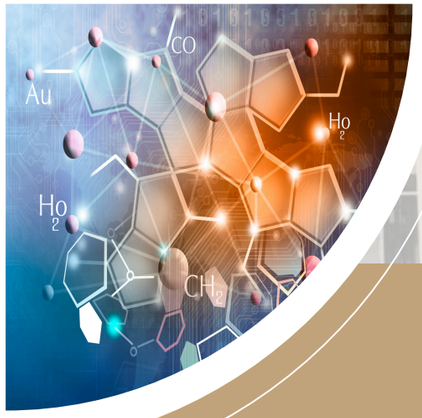
ASSESSMENT FRAMEWORK AND MODEL QUESTION PAPER

CHEMISTRY
Grade X

NATIONAL CURRICULUM OF PAKISTAN
2022-23

SCHEME OF STUDIES 2006





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ASSESSMENT FRAMEWORK

FOR

CHEMISTRY GRADE-X

CURRICULUM 2022-23

SCHEME OF STUDIES 2006

ACKNOWLEDGEMENT

It is a great honour that we, at the Federal Board of Intermediate and Secondary Education, have developed the Assessment Framework (AF) for the subject of Chemistry for Grade-X. The primary objective of the AF is to optimize the current curriculum 2022-23. This comprehensive framework has been crafted meticulously by subject matter and assessment experts who conducted an in-depth review of all learning outcomes for Grade-X Chemistry curriculum. They evaluated these outcomes in terms of their scope, cognitive level, and progression across the grade.

This significant undertaking was the result of a series of extensive meetings and collaborative efforts of the subject and assessment experts. Their dedication and expertise have been instrumental in bringing this framework to fruition.

The Assessment Framework will serve as a guiding document for students, teachers and paper setters. Students will receive clear directions for preparing themselves for the annual examination. Similarly, teachers will use it as a guide to understand what to teach in class and to prepare students for the final examinations accordingly. Similarly paper setters will also seek guidance from this document.

Following subject as well as assessment experts/committee members remained constantly engaged in the development of the AF:

1. Dr. Shaista Sabir, Associate Professor, PAEC Model College for Girls, Nilore, Islamabad
2. Mr. Naeem Mushtaq, Associate Professor, Islamabad Model College for Boys, G-10/4, Islamabad
3. Ms. Javeria Gul, HOD Chemistry, Pak Turk Muaarif International School, Islamabad
4. Ms. Aliya Sajid, Lecturer, Army Public School & College, Pasban, Rawalpindi

The whole work was successfully accomplished under the able supervision and guidance of Dr. Ikram Ali Malik, Chairman, FBISE and due to the hard work and dedication of the staff of Research Section of FBISE, in particular, Syed Zulfiqar Shah, Deputy Secretary, Research and Academics who played a pivotal and leading role in finalizing the Assessment Framework.

MIRZA ALI
Director (Test Development)
FBISE, Islamabad

ASSESSMENT FRAMEWORK FOR CHEMISTRY GRADE-X, CURRICULUM 2022-23

To ensure clarity and precision in assessment, the learning outcomes have been categorized into two distinct groups: formative and summative. This classification helps in effectively measuring student progress and understanding. Each Student learning outcome (SLO) has been carefully marked as either formative or summative within the newly developed Assessment Framework. SLOs of Summative Assessment Format will be part of the Final Examination while SLOs of Formative Assessment will although be part of the teaching-learning activity but they will **NOT** be part of Final Examinations. Estimated cognitive levels i.e Knowledge (K), Understanding (U) and Application (A) of all the SLOs have also been indicated. It may be noted that all the higher cognitive levels have been collectively accumulated in the cognitive level of 'Application'. In subjects involving Practicals (Lab work), it has been mentioned categorically whether an SLO is summative for theory or summative for Practical Based Assessment (PBA). If an SLO is summative for PBA, it means that Laboratory work is required in the teaching-learning activity and it will be part of the Practical Examination/ Practical Based Assessment.

