

Class 10

Section I

Suggested pedagogical process

The learners maybe provided with opportunities individually / in groups and encouraged to -

Recognize the difference between reactions, such as exothermic and endothermic.

Observes to understand the difference in the temperatures in both the reactions using laboratory thermometer.

Investigate the ways of segregation of waste materials on the basis of their degradation property. They may be encouraged to practice the segregation of waste before disposal at home, school and public places.

Explore the relationship between two physical quantities, such as between potential difference across a conductor and the current through it. Design, conduct and share the findings of an activity

Find out 'why' and 'how' of processes / phenomena, such as transportation in plants and animals, extraction of metals from ores, with the help of activities / experiments / demonstration. The learners may be encouraged to discuss, relate, conclude and explain to process /phenomena to their peers.

Observe diagrams, such as of digestive tract, and names given to various parts. The learners may be motivated to make poster of digestive tract for displaying in school. They may also be provided opportunities to use ICT tools for drawing.

Collect wide variety of graphs from newspapers, magazines, or internet, with a view to understand the information contained therein. The learners may be facilitated to draw a graph, such as v-I graph for analysing the relationship between the potential difference across a conductor and the current through it.

Study how chemical equations are balanced using simple mathematical skills. Discussion may be conducted on the significance of balancing of chemical equations.

Get familiar with new cartesian sign convention using illustrated cards and may be given ample opportunities to apply the sign convention in various situations of reflection by spherical mirrors.

Perform a role-play on ecosystem on a hypothetical situation, such as what will happen if all herbivores suddenly vanish from earth. This may be followed by a discussion about how the loss of biodiversity disrupts the food chain hereby adversely affecting the energy flow in an ecosystem.

Derive equations, formulae, laws, etc., for example the derivation for formula of the equivalent resistance of resistors in series (or parallel). They should be encouraged to practice the derivation till they are confident.

Study the features inherited through genes, such as attached or free earlobes. They may be encouraged to observe and compare the earlobes of their friends with the ear lobes of their parents and grandparents to arrive at the conclusion that characters or traits are inherited in off-springs from their parents.

Collect print and non-print materials by exploring library and internet about scientists and their findings to appreciate how concepts evolved with time. They may be motivated to share their findings by preparing posters and performing role play / skits.

Collect eco-friendly / commonly available materials to design and develop technological devices / innovative exhibits, such as electric motor, soda acid fire extinguisher, respiratory system. They may be motivated to display their exhibits / models in science exhibitions, science club, class- rooms, during parent–teacher meet and to respond to the queries raised during interaction.

Visit classrooms, laboratories, library, toilets, playground, etc. To identify places where wastage of electricity and water may be occurring. Discussion may be held on importance of natural resources and their conservation, leading to the conviction for adoption of good habits in their day to day life. The learners may also organize a sensitization programme on such issues.

Share their findings of the activities / projects / experiments, such as extraction of metals from ores, working of electric motor and generator, formation of rainbow, etc. In oral and written forms. Report writing may be facilitated to share their findings by using appropriate technical terms / figures / tables / graphs, etc. They may be encouraged to draw conclusions on the basis of their observations.

Section II

Learning Outcomes of NCERT

Measuring the Los

The learner -

Differentiates materials / objects / organisms / phenomena / processes, based on, properties / characteristics, such as autotrophic and heterotrophic nutrition, biodegradable and non-biodegradable substances, various types of reactions, strong and weak acids and bases, acidic, basic and neutral salts, real and virtual images, etc.

Explains properties /characteristics in order to differentiate materials / objects /organisms /phenomena /processes.

Classifies materials / objects / organisms / phenomena / processes, based on, properties / characteristics, such as metals and non-metals on the basis of their physical and chemical properties, acids and bases on the basis of their chemical properties, etc.

Describes and interprets properties /characteristics in order to classify materials /objects /organisms / phenomena / processes.

Plans and conducts investigations / experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own, such as investigates conditions necessary for rusting, tests the conductivity of various solutions, compares the foaming capacity of different types of soap samples, verifies laws of reflection and refraction of light, ohm's law, do variegated leaves perform photosynthesis? Which gas is evolved

Plans and conducts investigations /experiments on their own, in order to arrive at facts and in order to verify the principles /phenomena, or in order to seek answers to queries.

during fermentation? Why plants shoot moves towards light?	
Relates processes and phenomena with causes / effects , such as hormones with their functions, tooth decay with pH of saliva, growth of plants with pH of the soil, survival of aquatic life with pH of water, blue colour of sky with scattering of light, deflection of compass needle due to magnetic effect of electric current, etc.	Examines and explains processes and phenomena in order to relate them with causes and effects.
Explains processes and phenomena , such as nutrition in human beings and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.	Explains processes and phenomena in order to relate to science behind the phenomena /processes and develop a keen interest in the science in daily life.
Draws labelled diagrams / flow charts / concept map /graphs , such as digestive, respiratory, circulatory, excretory and reproductive systems, electrolysis of water, electron dot structure of atoms and molecules, flow chart for extraction of metals from ores, ray diagrams, magnetic field lines, etc.	Draws labelled diagrams /flow charts /concept map /graphs to demonstrate knowledge of how the process /structure /relationship works and also to demonstrate the application of different forms of illustrations.
Analyses and interprets data / graph / figure , such as melting and boiling points of substances to differentiate between covalent and ionic compounds, pH of solutions to predict the nature of substances, v-i graphs, ray diagrams, etc.	Analyses data /graph /figures in order to interpret them.
Calculates using the data given , such as number of atoms in reactants and products to balance a chemical equation, resistance of a system of resistors, power of a lens, electric power, etc.	Calculates using the data given, in order to show measurability of scientific postulates and applications of scientific measurement units.
Uses scientific conventions to represent units of various quantities / symbols / formulae / equations , such as balanced chemical equation by using symbols and physical states of substances, sign convention in optics, si units, etc.	Uses scientific conventions in order to represent units of various quantities / symbols /formulae /equations.

