DIRECTORATE OF SCHOOL EDUCATION, GOVT. OF TAMIL NADU, CHENNAI - 600 006
PHYSICAL SCIENCE SYLLABUS

STANDARD IX **CHEMISTRY – UNIT I – NATURE AND BEHAVIOUR**

(Developed by professor Dr. V. Balasubramanian Chair person (Chemistry) Science Syllabus committee)

Expected Specific Outcomes of Learning	Content in terms of concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested Number of Periods
1	2	3	4	5	6
✍ Recognises the classification of matter on the basis of constitution	1.1 Nature of matter 1.1.1 Classification of matter as elements compounds and mixture and atomicity of elements.	Explain the classification of matter like hydrogen, water, air. Definition of elements Symbols of first thirty elements. Explaining the atomicity of elements like H_2, N_2, O_2, Cl_2 . Definition of compounds and mixture.	Table showing the symbols of first thirty elements derived from English names and Latin names. Compound and mixture are explained with example.	Differentiate between a compound and a mixture.	2
✍ Analyses the types of mixtures and solutions	1.1.2 Type of mixtures homogeneous and heterogeneous mixture. Solution, suspension and colloid.	Explaining Homogeneous and Heterogeneous mixture. Explaining solution Colloid and suspension based on size of particles.	Homogeneous mixture-air,alloy Heterogeneous mixture – mixture of sand & sugar. Examples for solution - sugar solution, salt solution Example for suspension - chalk in water, sand in water Colloidal solution - milk smoke.	In what way colloid differs from solution and suspension.	1
	1.1.3 Concentration of solution	Concentration of solution in terms of percentage.	Explanation of preparing x% solution of sodium chloride and	How would you prepare 10% Nacl	1

			glucose.	solution?	
✍ Recalls the concept of atoms and molecules and recognises Dalton's atomic theory	1.2 Atoms and molecules	Atomic theory - Dalton's atomic theory	Mentioning the postulates of Dalton's theory and its drawbacks.	Outline the postulates of Dalton's theory	1
✍ Analyses the concept of atomic mass and molecular mass	1.2.1 Atomic mass 1.2.2 Molecular mass	Concept of atomic mass is explained. Concept of molecular mass is explained.	Expressing the atomic mass of elements like nitrogen, oxygen and chlorine in terms of IUPAC standard C-12 scale and molecular mass of molecules of elements like N_2, O_2, Cl_2, and compounds like H_2O, CO_2, NH_3	Calculate molecular mass of H_2, Cl_2 and NH_3 from atomic masses of their elements	1 1
✍ Analyses the concept of mole	1.2.3 Mole concept	Simple calculations involving mole, no. of moles and weight of the substances.		Calculate the number of moles of oxygen present in 64 g of oxygen (atomic mass of O = 16)	1
✍ Recognises the law of constant proportion	1.3 Law of constant proportion	Explanation of law of constant proportion by taking the formation of CO_2 and H_2O as examples.	Calculation involving law of constant proportion.	Illustrate the law of constant proportion with one example.	1
✍ Calculates the percentage composition of elements in compounds	1.3.1 Percentage composition of elements in simple compounds	Calculation of percentage composition of elements in compounds like water CO_2 and NH_3		Calculate the percentage of oxygen in water and Carbon dioxide	1

✍ Finds molecular and empirical formulae	1.3.2 Determination of empirical and molecular formulae.	Definition of empirical and molecular formulae, relation between empirical and molecular formulae.	Giving empirical and molecular formulae of compounds like H_2O_2, CH_4, C_2H_4, C_2H_6	Mention the empirical and molecular formulae of H_2O_2, methane and ethane.	2
	Unit - 2 - Structure of Atom				
✍ Recalls the historical approach ✍ Analyses the composition of nucleus	2. Structure of atom 2.1Constituents of an atom	Discovery of electron proton and neutron Mention Rutherford's model of an atom	Chart showing Rutherford's atomic model of atom	Who discovered electron, proton and neutron.	2
✍ Finds the atomic and mass number of isotopes	2.2 Atomic number mass number and isotopes	Giving atomic and mass numbers of first thirty elements. Definition of isotope.	Chart showing the number of p, n and e in first thirty elements Isotopes of hydrogen, carbon, oxygen and chlorine	Explain Rutherford's model of an atom Calculate the No. of p, e and n present in carbon and oxygen atoms (atomic no. of C=6, O=8, mass no. of C=12, O=16) Reason out fractional atomic masses of elements.	3
✍ Recognises the arrangement of electrons in atoms	2.3 Distribution of electrons in shells	Electronic configuration of elements. Bohr's model of atom superiority of this model over Rutherford's model of an atom	Diagrams showing the arrangement of electrons giving the maximum accommodation of shell.	Write the electronic configuration of sodium atom and sodium ion.	1
✍ Analyses the	2.3.1 Valance electron	Explaining the valency with suitable example.	Relation between the valence electron and the properties of elements.	Which electrons of an atom decide the chemical properties of	1