The Assessment Framework will act as a comprehensive guide for students, teachers and paper setters. Students will have clear instructions on how to prepare for the annual examinations. Teachers will use the framework to understand the curriculum and effectively prepare their students for the final examination. Additionally, paper setters will refer to this document for guidance in setting examination papers.

A model question paper has also been developed to provide a clear structure and format for upcoming examinations. The model question paper ensures consistency and fairness, offering students a comprehensive understanding of what to expect in their examinations. By aligning the paper with the Student Learning Outcomes (SLOs) of the curriculum, we ensured that the questions accurately reflect the skills and knowledge that students are expected to acquire.

A detailed Table of Specifications (ToS) has been created to ensure equitable coverage of cognitive levels and content domains in order to generate a balanced question paper. The ToS serves as drawing scale and action plan for the question paper, ensuring that all important areas of the curriculum are adequately and proportionately assessed.

FORMATIVE ASSESSMENT: AN ESSENTIAL COMPONENT OF EFFECTIVE LEARNING

Formative assessment is a pivotal element in the educational process, distinguished by its role in providing ongoing feedback to both students and educators. Unlike summative assessments, which evaluate student learning at the end of an instructional period, formative assessments are integrated into the learning process to monitor student understanding and guide instructional decisions.

The primary objective of formative assessment is to identify learning gaps and misunderstandings as they occur, enabling timely interventions. This dynamic approach allows teachers to adjust their teaching strategies to better meet the needs of their students. For instance, if a teacher notices through a quick quiz or class discussion that a significant portion of the class struggles with a particular concept, they can revisit that topic, providing additional explanations or alternative methods of instruction. This adaptability is crucial for fostering a deeper understanding of the material.

Formative assessments come in various forms, ranging from informal methods like classroom discussions, observations, and questioning, to more structured approaches such as quizzes, peer assessments, and self-reflections. These methods are not limited to paper-and-pencil tasks but can include digital tools that provide instant feedback. The versatility of formative assessments allows educators to cater to diverse learning styles and preferences, ensuring that all students are engaged and supported in their learning journey.

Formative assessment plays a significant role in creating a supportive classroom environment. It shifts the focus from merely achieving grades to understanding the learning process. This approach reduces the pressure on students, as they perceive assessments not as a final judgment of their abilities but as a part of their learning journey. Consequently, formative assessment can lead to increased student motivation and engagement.

In conclusion, formative assessment is a powerful tool that, when effectively implemented, can significantly enhance the learning experience. It provides invaluable insights for both teachers and students, promotes a growth-oriented learning environment, and supports the continuous development of essential skills. As education evolves, the role of formative assessment will undoubtedly continue to be central in fostering successful and meaningful learning experiences.

SUMMATIVE ASSESSMENT: EVALUATING LEARNING OUTCOMES IN THE FORM OF TERMINAL/FINAL EXAMINATION

Summative assessment is a fundamental component of the educational process, designed to evaluate student learning at the conclusion of an instructional period. Unlike formative assessment, which provides ongoing feedback during the learning process, summative assessment serves as a final measure of what students have learned. Typically administered at the end of a unit, course, or academic year. Summative assessment aims to determine the extent to which educational objectives have been achieved.

The primary purpose of summative assessment is to assess the overall effectiveness of instruction and learning. It provides a conclusive evaluation of student performance, often in the form of tests, final projects, or standardized exams. These assessments generate grades or scores that reflect a student's achievement in a given subject area over a specific period or time duration.

Summative assessment is often used to make critical decisions regarding student progression, certification, or placement in subsequent educational levels. Additionally, summative assessments provide valuable data that inform curriculum development and instructional strategies. By analyzing summative assessment results, educators can identify trends, strengths, and weaknesses within their instructional approaches, allowing for improvements in future teaching.