<p>Measures physical quantities using appropriate apparatus / instruments / devices, such as pH of substances using different indicators, electric current and potential difference using ammeter and voltmeter, etc.</p>	<p>Selects and uses appropriate apparatus /instruments / devices in order to measure physical quantities.</p>
<p>Applies learning to hypothetical situations, such as what happens if all herbivores removed from an ecosystem? What will happen if all non-renewable sources of energy are exhausted?</p>	<p>Applies learning to given hypothetical situations in order to solve problems /give possible solutions.</p>
<p>Applies scientific concepts in daily life and solving problems, such as takes precautions to prevent sexually transmitted infections, uses appropriate electrical plugs (5 /15a) for different electrical devices, uses vegetative propagation to develop saplings in gardening, performs exercise to keep in good health, avoids using appliances responsible for ozone layer depletion, applies concept of decomposition reaction of baking soda to make spongy cakes, etc.</p>	<p>Applies learning of scientific concepts in daily life in order to solve problems.</p>
<p>Derives formulae / equations / laws, such as equivalent resistance of resistors in series and parallel, etc.</p>	<p>Derives formulae /equations /laws in order to demonstrate mathematical thinking skills and understanding of scientific laws /concepts.</p>
<p>Draws conclusion, such as traits / features are inherited through genes present on chromosomes, a new species originates through evolutionary processes, water is made up of hydrogen and oxygen, properties of elements vary periodically along the groups and periods in periodic table, potential difference across a metal conductor is proportional to the electric current through it, etc.</p>	<p>Analyses interdependencies in order to draw conclusions.</p>
<p>Takes initiative to know about scientific discoveries / inventions, such as Mendel's contribution in understanding the concept of inheritance, Dobereiner for discovering triads of elements, Mendeleev for the development of the periodic table of elements, Oersted discovery that electricity and magnetism are related, discovery of relation between potential difference across a metal conductor and the electric current through it by ohm, etc.</p>	<p>Takes initiative to know about and describes scientific discoveries /inventions in order to compare, contrast, and evaluate their usefulness, particularly in context of the age in which it was discovered /invented and its relevance today.</p>

<p>Exhibits creativity in designing models using eco-friendly resources, such as working model of respiratory, digestive and excretory systems, soda acid fire extinguisher, periodic table, micelles formation, diamond / graphite / Buckminster fullerene, human eye, electric motor and generator, etc.</p>	<p>Designs models using eco-friendly resources in order to exhibit creativity.</p>
<p>Exhibits values of honesty / objectivity / rational thinking / freedom from myth / superstitious beliefs while taking decisions, respect for life, etc. Such as reports and records experimental data accurately, says no to consumption of alcohol and sensitizes others about its effect on physical and mental health, motivates for organ donation, prevents pre-natal sex determination, etc.</p>	<p>Records & reports experimental data objectively and honestly, in order to exhibit values of honesty /objectivity /rational thinking /respect for life and freedom from myths /superstitious /beliefs /etc. while taking decisions.</p>
<p>Communicates the findings and conclusions effectively, such as those of experiment / activity / project orally and in written form using appropriate figures / tables / graphs / digital form, etc.</p>	<p>Uses appropriate figures / tables /graphs /digital form /etc. and records findings of experiment / activity /project in order to communicate effectively, both orally and in written form, the findings and conclusions.</p>
<p>Makes efforts to conserve environment realizing the inter- dependency and interrelationship in the biotic and abiotic factors of environment, such as appreciates and promotes segregation of biodegradable and non - biodegradable wastes, takes steps to promote sustainable management of resources in day to day life, advocates use of fuels which produces less pollutants, uses energy efficient electric devices, uses fossil fuels judiciously, etc.</p>	<p>Realises the interdependency and interrelationship in the biotic and abiotic factors of environment and applies it in order to make efforts to promote conservation of environment.</p>

Section III**Learning Objectives mapped with Learning Outcomes adapted by CBSE**

Chapter No.	Learning Objectives	Learning Outcome
1. Chemical Reactions and Equations	Compare the characteristics of initial & final substances in order to check whether the change is physical or chemical.	Draws conclusion , such as traits / features are inherited through genes present on chromosomes, a new species originates through evolutionary processes, water is made up of hydrogen and oxygen, properties of elements vary periodically along the groups and periods in periodic table, potential difference across a metal conductor is proportional to the electric current through it, etc.
	Relate the substances taking part in the chemical reaction & substances formed in the chemical reaction in order to classify them as reactants & products.	Uses scientific conventions to represent units of various quantities / symbols / formulae / equations , such as balanced chemical equation by using symbols and physical states of substances, sign convention in optics, si units, etc.
	Use chemical symbols & chemical formulae correctly in order to acquire the skill of writing chemical equations.	Calculates using the data given , such as number of atoms in reactants and products to balance a chemical equation, resistance of a system of resistors, power of a lens, electric power, etc.
	Apply Law of Conservation of Mass in order to balance chemical equations.	
	Categorize the given reactions as (combination / decomposition) based on the reactants & products of a chemical reaction.	Differentiates materials / objects / organisms / phenomena / processes, based on, properties / characteristics , such as autotrophic and heterotrophic nutrition, biodegradable and non- biodegradable substances, various types of reactions, strong and weak acids and bases, acidic, basic and neutral salts, real and virtual images, etc.
	Classify the given reaction as displacement or double displacement based on the type of reactants used & products formed.	
	Predict the reaction as Oxidation or Reduction based on the addition/ removal of oxygen/	

	hydrogen/ electrons to the reactants to form products.	
	Observe colour change in iron, copper and silver articles over time in order to outline the effects of corrosion in our surroundings (real life situations, stating any two).	Applies scientific concepts in daily life and solving problems , such as takes precautions to prevent sexually transmitted infections, uses appropriate electrical plugs (5 /15a) for different electrical devices, uses vegetative propagation to develop saplings in gardening, performs exercise to keep in good health, avoids using appliances responsible for ozone layer depletion, applies concept of decomposition reaction of baking soda to make spongy cakes, etc.
	Detect changes in smell, colour, taste of food items overtime, in order to explain effects of oxidation on food items	

