

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

STANDARD X CHEMISTRY UNIT I: MATTER

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Science Syllabus Revision Committee

Chemical reactions and important chemical compounds

Expected specific outcomes learning	Contents in terms of concepts	Curriculum transactional strategies	Illustrations	Evaluation	Suggested no. of periods
1	2	3	4	5	6
Recognises the role of rate of reactions in identifying the reactions.	1.1. Rate of chemical reaction.	Explaining the rate of chemical reactions – graphical representation.	Graph showing the concentration of reactants vs time.	Define rate of a reaction.	1
Analyses the chemical reaction as slow and fast reactions.	1.1.1 Types of reactions. 1.1.2 Slow and fast reactions.	Most of organic reactions are slow due to covalent bonds and all ionic reactions are fast due to ionic bonds. Example – decomposition of hydrogen peroxide.	Giving examples of organic reaction and ionic reaction.	Reactions between ionic compounds are faster than that between covalent compounds. Justify.	2
	Reaction with measurable rates.				1

Analyses the chemical reactions as reversible and irreversible reactions.	1.1.3 Reversible and irreversible reactions.	Meaning of reversibility and irreversibility with examples.	Formation of hydrogen iodide is a reversible reaction and formation of water is an irreversible reaction.	What are reversible and irreversible reactions?	2
Understands the concept of chemical equilibrium.	1.1.4 Chemical equilibrium – Dynamic equilibrium.	Explain dynamic equilibrium to impact occurrence of reactants and products at a time.	Explain the concept of equilibrium considering the reaction $\text{H}_2 + \text{I}_2 \rightleftharpoons 2\text{HI}$	What is meant by dynamic equilibrium?	2
Recognises the importance of energy changes in chemical reactions.	1.1.5. Exothermic and endothermic reactions.	Formations of ammonia and sulphur trioxide are exothermic reactions. Formation of NO from NO ₂ and O ₂ is an exothermic reaction.	Chart showing exothermic and endothermic reactions.	What are exothermic and endothermic reactions?	2
Realises the importance of pH.	1.1.6. pH scale – acidic and basic nature.	$\text{pH} = \log \frac{1}{[\text{H}^+]}$ should be explained.	Chart showing pH scale	What is meant by pH? Classify the following solutions as acidic or basic or neutral. i. pH = 1.5, ii. pH=8, iii. pH=7	2

Unit - 2 - SOME IMPORTANT CHEMICAL COMPOUNDS

<p>Relates Science and technology to industry and in domestic life. Learns the manufacture of washing soda. Analyses the properties of washing soda.</p> <p>Recognises the uses of washing soda both in industry and house hold purposes.</p> <p>Recognises the importance of baking soda</p> <p>Analyses the properties of baking soda.</p>	2. Some important chemical compounds	Naming some chemical compounds.	Chemical compounds are used in day to day life.		2
	2.1. Washing soda – preparation	Manufacture by Solvay process	Diagrammatic representation using block diagram.	How is washing soda prepared?	2
	2.1.1. Properties	Physical properties – Existence in two forms namely washing soda and soda ash. Chemical properties – reaction with HCl and BaCl ₂ .		What is the action of sodium carbonate with HCl?	
	2.1.2. Uses	Uses – In softening of water, glass industry, soap preparation.	Make them to understand the importance of softening of water and how soap is wasted in hard water.	Mention the uses of sodium carbonate.	
	2.2. Baking soda – preparation	Manufacture – by Solvay process (outline only)	Block diagrammatic representation of Solvay process.	How is baking soda manufactured?	1
	2.2.1. Properties	Properties like colour, solubility and action of heat can be explained	Ask the students to bring baking sods and ask them to study its physical properties.	What happens when baking soda is heated?	

Recognises the use of baking soda in preparing soft drinks.	2.2.2. Uses	Use – as baking soda in effervescent soft drinks.	Uses of baking soda in household preparation.	Write the uses of baking soda.	2
Recognises the importance of bleaching powder.	2.3. Bleaching powder – Manufacture	Chemical nature and formula. Manufacture using slaked lime and dry chlorine.	Explanation through equations.	How is bleaching powder manufactured?	
Analyses the properties of bleaching powder.	2.3.1. Properties	Physical –moist white powder, strong suffocating odour as that of chlorine. Chemical –action with HCl.	Make the students to tell the physical properties by seeing the bleaching powder.		
Recognises the uses of bleaching powder.	2.3.2. Uses	Used for bleaching cloths, wood, pulp etc., for sterilizing water, as a disinfectant.	The reason for spraying bleaching powder in streets and in water.		
Learns the preparation and properties of Plaster of paris. Recalls the use of plaster of paris	2.4. Plaster of paris - Preparation. 2.4.1. Property. 2.4.2. Uses.	Preparation from gypsum. Plasticity property Uses in surgery, for plastic moulds for statues, in dentistry, for making false ceilings.	Explanation through equation. Demonstrating, the students how moulds are made since it expands on setting.	How is plaster of Paris prepared? Write the uses of plaster of paris in medicine?	2