relation between valence electron and the properties of element	and valency		Chart showing the distribution of electrons for elements from atomic no. 1-20	the elements?	
✍ Analyses the concept of radioactivity	2.4. Radio activity	Discovery of radioactivily Nature of radioactive radiations (? ? and ? rays)	Mentioning the discovery of radioactivity and the property of radioactive radiations with specific reference to charge, mass and penetrating power	What is meant by radioactivity? What is the nature of radioactive radiations?	2
✍ Recognises the uses of radioisotopes	2.4.1 Radioisotopes 2.4.2 Applications of radio isotopes	Examples of radlioisotopes of ^{14}C, ^{60}CO and ^{238}U Brief explanation of finding the age of rock and fossils, nuclear fules,Radiotherapy	The uses of radio isotopes in human welfare	Mention the uses of ^{14}C, ^{60}C and ^{238}U isotopes.	1
		Unit - 3 - Periodic Classification			
✍ Regonises the historical approach. ✍ Appreciates and learns Mendeleev's periodic classification.	3. Periodic classification 3.1. Historical approach	Doberiener's law of triads Newland's law of octaves Mendeleev's periodic law , classification and periodic table mentioning the nature of groups and periods. (0 to VIII) groups and (1 to 7) periods)	Example for triads Li,Na,K and Cl, Br, I. Mendeleev's periodic table and its important feature	What are groups and periods in Mendeleev's periodic table? Give the merits and demerits of Mendeleev's periodic table	2
✍ Analyses the grouping of elements in the modern periodic	3.2 Modern periodic classification	Defects of Mendeleev's periodic table. Need for this classification. Basis for this classification and modern periodic law Variation of metallic and non-metallic properties, atomic size	Long form of periodic table Mentioning the variation of properties like metallic and non-	State and explain modern periodic law. What are periodic properties?	3

table. ✍ Variation of properties across a period and along a group.	3.3 Periodicity in the properties of elements	electronegativity ionization energy and electron affinity.	metallic properties, atomic size electronegativity, ionisaton energy and electron affinity along a group and across a period	Explain how size varies along the same period and down the groups	3
	Unit - 4 - Chemical bonding				
✍ Recognises the formation of a chemical bond	4. Chemical bonding 4.1 Formation of a chemical bond. Octet rule	Cause of chemical bonding through octet rule Formation of positive ions and negative ions Difference between an atom and an ion. Representation of ions.	Attainment on inert gas configuration Formation of Na^+,K^+, Li^+, F^+, Cl^+ and O^{2+} Electron dot representation of ions.	State and explain octet rule.	2
✍ Learns about ionic and covalent bond	4.2 Types of bonds. 4.2.1 Electrovalent or ionic bond	Electrovalent or ionic bond should be explained in the case of formation of NaCl, $CaCl_2$ and MgO.	Diagrammatic representation of formation of NaCl, $CaCl_2$ and MgO.	How NaCl is formed from sodium and chlorine?	2
	4.2.2 Covalent bond	Covalent bond. Types of covalent bond single bond, double bond and triple bond.	Formation of Cl_2, O_2, N_2, HCl, H_2O, CH_4, and NH_3 with diagrams.	Mention the type of bonding present in i) HCl ii) NaCl iii)N_2 iv) O_2	2
✍ Analyses the properties of ionic and covalent compounds.	4.2.3 Properties of ionic and covalent Compounds	Properties of ionic and covalent compounds like physical state, melting and boiling points, solubility and conductivity can be mentioned	Solubility of certain covalent and ionic compounds can be shown.	Differentiate between ionic and covalent compounds.	2
✍ Analyses the concept of	4.3 Electronegativity and polar covalent	Concept of electronegativity through the properties.	Explaining the polarity of covalent bond in HCl	Why is bonding in HCl called as polar covalent bond?	