Chapter No.	Learning Objectives	Learning Outcome
2. Acids, Bases and Salts	Write down the ions present in aqueous solution of an acid or a base, in order to explain why aqueous acid/ base conduct electricity	Differentiates materials / objects / organisms / phenomena / processes, based on, properties / characteristics , such as autotrophic and heterotrophic nutrition, biodegradable and non-biodegradable substances, various types of reactions, strong and weak acids and bases, acidic, basic and neutral salts, real and virtual images, etc.
	Identify the positive and negative radicals present in a salt, in order to predict a salt's family and pH range	
	Recall the tastes of acids and bases in order to point out if given food items contain an acid or a base.	Classifies materials / objects / organisms / phenomena / processes, based on, properties / characteristics , such as metals and non-metals on the basis of their physical and chemical properties, acids and bases on the basis of their chemical properties, etc.
	Observe the action of given substances with various indicators, in order to categorize them as acids or bases	Plans and conducts investigations / experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own , such as investigates conditions necessary for rusting, tests the conductivity of various solutions, compares the foaming capacity of different types of soap samples, verifies laws of reflection and refraction of light, ohm's law, do
	Detect the formation of hydrogen gas when a metal reacts with an acid or a base, in order to confirm the presence of an acid/ base given an unknown compound	

2. Acids, Bases and Salts	Detect the formation of carbon dioxide when a metal carbonate/ bicarbonate reacts with acid, in order to detect the presence of acid given an unknown compound	variegated leaves perform photosynthesis? Which gas is evolved during fermentation? Why plants shoot moves towards light?
	Demonstrate the activity of heating copper sulphate crystals and change in colour, in order to detect the presence of water of crystallisation	
	Explain the effect of pH change in animals, plants and environment in order to learn suitable pH range for survival	Relates processes and phenomena with causes / effects , such as hormones with their functions, tooth decay with pH of saliva, growth of plants with pH of the soil, survival of aquatic life with pH of water, blue colour of sky with scattering of light, deflection of compass needle due to magnetic effect of electric current, etc.
	Outline the process of formation of sodium hydroxide in order to explain its manufacture using common salt	Explains processes and phenomena , such as nutrition in human beings and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.
	List the properties & explain the preparation/ manufacture some important compounds of Sodium. (bleaching powder, baking soda and washing soda) in order to explain their manufacture using common salt	
	Detect the strength of given substances based on their position in the pH scale.	Analyses and interprets data / graph / figure , such as melting and boiling points of substances to differentiate between covalent and ionic compounds, pH of solutions to predict the nature of substances, v-i graphs, ray diagrams, etc.
	Analyse the reaction taking place between an acid and a base (alkalis, metal oxides) using an indicator.	Measures physical quantities using appropriate apparatus / instruments /devices, such as ph of substances using different indicators, electric current and potential difference using ammeter and voltmeter, etc.

Chapter no	Learning Objectives	Learning Outcome
------------	---------------------	------------------

3. Metals and Non-metals	Observe various substances and their physical properties in order to classify them as metals or non-metals	Classifies materials / objects / organisms / phenomena / processes, based on, properties / characteristics , such as metals and non-metals on the basis of their physical and chemical properties, acids and bases on the basis of their chemical properties, etc.
	Predict the products when metals & non-metals react with oxygen, water, dilute acids in order to write a balanced chemical equation.	
	Identify the product formed when a metal reacts with a metal salt, in order to list the metals in order of their reactivity	Explains processes and phenomena , such as nutrition in human beings and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.
	Analyse the process of getting metals from their oxides, sulphides, carbonates in order to extract them from their ores	
	Explain the process of electrolytic refining in order to assess how to obtain pure metals from impure samples	
	Observe corrosion in metal articles & its process in order to develop ways to prevent corrosion by forming alloys, painting, galvanising	
3. Metals and Non-metals	Discuss the process of how metals react with non-metals, in order to explain formation & properties of ionic compounds	Draws labelled diagrams / flow charts / concept map / graphs , such as digestive, respiratory, circulatory, excretory and reproductive systems, electrolysis of water, electron dot structure of atoms and molecules, flow chart for extraction of metals from ores, ray diagrams, magnetic field lines, etc.
	Analyse the process of getting metals from their oxides, sulphides, carbonates in order to extract them from their ores	
	Discuss the process of how metals react with non-metals, in order to explain formation & properties of ionic compounds	Analyses and interprets data / graph / figure , such as melting and boiling points of substances to differentiate between covalent and ionic compounds, pH of solutions to predict the nature of substances, v-i graphs, ray diagrams, etc.

Chapter no	Learning Objectives	Learning Outcome
4. Carbon and its Compounds	Classify carbon compounds in homologous series in order to predict their properties	Differentiates materials / objects / organisms / phenomena / processes, based on, properties / characteristics, such as autotrophic and heterotrophic nutrition, biodegradable and non-biodegradable substances, various types of reactions, strong and weak acids and bases, acidic, basic and neutral salts, real and virtual images, etc.
	Illustrate the chemical properties of carbon compounds (like combustion, oxidation, addition & substitution) along with balanced chemical reaction.	
	Identify how carbon compounds react with hydrogen in the presence of nickel catalyst, in order to write a balanced chemical reaction	
	Identify how carbon compounds react with chlorine in the presence of sunlight, in order to write a balanced chemical reaction	
4. Carbon and its Compounds	Observe how carbon compounds burn in oxygen, in order to classify them as saturated or unsaturated	Plans and conducts investigations / experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own, such as investigates conditions necessary for rusting, tests the conductivity of various solutions, compares the foaming capacity of different types of soap samples, verifies laws of reflection and refraction of light, ohm's law, do variegated leaves perform photosynthesis? Which gas is evolved during fermentation? Why plants shoot moves towards light?
	Perform physical and chemical tests in order to distinguish between Ethanol & Ethanoic acid based on their properties (reaction with other substances)	
	Describe the process of micelle formation in order to understand how soaps work	
	Draw structures of carbon compounds and show types of bonds (single/ double/ triple) in order to classify them as alkanes/ alkenes/ alkynes	Draws labelled diagrams / flow charts / concept map /graphs, such as digestive, respiratory, circulatory, excretory and reproductive systems, electrolysis of water, electron dot structure of atoms and molecules, flow chart for extraction of metals from ores, ray diagrams, magnetic field lines, etc.
	Draw structures of carbon compounds with functional groups, in order to predict their properties due to functional groups and type of bonding present	
	Write down electron shell configuration of carbon in order to predict formulae of carbon compounds and illustrate the structure of molecules of carbon compounds with chain, branched & ring structure.	