Recognises the Importance of cement	2.5. Cement - Manufacture	Cement formula Manufacture raw materials required slurry.	The importance of building materials	What is slurry?	1
	2.5.1. Uses of cement	Building materials Concrete, reinforced cement or RCC, bridges, roofs, multistoried building.		How is cement used in construction?	
Recalls the manufacture of glass	2.6. Glass - Manufacture (outline) raw materials required, cooling of glass, annealing	Briefly explain the manufacture of glass, cooling of glass and annealing.		What is annealing ?	1
	2.6.1 Uses	Used in optical lenses, as mirrors and in domestic life?			
Analyses an alloy into its constituents uses.	2.7. Steel	Composition - steel	Role of steel in construction and in domestic life.		1
	2.7.1. Alloy steel Stainless steel composition and uses, tungsten steel Composition uses	House hold wares and cutting tools are nothing but stainless steel.	Mention the uses and composition of steel and tungsten Steel.	What are the uses of steel?	1

Unit 3 – NATURAL RESOURCES

STANDARD - X

METALS AND NON METALS

Expected specific outcomes learning	Contents in terms of concepts	Curriculum transactional strategies	Illustrations	Evaluation	Suggested no. of periods
Recognizes the Nature of metals and nonmetals in the form of ores.	3.1. Special character of metals and nonmetals.				
Importance of Minerals and ores in day to day life.	3.1.1 Minerals and ores	Definition of ores and minerals	Showing the picture of certain important ores.	What are ores? In what way it differs from minerals.	
		Examples of minerals- Bauxite, haematite, mica & pyrolusite, Some important ores, oxide ores, sulphide ores.		Mention important ores of Iron and Aluminium	

Analyses the given ores into its components.	3.1.2. Metallurgy	<p>Introduction- Concentration of ores. Extraction, Refining of metals, occurrence of ores. Oxide ores - gravity separation Sulphides ores – froth floatation, roasting, smelting, refining.</p>	<p>Listing the ores of Iron</p> <p>Showing the three forms of Iron.</p>		
Recalls the manufacturing process of iron.	3.2 Metallurgy of Iron.	<p>Forms of Iron Extraction from the ores mentioning chemical changes diagrammatic representation. Explain the preparation of wrought iron from cast Iron. Explain the Preparation of steel using Bessemer converter.</p>	<p>Showing the picture of reverbratory furnace.</p> <p>Showing the Picture of Bessemer converter.</p>		

Comparing different types of iron with reference to properties and uses.	3.2.1 Properties of iron.	Comparison of physical properties of three types of iron. Note down some important chemical-properties of iron, brief discussion about the hardening and annealing process of steel, mention uses of Iron.			
Recalls the extraction of aluminum from its ores.	3.3 Metallurgy of Aluminum	Occurrence in Nature, Extraction process of Aluminium from bauxite ore. Explanation of purification of aluminum.	Listing of ores. Showing the picture of electrolytic method.	Mention the important ores of Aluminum. How Aluminum is extracted from Bauxite. How is Aluminum purified? Give any three important chemical reactions of Aluminium? Mention the uses of Aluminium.	
Recognises the properties and uses of Aluminium	3.3.1 Properties of Aluminium	Discussion of important physical and chemical properties of Aluminum. Use of Aluminum.			