In conclusion, summative assessment plays a critical role in the educational process by providing a final evaluation of student learning. While it differs from formative assessment in its focus and application, it is an essential tool for measuring academic achievement. When balanced with formative assessments, summative assessments contribute to a well-rounded and effective approach to evaluating and supporting student learning.

National Curriculum of Pakistan 2022-2023
ASSESSMENT FRAMEWORK CHEMISTRY GRADE-X (SSC-II)
Details of Content Areas/ SLOs

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1 Period =40 minutes)
'A' **Nature of Science in Chemistry**	**History of Chemistry**	[SLO:C-10-A-01]	Justify, with examples, that to do science is to be involved in a community of inquiry. (For context in Chemistry- This community adheres to certain common principles, methodologies, and processes, such as the use of empirical evidence and logical reasoning to develop scientific theories. For example, chemists based their research on the assumptions of conservation of mass and energy and use this to verify whether their calculations and findings are sensible. - Scientists in different fields often share similar methodologies, such as the use of controlled experiments and the peer review process. The scientific community also values objectivity and skepticism, which are essential for ensuring the accuracy and validity of scientific findings).	Understanding	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	**02**
		[SLO:C-10-A-02]	Explain, with examples, that a 'scientific paradigm' is a theoretical model of how nature works (Some examples include: - The belief that materials that burn do so because a material called 'phlogiston' was the paradigm in chemistry in the 18th century - Historical models of the atom are paradigms, such as the 'plum pudding' and the Rutherford models of the atom - The periodic table of elements, and belief in the 'periodicity' of atoms based on the arrangements of their electrons is a paradigm Scientific paradigms in chemistry provide a framework for understanding the properties of materials and developing new	Understanding	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	

			materials with specific properties. Overall, scientific paradigms in chemistry guide research and development in the field, and help scientists to better understand the behavior of chemicals and their interactions.				
		[SLO:C-10-A-03]	Explain, with examples, how scientists speak of "levels of confidence" (or uncertainty) when discussing experimental outcomes.	Understanding	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	
		[SLO: C-10-A-04]	Explain the difference between repeatability and reproducibility in chemistry. (For context: - repeatability as the idea that scientific results from experiments should be possible to verify by conducting the experiment again under the same physical conditions. - reproducibility as the idea that the same or similar result is obtained when the measurement is made under either different conditions or by a different method or in different experiment).	Understanding	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	
'B' **Physical Chemistry**	**Matter**	[SLO: C-10-B-01]	Explain changes of state and internal energy without change in temperature (melting, boiling, freezing, condensation, sublimation, and deposition) in terms of kinetic particle theory.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	**11**
		[SLO: C-10-B-02]	Distinguish between evaporation and boiling.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-03]	Interpret heating and cooling curves in terms of kinetic theory.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-04]	Interpret in terms of kinetic particle theory the effects of changing pressure, temperature and volume of a gas on the other two with regards to Boyle's law, Charles' Law, and Avogadro's Law.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-05]	Explain qualitatively the effect of external pressure on rate of boiling and evaporation.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	

		[SLO: C-10-B-06]	Explain diffusion of gases in terms of kinetic particle theory.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-07]	Examine qualitatively the effect of molecular mass and temperature on the rate of diffusion.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-08]	Discuss applications of sublimation around us. (Examples may include: solid air fresheners and 3D printing)	Understanding	**Summative for PBA**	**Lab work Questions will be asked in PBA.**	
		[SLO: C-10-B-09]	Explain, with the help of kinetic particle theory, the importance of rates of diffusion of medicines in the body.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
	Stoichiometry	[SLO: C-10-B-10]	Use the molar gas volume, 24 dm^3 at room temperature and pressure, in calculations involving gases.	Application	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	**08**
		[SLO: C-10-B-11]	Define concentration, use both g/dm^3 and mol/dm^3 and convert them.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-12]	Calculate stoichiometric relationships between substances relationships (specifically: ● reacting masses, limiting reactants, ● volume of gasses at r.t.p., ● volumes of solution and concentrations of solutions in g/dm^3 or mol/dm^3, including conversion between cm and dm^3)	Application	**Summative + Formative**	**Question(s) will be asked in annual examination. However calculation for limiting reactants are formative**	
		[SLO: C-10-B-13]	Calculate concentration of a solution in a titration using empirical data.	Application	**Summative for PBA**	**Lab work Questions will be asked in PBA.**	
		[SLO: C-10-B-14]	Calculate empirical formula and molecular formula from appropriate data.	Application	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-15]	Calculate percentage yield, percentage composition by mass and percentage purity from appropriate data.	Application	**Formative**	**Question(s) will not be asked in annual examination, however it will be a**	