	Draw structures of carbon compounds in order to classify them as saturated or unsaturated	
	Identify the functional group, type of bonding, number of C atoms present in a carbon compound, in order to correctly name them	Uses scientific conventions to represent units of various quantities / symbols / formulae / equations , such as balanced chemical equation by using symbols and physical states of substances, sign convention in optics, si units, etc.

Chapter no	Learning Objectives	Learning Outcome
5. Periodic Classification of Elements	Interpret the arrangement of elements in the MPT.	Explains processes and phenomena , such as nutrition in human beings and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.
	Analyse the usefulness of MPT in studying the chemical behaviour of elements.	
	Arrange the elements on the basis of their properties like oxides and hydrides, in order to form Mendeleev's Periodic Table	Draws conclusion , such as traits / features are inherited through genes present on chromosomes, a new species originates through evolutionary processes, water is made up of hydrogen and oxygen, properties of elements vary periodically along the groups and periods in periodic table, potential difference across a metal conductor is proportional to the electric current through it, etc.
	Compute the group and period number of an element given its atomic number, in order to determine its place in MPT	
	Compute the number of shells & valence electrons of an element given its position in MPT, in order to determine its properties	
	Predict the position of elements in the MPT in order to explain the trends in groups and periods.	

	Predict the trend of atomic size across the period and down the group, in order to explain arrangement of elements in MPT	Takes initiative to know about scientific discoveries / inventions, such as Mendel's contribution in understanding the concept of inheritance, Dobereiner for discovering triads of elements, Mendeleev for the development of the periodic table of elements, Oersted discovery that electricity and magnetism are related, discovery of relation between potential difference across a metal conductor and the electric current through it by ohm, etc.
	Calculate the average atomic mass given masses of different elements, in order to identify Dobereiner's Triads	
	Arrange elements in order of increasing atomic masses, in order to form Newlands' Octaves	
	Identify the achievements and limitations in Mendeleev's periodic table with respect to arrangement of elements.	

Chapter no	Learning Objectives	Learning Outcomes
6. Life Processes	List and explain the strategies employed by heterotrophs to take up food, in order to understand how heterotrophs obtain nutrition and differentiate it from autotrophic nutrition.	Differentiates materials / objects / organisms / phenomena / processes, based on, properties / characteristics, such as autotrophic and heterotrophic nutrition, biodegradable and non-biodegradable substances, various types of reactions, strong and weak acids and bases, acidic, basic and neutral salts, real and virtual images, etc.

6. Life Processes	Explain the process of absorption of CO ₂ & H ₂ O, in order to understand how autotrophs obtain substances necessary for nutrition	Plans and conducts investigations / experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own , such as investigates conditions necessary for rusting, tests the conductivity of various solutions, compares the foaming capacity of different types of soap samples, verifies laws of reflection and refraction of light, ohm's law, do variegated leaves perform photosynthesis? Which gas is evolved during fermentation? Why plants shoot moves towards light?
	Explain the process of conversion of CO ₂ & H ₂ O into carbohydrates, in order to understand how autotrophs obtain nutrition	Explains processes and phenomena , such as nutrition in human beings and plants, transportation in plants and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.
	Illustrate the process involved in human digestive system, in order to explain how humans obtain nutrients from food	
	List the enzymes & their functions involved in human digestive system, in order to understand breakdown of food in humans	
	Outline and explain the ways of breakdown of glucose by various pathways, in order to explain how energy is obtained in organisms	
	Illustrate the process involved in human respiratory system, in order to explain how humans take in oxygen and expel CO ₂	
	Illustrate the process of transport of oxygenated & de-oxygenated blood by human heart, in order to explain how oxygen is transported to cells	

6. Life Processes	Outline the process of double circulation of blood in fishes, in order to explain how oxygenated & deoxygenated blood is compartmentalized		
	Describe the function of blood vessels, arteries, platelets & lymph in human body, in order to understand how human transportation system works		
	Explain the function of xylem (vessels and tracheids) in plants, in order to explain how plants take up water from soil		
	Explain the function of transpiration in order to explain how water travels up in plants		
	Explain the function of phloem & ATP, in order to explain how food is transported in plants		
	Illustrate the process involved in human excretory system, in order to explain how waste is transported out of humans' body		
	Describe transpiration and other ways in which plants shed extra wastes, in order to explain excretion in plants		
	List and explain the strategies employed by heterotrophs to take up food, in order to understand how heterotrophs obtain nutrition and differentiate it from autotrophic nutrition.		Draws labelled diagrams / flow charts / concept map /graphs, such as digestive, respiratory, circulatory, excretory and reproductive systems, electrolysis of water, electron dot structure of atoms and molecules, flow chart for extraction of metals from ores, ray diagrams, magnetic field lines, etc.
	Illustrate the process involved in human digestive system, in order to explain how humans obtain nutrients from food		
	Illustrate the process involved in human respiratory system, in order to explain how humans take in oxygen and expel CO ₂		
Illustrate the process of transport of oxygenated & de-oxygenated blood by human heart, in order to explain how oxygen is transported to cells			