Importance of Special nature of Alloys	3.4 Special Character of Alloys	Definition of Alloys	Illustration of composition and uses of alloys in day to day life.	What are alloys?	
Recalls the importance of displacement of metal from other salts.	3.5 Alloying of Gold. 1. Activity Series 2. Displacement of one metal from another metal	Explanation with examples, high, reacting, low and reacting moderately - reacting nature. Specific examples $\text{CuSO}_4 + \text{Zn} \rightarrow \text{ZnSO}_4 + \text{Cu}$	Chart showing the activity series. Experiment Mercury tree Electroplating.	On what basis activity series of metals are arranged?	
Recognises the importance of Corrosion. Analyses the nature of gold, ornamental and pure gold.	3.6 Corrosion of metals 3.7 Alloying of Gold, Metallurgy, flexible character, alloying	Definition of Corrosion (impress that it is a chemical change) Corrosion of different metals, rusting of Iron. Explanation	Showing the picture about rusting of Iron. Importance of "carat" to check the purity of Gold.	Explain chemical reactions associated with rusting of Iron. Explain the uses of Gold Alloys. Why copper is added to gold to make gold	

	with copper it becomes hard.			ornaments.	
Recognises the abundance of hydrogen in nature.	3.8 Introduction about Hydrogen.	Occurrence of Source.			
Recalls the preparation of Hydrogen	3.8.1. Preparation of Hydrogen	Explanation of simple laboratory method of preparation of hydrogen.	Experiment to demonstrate the preparation using metal with dil. Acid.	How is hydrogen manufactured?	
Recalls the properties of hydrogen.	3.8.2. Properties of Hydrogen	Explain the Physical and Chemical properties	Giving equations for chemical reactions.		
Recalls the uses of hydrogen.	3.8.3. Uses of Hydrogen	Industrial and Laboratory uses.	Preparation of Vanaspathi by hydrogenation – manufacture NH_3 . (Water gas) $\text{CO} + 2 \text{H}_2$? CH_3OH	Mention industrial uses of hydrogen.	
Recalls the importance of ammonia	3.9 Ammonia				

Recalls the preparation of NH_3	3.9.1 Preparation of ammonia	Explanation of the laboratory and industrial preparation of ammonia.	Experiment to demonstrate the preparation.	How is NH_3 prepared by Haber's process?	
Recalls the properties and uses of ammonia	3.9.2 Properties of NH_3	Explain the physical and chemical Properties	Giving equations for chemical reactions. Experiment to show fountain experiment.		
	3.9.3 Uses of ammonia	Giving - industrial and laboratory uses.		Explain the uses of ammonia.	
Recognises the importance of sulphur	3.10 Occurrence of sulphur	Explain the natural occurrence of sulphur.	Oral instruction		
Analyses the allotropic nature of sulphur	3.10.1 Allotropy of sulphur.	Demonstration about the three allotropes of sulphur.	Picture showing the three types of sulphur.	Write briefly on allotropy of sulphur?	
Recalls the extraction from natural sources.	3.10.2 Extraction of sulphur	Explanation of two methods of extraction. 1. Sicilian method 2. Frasch method.	Diagrammatic representation of extraction of sulphur	How is sulphur extracted? Mention the uses of sulphur.	

Recalls the properties of sulphur	3.10.3 Properties of sulphur	Explain the physical and chemical properties.	Demonstrate the action of heat on three types of sulphur. Giving equation for chemical reaction.		
Recalls the uses of sulphur.	3.10.4 Uses of Sulphur.	Giving industrial and medicinal uses.			
Recalls the preparation proerties ans uses of sulphur dioxide.	3.11 Preparation of Sulphur dioxide. 3.11.1 Properties 3.11.2 user of sulphur dioxide	Laboratory preparation of SO ₂ . Explanation of physical and chemical properties. Giving Industrial Uses.	Give chemical equation of Solubility, action of heat, Reaction with oxygen. Specification in the manufacture of sulphuric acid and bleaching nature.	How SO ₂ is prepared?	
Recalls the process of manufacturing sulphuric acid.	3.12 Manufacturing of sulphuric acid.	Explain the Preparation of sulphuric acid (One method)	Illustrate only the chemical equation	Explain in detail the manufacture of sulphuric acid by "contact Process"	

Recalls the properties of sulphuric acid.	3.12.1 Properties of sulphuric acid.	Physical and Chemical properties - action with water, metal sugar and cellulose.	Showing the experiments for chemical reaction	What happens when H_2SO_4 reacts with metal?	
Importance of using sulphuric acid	3.12.2 Uses of sulphuric Acid.	Explain the Industrial of laboratory Use.	Mentioning about “King of Chemical”	Mention the industrial uses of sulphuric acid.	