electronegativity	bond	Polarity of covalent bonds.			2
		Unit - 5 - Chemical Reactions			
✍ Writes formulae of compounds.	5. Chemical reactions 5.1 Formulae of compounds with reference to 1:1, 1:2, 1:3 and 2:2 compound	Names and formulae of simple compounds by criss-cross method.	Chemical formulae of compounds like NaCl, $BaCl_2$, $AlCl_3$ and CaO.	Write the chemical formulae of calcium chloride and magnesium oxide.	1
✍ Writes balanced chemical equations given.	5.2 Chemical equation 5.2.1 Equations of simple chemical reactions and balancing	Writing the chemical equations for simple reactions and balancing the chemical equations like formation of water CO_2 HCl, decomposition of CO_2, HCl and $CaCO_3$		Balance the following equations. 1. H_2+O_2 --✍ H_2O 2. H_2+I_2 ---✍ HI 3. $CaCO_3$ ---✍ CaO + CO_2 4. $Fe+Cl_2$ ----✍ $FeCl_3$	2
✍ Classifies different types of chemical reactions.	5.3 Types of chemical reactions 5.3.1 Combination 5.3.2. Decomposition 5.3.3. Displacement 5.3.4. Oxidation and reduction electronic concept	Reaction between H_2 & Cl_2 , and H_2 & I_2 Decomposition of $CaCO_3$ Reaction between NaCl and $AgNO_3$ Reaction between zinc and copper sulphate. Formation of Nacl from Na and Cl_2	Balancing of different types of reactions.	Give one example each for i) Chemical double decomposition ii) Displacement iii) Oxidation and iv) Reduction	6

Unit - 6 - Coal & Petroleum

✍ Recognises the importance of coal and petroleum in our life.	6. Coal and petroleum 6.1 Coal and petroleum as natural sources of carbon and its compounds.	Formation of coal, types of coal, Formation of petroleum and its composition. Destructive distillation of coal - the products obtained at different temperatures (briefly) Fractional distillation of petroleum (a brief explanation) various fractions obtained in the fractional distillation.	. Table of products obtained at different temperatures from destructive distillation of coal (briefly) Table of products obtained from various fractions of factional distillation of petroleum	How is coal obtained? Explain how petroleum is obtained. What are the various petroleum products obtained form fractional distillation of petroleum?	2
✍ Appreciates tetravalency of carbon with other atoms.	6.2 Carbon - tetravalency 6.2.1. Catenation	Explaining the tetravalency of carbon in tetraheral nature Catenation property of carbon - a source of getting many organic compounds.	Examples of carbon compounds showing the formation of chains- ethane, prepane, butane and isobutane. Diagrammatic representation of ethane, ethene and ethyne.	Explain the nature of valency of carbon. Which property is the cause for the presence of large number of carbon compounds.	1
✍ Recognises the importance of hydrocarbons in domestic life.	6.3 Hydrocarbons 6.3.1 Classification of hydrocarbons.	Saturated and unsaturated hydrocarbons Homologous series of alkanes alkenes and alkynes and their general formula.	Illustrate the isomers of butane.	Mention the type of bonds present in ethane, ethene and ethyne.	1
✍ Analyses the phenomenon of isomerism.	6.3.2. Isomerism 6.3.3. Chain isomerism	Explaining isomerism and chain isomerism taking butane as example.	Representing chemical reactions.	What is isomerism? Give example .	2
✍ Recalls preparation,	6.4 Methane	Methane - sources, molecular formula and mol.wt.		How is methane	

properties and uses of methane.	6.4.1. Preparation 6.4.2. Property 6.4.3 uses	Laboratory preparation from sodium acetate and soda lime. Physical properties chemical properties- combustion, reaction with steam and chlorine. Fuel, preparation of carbon black.		obtained in the laboratory? Explain the reaction between methane with i) steam ii) Cl_2.	1
✍ Recalls preparation, properties and uses of ethene.	6.5 Ethene 6.5.1. Preparation 6.5.2. Properties 6.5.3. Uses	Molecular formula and mol.wt. Laboratory preparation from ethyl alcohol. Physical properties chemical properties- combustion, reaction with hydrogen and chlorine. To prepare polyethylene, in the manufacture of ethanol, for preservation and ripening of fruits.	Represent the preparation properties of ethene through chemical equations.	How is ethene prepared in the laboratory Explain what happens when ethene reacts with i) H_2 ii) Cl_2 Mention the uses of ethene.	1
✍ Recalls preparation, properties and uses of ethyne.	6.6 Ethyne 6.6.1. Preparation 6.6.2. Properties 6.6.3. Uses	Molecular formula and mol.wt. Laboratory preparation from calcium carbide. Physical properties chemical properties- combustion, reaction with hydrogen and chlorine. Used in oxyacetylene flame, manufacture of PVC, Preparation of acetic acid and ethanol.	Represent the preparation and properties of ethyne through chemical equations.	How is ethyne prepared in the laboratory Explain what happens when ethyne reacts with i) H_2 ii) Cl_2 Mention the uses of ethyne.	1