6. Life Processes	Illustrate the process involved in human excretory system, in order to explain how waste is transported out of humans' body	Exhibits creativity in designing models using eco-friendly resources , such as working model of respiratory, digestive and excretory systems, soda acid fire extinguisher, periodic table, micelles formation, diamond / graphite / Buckminster fullerene, human eye, electric motor and generator, etc.
	Illustrate the process involved in human digestive system, in order to explain how humans obtain nutrients from food	
	Illustrate the process involved in human respiratory system, in order to explain how humans take in oxygen and expel CO ₂	
	Illustrate the process of transport of oxygenated & de-oxygenated blood by human heart, in order to explain how oxygen is transported to cells	
	Illustrate the process involved in human excretory system, in order to explain how waste is transported out of humans' body	

Chapter no.	Learning Objectives	Learning Outcomes
7. Control and Coordination	Outline the working of a reflex arc, in order to explain how reflex actions take place in humans	Relates processes and phenomena with causes / effects , such as hormones with their functions, tooth decay with pH of saliva, growth of plants with pH of the soil, survival of aquatic life with pH of water, blue colour of sky with scattering of light, deflection of compass needle due to magnetic effect of electric current, etc.
	Examine tropic movements in plants, in order to understand how plants respond to environmental triggers like light, gravity, water	
	Discuss limitations of electrical impulses, in order to outline the importance and use of hormones	
	Illustrate the function of endocrine glands in human body, in order to understand functioning of hormones	
	Draw the structure & explain the functioning of a neuron, in order to explain how electrical signals travel in human body	

	Illustrate the location and functions of different parts of human brain, in order to understand working of human brain	ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.
	Draw the structure & explain the functioning of a neuron, in order to explain how electrical signals travel in human body	Draws labelled diagrams / flow charts / concept map /graphs, such as digestive, respiratory, circulatory, excretory and reproductive systems, electrolysis of water, electron dot structure of atoms and molecules, flow chart for extraction of metals from ores, ray diagrams, magnetic field lines, etc.
	Outline the working of a reflex arc, in order to explain how reflex actions take place in humans	

Chapter no.	Learning Objectives	Learning Outcomes
8. How Do Organisms Reproduce?	Describe the changes taking place in female body after/ without fertilization, in order to understand human reproduction	Relates processes and phenomena with causes / effects, such as hormones with their functions, tooth decay with pH of saliva, growth of plants with pH of the soil, survival of aquatic life with pH of water, blue colour of sky with scattering of light, deflection of compass needle due to magnetic effect of electric current, etc.
	Illustrate the process of fission in amoeba, leishmania & plasmodium, in order to understand how unicellular organisms divide	Explains processes and phenomena, such as nutrition in human beings and plants, transportation in plants and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.
	Illustrate the process of fragmentation in Spirogyra & spore formation in Rhizopus, in order to understand how multicellular organisms with simple body design divide	
	Illustrate the process of regeneration in Planaria, in order to understand how fully differentiated multicellular organisms divide	

8. How Do Organisms Reproduce?	Illustrate the process of budding in Hydra, in order to understand how fully differentiated multi-cellular organisms use regenerative cells to divide	Draws labelled diagrams / flow charts / concept map /graphs, such as digestive, respiratory, circulatory, excretory and reproductive systems, electrolysis of water, electron dot structure of atoms and molecules, flow chart for extraction of metals from ores, ray diagrams, magnetic field lines, etc.
	Illustrate the process of vegetative propagation in plants like sugarcane, roses, grapes in order to understand how plants reproduce without seeds	
	Label the different parts of a flower and explain their functions, in order to understand how flowers reproduce to form fruit	
	List down the changes occurring in male and female body in teenage years, in order to understand effects of puberty	
	Illustrate the male reproductive system, in order to understand its function in reproduction	
	Illustrate the female reproductive system, in order to understand its function in reproduction	
8. How Do Organisms Reproduce?	Illustrate the process of fission in amoeba, leishmania & plasmodium, in order to understand how unicellular organisms divide	
	Illustrate the process of fragmentation in Spirogyra & spore formation in Rhizopus, in order to understand how multicellular organisms with simple body design divide	
	Illustrate the process of regeneration in Planaria, in order to understand how fully differentiated multicellular organisms divide	
	Illustrate the process of budding in Hydra, in order to understand how fully differentiated multi-cellular organisms use regenerative cells to divide	
	Illustrate the process of vegetative propagation in plants like sugarcane, roses, grapes in order to understand how plants reproduce without seeds	

	Illustrate the male reproductive system, in order to understand its function in reproduction		
	Illustrate the female reproductive system, in order to understand its function in reproduction		
	List down the ways to avoid fertilization, in order to avoid pregnancy and maintain reproductive health		Applies scientific concepts in daily life and solving problems , such as takes precautions to prevent sexually transmitted infections, uses appropriate electrical plugs (5 /15a) for different electrical devices, uses vegetative propagation to develop saplings in gardening, performs exercise to keep in good health, avoids using appliances responsible for ozone layer depletion, applies concept of decomposition reaction of baking soda to make spongy cakes, etc.
	List down the reasons for changes in DNA copying and their effect on ecosystem, in order to understand importance of variations		Draws conclusion , such as traits / features are inherited through genes present on chromosomes, a new species originates through evolutionary processes, water is made up of hydrogen and oxygen, properties of elements vary periodically along the groups and periods in periodic table, potential difference across a metal conductor is proportional to the electric current through it, etc.