						part of classroom teaching.	
	Electrochemistry	[SLO: C-10-B-16]	Define electrolysis as decomposition of ionic compound, in molten or aqueous solution, by passage of electric current.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	**14**
		[SLO: C-10-B-17]	Identify and label in simple electrolytic cells, the anode (+), cathode (-), electrolyte and direction of flow of electrons in external circuit.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-18]	Describe the transfer of charge in external circuit, movement of ions in the electrolyte and transfer of electrons at electrodes.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-8-19]	Identify the products formed at electrodes and describe the observations made during the electrolysis of molten lead (lI) chloride, concentrated aqueous sodium chloride, dilute sulfuric acid using inert electrodes (platinum or carbon/graphite).	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-20)	State that hydrogen- oxygen fuel cell uses hydrogen and oxygen to produce electricity with water as the only chemical product.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-21]	Describe the advantages and disadvantages of using hydrogen-oxygen fuel cells in comparison with gasoline /petrol engines in vehicles.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-22]	Identify the products formed at electrodes and describe the observations made during the electrolysis of dilute copper sulphate using inert electrode or copper electrode.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-23]	Predict the identity of products of electrolysis of a halide compound in dilute or concentrated solution.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-24]	Construct ionic half-equations for reaction at either electrode.	Application	**Summative for theory**	**Question(s) will be asked in annual examination.**	

		[SLO: C-10-B-25]	Describe the electroplating and its applications.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-26]	Sketch a schematic diagram for a Voltaic cell e.g. Daniel cell.	Application	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-27]	Use the voltage data given for voltaic cells to determine order of reactivity of any two metals.	Application	**Summative for theory**	**Question(s) will be asked in annual examination.**	
	Kinetics	[SLO: C-10-B-28]	Describe collision theory in terms of number of particles per unit volume, frequency of collisions of particles, kinetic energy of particles and activation energy.	Understanding	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	**07**
		[SLO: C-10-B-29]	State that catalyst increases the rate of reaction, provides alternate pathway with lower activation energy, and remains unchanged at the end of a reaction.	Knowledge	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	
		[SLO: C-10-B-30]	Describe the physical parameters that may be affected by the rate of, reaction including change in mass, temperature, and formation of gas.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-31]	Interpret data, including graphs, for investigating rate of reaction.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-32]	Explain the effect on rate of reaction of changing concentration of a reactant, pressure of gases, surface area of solids, temperature, presence of catalyst (including enzymes) using collision theory.	Understanding	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	
		[SLO: C-10-B-33]	Justify the importance of chemical kinetics in the food industry to determine ideal harvesting and transportation times for produce.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	

