weightage in Theory Examination".

Different types of Projects Works

- Class/Interclass discussion and debates.
- Preparations of a reports, charts, posters and Diagrams based on lessons.
- Conducting Activities mentioned in the Textbook.

D. Content Weightage in Theory Examination

The chapter-wise weightage shown below is only indicative for the purpose of information of teachers while prioritising different chapters during teaching or assessment. Though the weightage in Theory Examination conducted by MBOSE would broadly follow the following pattern, there may still be some variation.

Syllabus	Marks (80)
Chapter 1: Chemical Reactions & Equations Chapter 2: Acids, Bases and Salts Chapter 3: Metals and Non-metals Chapter 4: Carbon and its Compounds	**26**
Chapter 5: Life Processes Chapter 6: Control and Coordination Chapter 7: How do Organisms Reproduce? Chapter 8: Heredity Chapter 13: Our Environment	**28**
Chapter 9: Light – Reflection and Refraction Chapter 10: The Human Eye and the Colourful World Chapter 11: Electricity Chapter 12: Magnetic Effects of Electric Current	**26**

Sample Question Paper
Science
(NCERT Textbook)
Class-X
Question Paper Code: XY

Time: 3 hours **Max Marks: 80 (Pass Marks: 24)**

General Instructions:

1. Please check that this Question Paper contains 56 Questions.
2. Question Paper Code given above should be written on the Answer Book, in the space provided, by the Candidate.
3. 15 minutes time is given for the candidates to read the Question paper. The Question Paper will be distributed 15 minutes before the scheduled time of the examination. In these 15 minutes, the candidates should only read the instructions and questions carefully and should not write answers on the Answer Sheet.
4. The Question Paper contains 4 sections, Section A, B, C and D.
5. Section-A contains Multiple Choice Questions (MCQ). Choose the most appropriate answer from the given options. The answers to this Section must be provided in the boxes provided in the Answer Sheet. Answers provided anywhere else will not be counted for marking.
6. Section-B contains Very Short Answer Questions. Answer the questions briefly, in not more than 30 (thirty) words.
7. Section-C contains Short Answer Questions. Answer the questions in not more than 50 (fifty) words each.
8. Section-D contains Long Answer Questions. Answer the questions in not more than 70 (seventy) words each.

Section A

Multiple Choice Questions: Attempt ALL Questions. (30x1=30)

1. A chemical equation without balancing is called:
A. Complete Equation
B. Skeletal Equation
C. Ionic Equation
D. Thermo chemical Equation

2. Which of the following is not a decomposition reaction?
A. Burning of food
B. Photosynthesis
C. Digestion of food
D. Photolysis of silver chloride

3. Which of the following is a natural source of citric acid?
A. Spinach
B. Apple
C. Lemon
D. Tomato

4. A student adds water to concentrated acid instead of acid to water. What will happen?
A. No reaction
B. Explosion or splashing
C. Cooling
D. Neutralisation

5. Blue colour Copper Sulphate turns white on heating due to loss of water, but blue colour returns due to:
A. Heat
B. Hydration
C. Evaporation
D. Loss of ion

6. Among the following metals which has the lowest melting point?
A. Tungsten
B. Lead
C. Mercury
D. Potassium

7. Roasting is generally done in case of:
A. Carbonate Ores
B. Oxide Ores
C. Sulphide Ores
D. Silicate Ores

8. An alloy used for making electrical heating element is:

A. Solder
B. Brass
C. Nichrome
D. Bronze

9. Carbon forms large molecules due to:
A. Catenation
B. Allotropy
C. Valency
D. Reactivity

10. The reaction between an organic acid and alcohol forms:
A. Salt
B. Ester
C. Alkane
D. Alkene

11. The function of bile is to:
A. Digest proteins
B. Digest Carbohydrates
C. Emulsify fats
D. Absorb water

12. Which of the following is the site of cellular respiration?
A. Nucleus
B. Ribosome
C. Mitochondria
D. Chloroplast

13. Reflex Actions are controlled by:
A. Brain
B. Spinal Cord
C. Nerves
D. Muscles

14. In a flower, the parts that produce male gametes are:
A. Ovary
B. Filament
C. Style
D. Anther

15. Variation in offspring is important for:
A. Survival of species
B. Digestion
C. Circulation
D. Excretion

16. The study of heredity and variation is called:

A. Ecology
B. Genetics
C. Anatomy
D. Physiology

17. Homozygous means:
A. Same alleles
B. Different alleles
C. No alleles
D. Multiple alleles

18. Which of the two in the following set belongs to the same trophic level:
A. Grass: Grasshopper
B. Goat: Spider
C. Hawk: Rat
D. Frog: Lizard

19. Which of the following is an abiotic component of an ecosystem:
A. Humus
B. Bacteria
C. Plants
D. Fungi

20. Energy flow in an ecosystem is:
A. Cyclic
B. Random
C. Unidirectional
D. Irregular

21. What is the power of a convex lens of focal length 25cm?
A. +2.5 D
B. -4 D
C. +4 D
D. -2.5 D

22. Which mirror is used in rear-view mirrors of vehicles?
A. Concave mirror
B. Plain Mirror
C. Convex Mirror
D. Spherical Mirror