Chapter No.	Learning Objectives	Learning Outcomes
9. Heredity and Evolution	Explain the combination of sex chromosomes, in order to understand how sex is determined in humans	Explains processes and phenomena , such as nutrition in human beings and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.
	Explain the combination of sex chromosomes, in order to understand how sex is determined in humans	Draws labelled diagrams / flow charts / concept map /graphs , such as digestive, respiratory, circulatory, excretory and reproductive systems, electrolysis of water, electron dot structure of atoms and molecules, flow chart for extraction of metals from ores, ray diagrams, magnetic field lines, etc.
	State and explain Mendel's traits of inheritance, in order to understand how traits are inherited from one generation to next	

9. Heredity and Evolution	Classify the given traits as inherited or acquired, in order to understand which traits cause a change in genes.	Draws conclusion , such as traits / features are inherited through genes present on chromosomes, a new species originates through evolutionary processes, water is made up of hydrogen and oxygen, properties of elements vary periodically along the groups and periods in periodic table, potential difference across a metal conductor is proportional to the electric current through it, etc.
	Explain how changes in DNA can lead to stronger/ better species, or formation of new species altogether, in order to understand natural selection & speciation	
	Identify if a given pair of organs is analogous or homologous, in order to find relationship between species	
	Observe different fossils and identify the differences and similarities, in order to understand the timeline of evolution	
	State and explain Mendel's traits of inheritance, in order to understand how traits are inherited from one generation to next	
	State and explain Mendel's traits of inheritance, in order to understand how traits are inherited from one generation to next	Takes initiative to know about scientific discoveries / inventions , such as Mendel's contribution in understanding the concept of inheritance, Dobereiner for discovering triads of elements, Mendeleev for the development of the periodic table of elements, Oersted discovery that electricity and magnetism are related, discovery of relation between potential difference across a metal conductor and the electric current through it by ohm, etc.

Chapter no.	Learning Objectives	Learning Outcomes
	Demonstrate the path of light when it travels through a rectangular glass slab, in order to formulate laws of refraction of light.	Plans and conducts investigations / experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own , such as

10. Light – Reflection and Rarefaction	Outline the rule of image formation by spherical mirrors in order to complete the ray diagrams by drawing reflected rays.	investigates conditions necessary for rusting, tests the conductivity of various solutions, compares the foaming capacity of different types of soap samples, verifies laws of reflection and refraction of light, ohm's law, do variegated leaves perform photosynthesis? Which gas is evolved during fermentation? Why plants shoot moves towards light?
	Represent the path of incident & reflected light rays from a concave lens, in order decipher the position and nature of image formed.	
	Compare speed of light in one medium with another in order to calculate refractive index.	Relates processes and phenomena with causes / effects, such as hormones with their functions, tooth decay with pH of saliva, growth of plants with pH of the soil, survival of aquatic life with pH of water, blue colour of sky with scattering of light, deflection of compass needle due to magnetic effect of electric current, etc.
	State the laws of reflection of light, in order to understand how light travels in a medium when it encounters another object	Explains processes and phenomena in order to relate to science behind the phenomena/ processes and develop a keen interest in the science in daily life: (such as nutrition in human beings and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.)
	Represent the path of incident ray and reflected ray in order to decipher the position and nature of image formed.	
	Illustrate the path of incident & reflected light rays from a convex lens, in order decipher the position and nature of image formed.	
	Outline the rule of image formation by spherical mirrors in order to complete the ray diagrams by drawing reflected rays.	Draws labelled diagrams / flow charts / concept map /graphs, such as digestive, respiratory, circulatory, excretory and reproductive systems, electrolysis of water, electron dot structure of atoms and molecules, flow chart for extraction of metals from ores, ray diagrams, magnetic field lines, etc.
	Represent the path of incident ray and reflected ray in order to decipher the position and nature of image formed.	
	Demonstrate the path of light when it travels through a rectangular glass slab, in order to formulate laws of refraction of light.	

10. Light – Reflection and Rarefaction	Represent the path of incident & reflected light rays from a concave lens, in order decipher the position and nature of image formed.	
	Illustrate the path of incident & reflected light rays from a convex lens, in order decipher the position and nature of image formed.	
	Outline the rule of image formation by spherical mirrors in order to complete the ray diagrams by drawing reflected rays.	
	Represent the path of incident & reflected light rays from a concave lens, in order decipher the position and nature of image formed.	
10. Light – Reflection and Rarefaction	Express u , v , f in the mirror formula in order to apply sign convention in solving word problems to find the unknown variable.	Analyses and interprets data / graph / figure , such as melting and boiling points of substances to differentiate between covalent and ionic compounds, pH of solutions to predict the nature of substances, v - i graphs, ray diagrams, etc.
	Deduce the nature and size of image by magnification in order to relate height of object with height of image.	
	Compare speed of light in one medium with another in order to calculate refractive index.	
	Construct the lens formula for a lens relating v , u , f ; in order to find an unknown variable given the other two.	
	State the magnification for a lens, in order to relate height of object with height of image	
	Calculate the power of a lens, in order to determine its power to converge or diverge	
	Calculates using the data given , such as number of atoms in reactants and products to balance a chemical equation, resistance of a system of resistors, power of a lens, electric power, etc.	

	Express u , v , f in the mirror formula in order to apply sign convention in solving word problems to find the unknown variable.	Uses scientific conventions to represent units of various quantities / symbols / formulae / equations , such as balanced chemical equation by using symbols and physical states of substances, sign convention in optics, SI units, etc.
	Construct the lens formula for a lens relating v , u , f ; in order to find an unknown variable given the other two.	

Chapter no.	Learning Objectives	Learning Outcomes
11. Human Eye and the Colourful World	Relate changes in focal length of eye lens to vision of distant and nearby objects	Explains processes and phenomena , such as nutrition in human beings and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.
	Relate changes in focal length of eye lens to vision of distant and nearby objects	Draws labelled diagrams / flow charts / concept map / graphs , such as digestive, respiratory, circulatory, excretory and reproductive systems, electrolysis of water, electron dot structure of atoms and molecules, flow chart for extraction of metals from ores, ray diagrams, magnetic field lines, etc.
	Describe the structure of an eye and functions of various parts that help humans to see.	
	Identify the causes of defects of vision in human eye and suggest correction procedures.	Draws conclusion , such as traits / features are inherited through genes present on chromosomes, a new species originates through evolutionary processes, water is made up of hydrogen and oxygen, properties of elements vary periodically along the groups and periods in periodic table, potential difference across a metal conductor is proportional to the electric current through it, etc.
	Examine the path of light rays through a prism and identify various rays and angles formed	
Demonstrate that white light is dispersed into seven colours by a prism and explain the reasons for the same.		
11. Human Eye and the Colourful World		

	Provide scientific explanation for twinkling of stars, advanced sunrise and delayed sunset.	
	Describe the structure of an eye and functions of various parts that help humans to see.	
	Describe the structure of an eye and functions of various parts that help humans to see.	
	Relate scattering of light to Tyndall effect, blue colour of sky and red colour of sun at sunrise and sunset.	