	Salts	[SLO: C-10-B-34]	Explain that salts are ionic compounds formed due to electrostatic attraction between oppositely charged ions (in which the positive ions come from bases and negative ions come from acids).	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	05
		[SLO: C-10-B-35]	Explain why at STP salts are solids with high melting points.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-36]	Describe that under normal conditions, ionic compounds are usually solids with lattice structures.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-37]	Explain why the molten and aqueous solutions of salts are good conductors of electricity by making reference to the idea of mobile ions.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-38]	Describe the general solubility rules for salts. (These are: a. sodium, nitrate, potassium and ammonium salts are soluble b. chlorides are soluble except lead and silver. c. carbonates are insoluble except sodium, potassium and ammonium d. hydroxides are insoluble except sodium, potassium, ammonium and calcium (partially).	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-B-39]	Describe the preparation, separation and purification of soluble salts by reactions of acids with alkali (titration), excess metal, excess insoluble base, excess insoluble carbonate.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
'C' **Inorganic Chemistry**	**Nitrogen and Sulfur**	[SLO: C-10-C-01]	Recognize that atmospheric oxides of nitrogen (NO and NO_2) can react with unburned hydrocarbons to form peroxyacetyl nitrate, PAN, which is a component of photochemical smog.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	**07**
		[SLO: C-10-C-02]	Describe the role of NO and NO_2, in the formation of acid rain both directly and in their catalytic role in the oxidation of atmospheric sulfur dioxide.	Understanding	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	

		[SLO: C-10-C-03]	State the symbol equation for the production of ammonia in the Haber process: $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-C-04]	State the sources of the hydrogen (methane) and nitrogen (air) in the Haber process.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-C-05]	State the typical conditions in the Haber process as 450°C, 20000 kPa /200 atm and an iron catalyst.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-C-06]	State the symbol equation for the conversion of sulfur dioxide to sulfur trioxide in the Contact process: $2SO_2 + O_2 \rightleftharpoons 2SO_3$	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-C-07]	State the sources of the sulfur dioxide (burning sulfur or roasting sulfide ores) and oxygen (air) in the Contact process.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-C-08]	State the typical conditions for the conversion of sulfur dioxide to sulfur trioxide in the Contact process as 450°C, 200kPa /atm and a Vanadium(V) oxide catalyst.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
	Oxides	[SLO: C-10-C-09]	**Oxides** Describe amphoteric oxides as oxides that react with acids and bases to produce a salt and water.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	**05**
		[SLO: C-10-C-10]	Classify oxides as acidic, including SO_2, and CO_2, basic, including CuO and CaO, or amphoteric, limited to Al_2O_3 and ZnO, related to metallic and non-metallic character.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-C-11]	**Properties of metals** Identify the general chemical properties of metals, limited to their reactions with dilute acids, cold water, steam and oxygen.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-C-12]	Arrange metals in order of reactivity given relevant information.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	

'E' **Organic Chemistry**	**Basics of Organic Chemistry**	[SLO: C-10-E-01]	Name and draw the structural and displayed formulae of unbranched alkanes, alkenes, alcohols, and carboxylic acids. (Include but-1-ene and but-2-ene, propan-1-ol, propan2-0, butan-1-ol and butan-2-ol).	Application	**Summative for theory**	**Question(s) will be asked in annual examination.**	**06**
		[SLO: C-10-E-02]	State the type of compound present given the chemical name ending in - ane, -ene, -yne, -ol, or -oic acid or from a molecular, structural or displayed formula.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-03]	Name and draw the displayed formulae of the unbranched esters which can be made from unbranched alcohols and carboxylic acids, each containing up to four carbon atoms.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
	Hydro-carbons	[SLO: C-10-E-04]	**Alkenes** State that the bonding in alkenes includes a double carbon-carbon covalent bond and that alkenes are unsaturated hydrocarbons.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	**07**
		[SLO: C-10-E-05]	Describe the manufacture of alkenes by the cracking of large alkane molecules using a high temperature and a catalyst.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-06]	Describe the reasons for the cracking of large alkane molecules.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-07]	Describe the test to distinguish between saturated and unsaturated hydrocarbons by their reaction with aqueous bromine and $KMnO_4$.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-08]	Describe the properties of alkenes in terms of addition reactions with: a. bromine or aqueous bromine b. hydrogen in the presence of a nickel catalyst c. steam in the presence of an acid catalyst and draw the structural or displayed formulae of the products	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-09]	Describe, using symbol equations, preparation of alkenes by elimination reaction in halogenoalkanes and alcohols.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	