Unit - 4 - CARBON COMPOUNDS

Expected specific outcomes learning	Contents in terms of concepts	Curriculum transactional strategies	Illustrations	Evaluation	Suggested no. of Periods
Recognises the classification of organic compounds based on functional groups	4.1 Functional group	Classification of organic compounds based on functional group 1. alcohol 2. aldehyde 3. ketones 4. carboxylic acid	Naming of alcohols aldehydes, ketones, carboxylic acids taken from lower homologous series.	Name the functional group present in ethanal and ethanol.	3
Recalls the preparation, properties and uses of alcohol	4.2 Alcohol	IUPAC name and common name of lower alcohol			
	4.2.1 Preparation, concentration, fermentation and its importance.	Manufacture of ethanol from "molasses" concentration.	Fermentation and its importance can be illustrated	How is ethanol prepared from molasses? What is rectified spirit? How is absolute alcohol prepared?	4
Recognises the importance of alcohol in domestic life.	4.2.2 Properties of alcohol	Physical properties Colour, miscibility. Chemical properties - reaction with oxygen, metals, esterification, oxidation, dehydrogenation, dehydration with	Encourage the students by writing the chart explaining the properties of alcohols	what happens when ethanol is treated with 1. Sodium 2. PCl_5 3. Acetic Acid 4. O_2 5. Acidified $\text{K}_2\text{Cr}_2\text{O}_7$	

		bleaching powder.			
Recalls preparation, properties and uses of methanal.	4.2.3 Uses	Alcoholic beverages substitute for petrol.	Nature of alcohol content in medicine and in alcoholic beverages. Mention the IUPAC names	Which is used as substitute for petrol?	
	4.3 Aldehyde - methanol ethanol	First two members IUPAC name and common name		Give the IUPAC names of 1. HCHO 2. CH ₃ CHO	
	4.3.1 Preparation	Preparation of HCHO Direct oxidation of alcohol.	Explanation through equation	How is HCHO manufactured?	
	4.3.2 Properties of formaldehyde	Physical properties Nature, Boiling point Chemical properties 1. oxidation 2. reduction 3. with INH ₃	The reason for high b.p of HCHO	What happens when HCHO undergoes 1. Oxidation 2. Reduction 3. Reaction with NH ₃	
	4.3.3 Uses	Used in the preparation of bakelite, formalin, urotropine		Formalin-Give its uses.	
Recalls preparation, properties and uses of acetone.	4.4 Acetone	IUPAC name and common name	Giving the IUPAC name	Mention the IUPAC name of acetone.	
	4.4.1 Preparation	Manufacture of acetone by dehydrogenation of isopropyl alcohol	Importance of acetone in medicine and in industry	How is acetone prepared?	

Recalls the importance of acids present in Natural resources. Recalls the preparation, properties and uses of acetic acid.	4.4.2 Properties	Physical properties smell, density inflammable nature Chemical properties - Reduction, Oxidation Chlorination		What happens when acetone undergoes the following reactions 1. Reduction 2. Oxidation 3. With conc. sulphuric acid	
	4.4.3. Uses	Uses - solvent, in the manufacture of sulphonal		How is acetone useful in industry?	
	4.5 Carboxylic acid.	Naming two lower members of carboxylic acid - source of acetic acid	Naming the two members (Formic & Acetic acid)		
	4.5.1 Preparation of acetic acid	Carboxylic acid - source of acetic acid		How is acetic acid prepared?	
Recognises that acetic acid is technically important solvent.	4.5.2 Properties	Physical Properties- Colour, solubility, anhydrous nature. liquid – soluble in H ₂ O, anhydrous acetic acid and glacial acetic acid. Chemical properties- formation of salts, formation of esters, decarboxylation, reaction with PCl ₅ , with NH ₃ , with conc. H ₂ SO ₄ , Reduction, dehydration	Pure anhydrous acetic acid – called as glacial acetic acid	Pure anhydrous acetic acid is called as _____	
	4.5.3 Uses	Solvent for cellulose and resin, preservation of food coagulation of	Reaction using explanation	What is esterification? Write the conversion of acetic acid to 1. Ester 2. Acetamide 3. Methane	Write briefly any three uses of acetic acid.

Recalls manufacture of soaps and detergents	4.6 Soap	rubber. Soaps are salts of potassium or Sodium salts of long chain fatty acids can be emphasized.			
	4.6.1 Preparation	Saponification - Advantages and disadvantages.	Biodegradable property can be explained.		
Recalls the properties of soaps and detergents in day to day life.	4.6.2 Detergents	Explanation advantages and disadvantages over soaps	Discharge of detergents and water directly on the earth's surface leads to ground water pollution.	Distinguish between soap and detergent	