Takes initiative to know about scientific discoveries / inventions, such as Mendel's contribution in understanding the concept of inheritance, Dobereiner for discovering triads of elements, Mendeleev for the development of the periodic table of elements, Oersted discovery that electricity and magnetism are related, discovery of relation between potential difference across a metal conductor and the electric current through it by ohm, etc.

Chapter no	Learning Objectives	Learning Outcomes
12. Electricity	Plot a graph between voltage and current, in order to prove ohm's law & find resistance	Plans and conducts investigations / experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own , such as investigates conditions necessary for rusting, tests the conductivity of various solutions, compares the foaming capacity of different types of soap samples, verifies laws of reflection and refraction of light, ohm's law, do variegated leaves perform photosynthesis? Which gas is evolved during fermentation? Why plants shoot moves towards light?
	Define resistivity and its range for different materials, in order to classify substances as conductors, alloys and insulators	
	Explain and calculate the heating effect of electric current, in order to learn working of appliances like heater, iron and fuse.	

12. Electricity	Evaluate the charge flowing through a conductor in a given time, in order to calculate current flowing through it	<p>Calculates using the data given, such as number of atoms in reactants and products to balance a chemical equation, resistance of a system of resistors, power of a lens, electric power, etc.</p>
	Determine work done in moving a charge across two points, in order to calculate potential difference between two points	
	Calculate power, in order to represent electric consumption in domestic circuits	
	Evaluate the charge flowing through a conductor in a given time, in order to calculate current flowing through it	
12. Electricity	Determine work done in moving a charge across two points, in order to calculate potential difference between two points	<p>Uses scientific conventions to represent units of various quantities / symbols / formulae / equations, such as balanced chemical equation by using symbols and physical states of substances, sign convention in optics, si units, etc.</p>
	Plot a graph between voltage and current, in order to prove ohm's law & find resistance	
	Calculate power, in order to represent electric consumption in domestic circuits	
	Identify the electrical components and their functions, in order to build a functioning circuit	<p>Measures physical quantities using appropriate apparatus / instruments / devices, such as ph of substances using different indicators, electric current and potential difference using ammeter and voltmeter, etc.</p>
	Explain and calculate the heating effect of electric current, in order to learn working of appliances like heater, iron and fuse.	<p>Applies scientific concepts in daily life and solving problems, such as takes precautions to prevent sexually transmitted infections, uses appropriate electrical plugs (5 / 15a) for different electrical devices, uses vegetative propagation to develop saplings in gardening, performs exercise to keep in good health, avoids using appliances responsible for ozone layer depletion, applies concept of decomposition reaction of baking soda to make spongy cakes, etc.</p>

	Determine the resultant resistance in a series and a parallel combination, in order to identify the suitable combination like house, etc	Derives formulae / equations / laws , such as equivalent resistance of resistors in series and parallel, etc.
--	--	--

Chapter no	Learning Objectives	Learning Outcomes
13. Magnetic Effects of Electric Current	Draw magnetic field lines for a bar magnet, in order to identify the magnetic field strength at different points around a magnet	Relates processes and phenomena with causes / effects , such as hormones with their functions, tooth decay with pH of saliva, growth of plants with pH of the soil, survival of aquatic life with pH of water, blue colour of sky with scattering of light, deflection of compass needle due to magnetic effect of electric current, etc.
	Represent magnetic field lines for a straight current carrying conductor, in order to identify the magnetic field strength at different points around it.	
	Draw magnetic field lines for at current carrying circular loop, in order to identify the magnetic field strength at different points around it	
	Outline magnetic field lines for at current carrying solenoid, in order to identify the magnetic field strength at different points around it.	
	Discuss electromagnetic induction, in order to understand how a moving magnet can be used to generate electric currents.	
	State Fleming's Left-Hand rule, in order to understand the working of an electric motor	Explains processes and phenomena , such as nutrition in human beings and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.
	Explain Fleming's right hand rule, in order to understand the working of an electric generator	
Analyse the significance of neutral, earth and live wire, in order to understand formation of a domestic electrical circuit	Uses scientific conventions to represent units of various quantities / symbols / formulae / equations , such as balanced chemical equation by using symbols and physical states of substances, sign convention in optics, si units, etc.	

13. Magnetic Effects of Electric Current	Represent magnetic field lines for a straight current carrying conductor, in order to identify the magnetic field strength at different points around it.	Takes initiative to know about scientific discoveries / inventions , such as Mendel's contribution in understanding the concept of inheritance, Dobereiner for discovering triads of elements, Mendeleev for the development of the periodic table of elements, Oersted discovery that electricity and magnetism are related, discovery of relation between potential difference across a metal conductor and the electric current through it by ohm, etc.
	State Fleming's Left-Hand rule, in order to understand the working of an electric motor	Exhibits creativity in designing models using eco-friendly resources , such as working model of respiratory, digestive and excretory systems, soda acid fire extinguisher, periodic table, micelles formation, diamond / graphite / Buckminster fullerene, human eye, electric motor and generator, etc.
	Explain Fleming's right hand rule, in order to understand the working of an electric generator	

Chapter no	Learning Objectives	Learning Outcomes
	Classify different sources of energy on the basis of accessibility, cost, transportation and storage, in order to identify a 'good' source of energy	Classifies materials / objects / organisms / phenomena / processes, based on, properties / characteristics , such as metals and non-metals on the basis of their physical and chemical properties, acids and bases on the basis of their chemical properties, etc.
	Understand the process of extracting energy from fossil fuels, in order to develop its efficiency	Explains processes and phenomena , such as nutrition in human beings and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series,
	Compare the process of energy consumption through thermal and hydro power plants, in order to classify them as 'good' or 'bad' sources of energy.	