		[SLO: C-10-E-10]	**Alkynes** Identify alkynes as hydrocarbons containing triple carbon-carbon covalent bond and that alkynes are unsaturated hydrocarbons.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-11]	Describe the use of ethyne as fuel for welding and in artificially ripening fruits.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-12]	Describe separation of petroleum into useful fraction by fractional distillation.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-12]	Describe how the properties of fractions obtained from petroleum change from the bottom to the top of the fractionating column, limited to: a. decreasing chain length b. higher volatility c. lower boiling points d. lower viscosity	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-14]	Name the uses of the fractions as: a. refinery gas fraction for gas used in heating and cooking b. gasoline /petrol fraction for fuel used in cars c. naphtha fraction as a chemical feedstock d. kerosene /paraffin fraction for jet fuel e. diesel oil/ gas oil fraction for fuel used in diesel engines f. fuel oil fraction for fuel used in ships and home heating systems. g. lubricating oil fraction for lubricants, waxes and polishes h. bitumen fraction for making roads	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
	Hydroxy Compounds	[SLO: C-10-E-15]	Describe the manufacture of ethanol. (This can be done by discussing • Fermentation of aqueous glucose at 25-35 ^{O}C in the presence of yeast and in the absence of oxygen. • catalytic addition of steam to ethane at 300 ^{O}C and 6000kPa / 6atm in the presence of an acid catalyst including a	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	**04**

			comparison of the advantages and disadvantages of the two methods)				
		[SLO: C-10-E-16]	Describe the combustion of alcohols.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-17]	Discuss the applications of alcohols as fuels, including their advantages and disadvantages over fossil fuels.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-18]	Explain the role of alcohols in various industries such as pharmaceuticals, cosmetics, and fuel production.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-19]	Discuss the impact of alcohols on daily life, including their use as solvents and disinfectants.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
	Carbonyl Compounds	[SLO: C-10-E-20]	Describe the reactions of carboxylic acids with metals, bases and carbonates including names and formulae of the salts produced.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	**06**
		[SLO: C-10-E-21]	Describe the formation of ethanoic acid by the oxidation of ethanol: with acidified aqueous potassium manganate (VII) & by bacterial oxidation during vinegar production.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-22]	Describe the reaction of a carboxylic acid with an alcohol using an acid catalyst to form an ester.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-23]	Describe the industrial applications of carboxylic acids and esters, including their use as solvents, flavors, fragrances, and plastics.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-24]	Explain the role of carboxylic acids and esters in daily life, including their use in food preservation, cosmetics, and pharmaceuticals.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
	Polymers	[SLO: C-10-E-25]	Define polymers as large molecules built up from many smaller molecules called monomers.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	**04**
		[SLO: C-10-E-26]	Identify the repeating units and / or linkages in addition polymers and in condensation polymers.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-27]	Deduce the structure or repeat unit of an addition polymer from a given alkene and vice versa.	Understanding	**Summative for theory**	**Question(s) will not be asked in annual**	

						examination, however it will be a part of classroom teaching.	
		[SLO: C-10-E-28]	Deduce the structure or repeating unit of a condensation polymer from given monomers and vice versa, limited to: a. polyamides from a dicarboxylic acid and a diamine b. polyesters from a dicarboxylic acid and a diol	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-29]	Describe the differences between addition and condensation polymerization.	Understanding	**Summative for theory**	**Summative**	
		[SLO: C-10-E-30]	State that plastics are made from polymers.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-31]	Describe how the properties of plastics have implications for their disposal.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-32]	Describe the environmental challenges. caused by plastics, limited to: a. disposal in landfill sites b. accumulation in oceans c. formation of toxic gases from burning	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-33]	Describe the structure of: a. nylon, a polyamide b. PET, a polyester The full name for PET, polyethylene terephthalate, is not required	Knowledge	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	
		[SLO: C-10-E-34]	State that PET can be converted back into monomers and re-polymerized.	Knowledge	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	
		[SLO: C-10-E-35]	Outline the importance of polymers in the textile industry. (Examples for polymers being used may be given along with their specific properties)	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	