23. The twinkling of stars is due to:
A. Reflection of light by clouds
B. Scattering of light by dust particles
C. Dispersion of light by water droplets
D. Atmospheric refraction of starlight

24. The defect of the eye in which the eye ball becomes too long is:

A. Myopia
B. Hypermetropia
C. Presbyopia
D. Cataract

25. Which quantity is measured in Watts?
A. Voltage
B. Resistance
C. Power
D. Current

26. An electric device in which electrical energy is converted to heat energy in:
A. Generator
B. Bulb
C. Motor
D. Heater

27. At the time of a short circuit, the current in the circuit:
A. Reduces substantially
B. Does not change
C. Increases heavily
D. Vary continuously

28. Electric bells work on:
A. Heating Effect
B. Magnetic Effect
C. Sound Effect
D. Chemical Effect

29. Which defect of vision occurs due to weakening of ciliary muscles in old age?
A. Myopia
B. Hypermetropia
C. Astigmatism
D. Presbyopia

30. When the object is placed between F and 2F of a convex lens, the image formed is:
A. At F
B. At 2F
C. Beyond 2F
D. Between O and F

Section B

Very Short Answer Questions (Any 10) (2x10 = 20 marks)

31. Give one industrial application of combination reaction
32. What are the rules for displacement reaction?
33. What do you understand by olfactory indicators?

34. Name the following:
    a) Any metal which is preserved in kerosene
    b) A lustrous coloured non metal
    c) A metal which can melt when kept on the palm,
    d) A metal, which is a poor conductor of heat.
35. Grace wrote the names of four compounds as the first members of their respective homologous series. - methanol- methanal- methanone- methanoic acid
    (a) Which name has she written incorrectly? Justify your answer.
    (b) What name should she have written instead?
36. What is the role of enzymes in digestion? Name an enzyme present in the saliva.
37. Define aerobic respiration. Where does it occur.
38. What is a reflex action? Give one example.
39. What is binary fission? Give one example.
40. The eyeball of a person has become slightly larger. Which kind of lens should the person wear to correct the defect in the vision caused by this change in the size of the eyeball?
41. To correct myopia, the person should wear a lens that diverges the light rays slightly before they enter the eye, ensuring they focus properly on the retina.
    a. Which liquid fills the space behind the cornea?
    b. Which liquid fills the space between the eye lens and the retina?
42. How does the use of a fuse wire protect electrical appliances?
43. What is meant by magnetic field? List two methods of producing magnetic field

Section C

Short answer type questions (Any 6) (3x6=18 marks)

44. Give three differences between calcination and roasting?
45. What is a homologous series? Give its characteristics.
46. Why do arteries have thick and elastic walls whereas veins have valves? What is the composition of blood?
47. What is meant by trophic level in a food chain? Construct a terrestrial food chain with trophic levels. The energy flow in a food chain is always unidirectional. Why?
48. How is the sex of the child determined in human beings?
49. A convex mirror used for rear-view on an automobile has a radius of curvature of 3.00 m. If a bus is located at 5.00 m from this mirror, find the position, nature and size of the image.
50. Why is tungsten used for making bulb filaments of incandescent lamps? Name any two electric devices based on the heating effect of electric current.
51. State the rule to determine the direction of a
    (i) magnetic field produced around a straight conductor-carrying current,
    (ii) force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it, and
    (iii) Name a device that uses magnetic field and current carrying conductor.

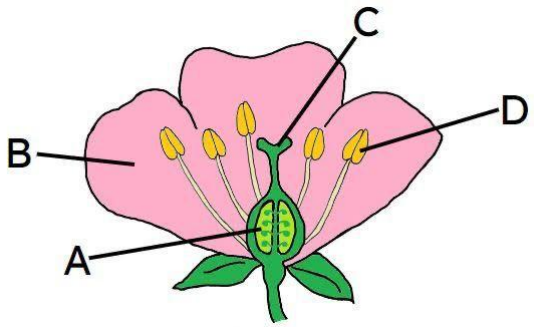
Section D

Long answer type questions (answer any 3) (3x4 marks = 12 Marks)

52. A student is unable to see clearly the words written on the black board placed at a distance of approximately 3 m from him. Name the defect of vision the boy is suffering from. State the possible causes of this defect and explain the method of correcting it.

53. Study the diagram of a flower given below and answer the following questions:
    (a) Label the parts A, B, C, and D.
    (b) Which part produces pollen grains?
    (c) Name the female reproductive part of the flower.
    (d) What is the function of the ovary?

    Diagram (for reference):



54. Why does micelle formation take place when soap is added to water? Will a micelle be formed in other solvents such as ethanol also?

55. a) Name the part that
        i. Produces urine and
        ii. Releases urine to the outside.
    b) What is the main toxic waste kidney filters from blood?
    c) Name any two substances which are selectively reabsorbed from the tubules of a nephron.
    d) Write one function of an artificial kidney.

56. Give Reasons:
    (i) Tap water conducts electricity whereas distilled water does not
    (ii) Dry hydrogen chloride gas does not turn blue litmus red whereas dilute hydrochloric acid does.
    (iii) During summer season a milk man usually adds a very small amount of baking soda to fresh milk
    (iv) Ammonia is a base but does not contain hydroxyl group.

End of Question Paper