14. Sources of Energy	Explain the formation of biomass, in order to classify it as 'good' or 'bad' sources of energy	working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.
	Outline the process of extracting energy from wind, in order to assess it as a conventional source of energy	
	Describe the process of extracting energy from sun's rays, in order to assess it as a non-conventional source of energy	
	Infer the process of extracting energy from the sea (tidal, wave, ocean thermal), in order to assess it as a non-conventional source of energy	
	Elaborate the process of extracting geothermal and nuclear energy, in order to assess it as a non-conventional source of energy	
	Understand the process of extracting energy from fossil fuels, in order to develop its efficiency	Applies learning to hypothetical situations , such as what happens if all herbivores removed from an ecosystem? What will happen if all non-renewable sources of energy are exhausted?
14. Sources of Energy	Describe the process of extracting energy from sun's rays, in order to assess it as a non-conventional source of energy	Applies scientific concepts in daily life and solving problems , such as takes precautions to prevent sexually transmitted infections, uses appropriate electrical plugs (5 /15a) for different electrical devices, uses vegetative propagation to develop saplings in gardening, performs exercise to keep in good health, avoids using appliances responsible for ozone layer depletion, applies concept of decomposition reaction of baking soda to make spongy cakes, etc.
	Infer the process of extracting energy from the sea (tidal, wave, ocean thermal), in order to assess it as a non-conventional source of energy	
	Elaborate the process of extracting geothermal and nuclear energy, in order to assess it as a non-conventional source of energy	

	Classify different sources of energy on the basis of accessibility, cost, transportation and storage, in order to identify a 'good' source of energy	Makes efforts to conserve environment realizing the inter-dependency and interrelationship in the biotic and abiotic factors of environment , such as appreciates and promotes segregation of biodegradable and non - biodegradable wastes, takes steps to promote sustainable management of resources in day to day life, advocates use of fuels which produces less pollutants, uses energy efficient electric devices, uses fossil fuels judiciously, etc.
	Understand the process of extracting energy from fossil fuels, in order to develop its efficiency	

Chapter no	Learning Objectives	Learning Outcomes
15. Our Environment	Classify different waste products as biodegradable or non-biodegradable, in order to assess their effect on environment	Differentiates materials / objects / organisms / phenomena / processes, based on, properties / characteristics , such as autotrophic and heterotrophic nutrition, biodegradable and non-biodegradable substances, various types of reactions, strong and weak acids and bases, acidic, basic and neutral salts, real and virtual images, etc.
	Tabulate the organisms feeding on one another (producers, consumers, decomposers) and energy transfer between them, in order to form a food chain or a food web	Applies learning to hypothetical situations , such as what happens if all herbivores removed from an ecosystem? What will happen if all non-renewable sources of energy are exhausted?
	Describe the formation & properties of ozone, in order to identify ways to protect it from depletion	Applies scientific concepts in daily life and solving problems , such as takes precautions to prevent sexually transmitted infections, uses appropriate electrical plugs (5 /15a) for different electrical devices, uses vegetative propagation to develop saplings in gardening, performs exercise to keep in good health, avoids using appliances responsible for ozone layer depletion, applies concept of decomposition reaction of baking soda to make spongy cakes, etc.
	Classify biotic and abiotic components and their interaction with each other, in order to describe an ecosystem	Makes efforts to conserve environment realizing the inter-dependency and interrelationship in the biotic and abiotic factors of environment , such as appreciates and promotes segregation of biodegradable and non - biodegradable wastes, takes steps to promote sustainable management of resources in day to day life, advocates use of fuels which produces less pollutants, uses energy efficient electric devices, uses fossil fuels judiciously, etc.
	Tabulate the organisms feeding on one another (producers, consumers, decomposers) and energy transfer between them, in order to form a food chain or a food web	

Chapter No	Learning Objectives	Learning Outcomes
<p style="text-align: center;">16. Sustainable Management of Natural Resources</p>	<p>Explain the construction and use of dams and water harvesting, in order to devise an efficient plan to conserve water</p>	<p>Explains processes and phenomena, such as nutrition in human beings and plants, transportation in plants and plants, transportation in plants and animals, extraction of metals from ores, placement of elements in modern periodic table, displacement of metals from their salt solutions on the basis of reactivity series, working of electric motor and generator, twinkling of stars, advance sunrise and delayed sunset, formation of rainbow, etc.</p>
	<p>Explain sustainable development, in order to conserve natural resources for future generations</p>	<p>Applies learning to hypothetical situations, such as what happens if all herbivores removed from an ecosystem? What will happen if all non-renewable sources of energy are exhausted?</p>
	<p>List down the disadvantages of using coal and petroleum as energy sources, in order to develop a better plan of generating energy</p>	
	<p>Identify the 5 R's (refuse, reduce, reuse, repurpose, recycle), in order to employ one of these methods to make environment-friendly choices</p>	<p>Applies scientific concepts in daily life and solving problems, such as takes precautions to prevent sexually transmitted infections, uses appropriate electrical plugs (5 /15a) for different electrical devices, uses vegetative propagation to develop saplings in gardening, performs exercise to keep in good health, avoids using appliances responsible for ozone layer depletion, applies concept of decomposition reaction of baking soda to make spongy cakes, etc.</p>
<p style="text-align: center;">16. Sustainable Management of Natural Resources</p>	<p>Identify different stakeholders involved in a forest, in order to prepare a conservation plan for forests</p>	<p>Makes efforts to conserve environment realizing the inter-dependency and interrelationship in the biotic and abiotic factors of environment, such as appreciates and promotes segregation of biodegradable and non - biodegradable wastes, takes steps to promote sustainable management of resources in day to day life, advocates use of fuels which produces less pollutants, uses energy efficient electric devices, uses fossil fuels judiciously, etc.</p>