	Bio-chemistry	[SLO: C-10-E-36]	Describe proteins as natural polyamides and that they are formed from amino acid monomers with the general structure.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	**05**
		[SLO: C-10-E-37]	Draw the general structure of proteins.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-38]	Explain the sources, use and structure of proteins, lipids and carbohydrates.	Understanding	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	
		[SLO: C-10-E-39]	Describe the importance of nucleic acids.	Understanding	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	
		[SLO: C-10-E-40]	Explain vitamins, their sources and their importance to health.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-E-41]	Identify applications of biochemistry in testing (blood test, pregnancy test, cancer screening, parental genetic testing), genetic engineering, gene therapy and cloning.	Understanding	**Formative**	**Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.**	
'F' **Empirical Data Collection & Analysis**	**Energy**	[SLO: C-10-F-01]	Name fossil fuels; coal, natural gas and petroleum.	Knowledge	**Summative for theory**	**Question(s) will be asked in annual examination.**	**04**
		[SLO: C-10-F-02]	Name methane as main constituent of natural gas.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
		[SLO: C-10-F-03]	State that petroleum is a mixture of hydrocarbons, compounds containing hydrogen and carbon only.	Understanding	**Summative for theory**	**Question(s) will be asked in annual examination.**	
'G'		[SLO: C-09-10-G-01]	Explain, with examples, the types of chemical hazards in the lab and suggest safety precautions.	Understanding	**Formative for PBA**	**Question(s) will not be asked in annual**	**15**

	Lab and Practical Skills		(Types of chemical hazards to be identified: flammable or explosive hazards, corrosive hazards, toxic hazards, reactive hazards, radiation hazards and asphyxiation hazards).			**examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-02]	Recognize the meaning of different chemical hazard signs in the lab and on chemicals.	Knowledge	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work**	
		[SLO: C-09-10-G-03]	Recognize the importance of personal protective equipment (PPE) by correctly lab activities identifying the types of PPE needed for different lab activities.	Knowledge	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work**	
		[SLO: C-09-10-G-04]	Locate the nearest fire extinguisher and emergency shower.	Understanding	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work**	
		[SLO: C-09-10-G-05]	Show awareness of emergency procedures in the event of an emergency in the lab.	Understanding	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-06]	Identify apparatus from diagrams or descriptions.	Understanding	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-07]	Draw, complete or label diagrams of apparatus.	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA**	
		[SLO: C-09-10-G-08]	Explain the use of, common techniques, apparatus and materials.	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-09]	Select the most appropriate apparatus or method for the task and justify the choice made	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA**	

		[SLO: C-09-10-G-10]	Describe tests (qualitative, gas tests, other tests).	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-11]	Describe and explain techniques used to ensure the accuracy of observations and data.	Understanding	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-12]	Carry out the following tests under supervision. • Identification of metal ions. • Non-metal ions and gases. • Chemical test for water. • Test-tube reactions of dilute acids, including ethanoic acid. • Tests for oxidizing and reducing agents. • Melting points and boiling points. • Displacement reactions of metals and halogens. • Temperature changes during reactions.	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-13]	Carry out separation and purification techniques. (This may include: • Filtration. • Crystallization. • Simple distillation, fractional distillation. • Chromatography. • Electrolysis).	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-14]	Suggest the most appropriate apparatus or technique and justify the choice made.	Understanding	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-15]	Describe experimental procedures.	Understanding	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-16]	Take readings from apparatus (analogue and digital) or from diagrams of apparatus with appropriate precision.	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	

		[SLO: C-09-10-G-17]	Take sufficient observations or measurements, including repeats where appropriate.	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-18]	Record qualitative observations from chemical tests and other tests.	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-19]	Record observations and measurements systematically (in a suitable table, to an appropriate degree of precision and using appropriate units).	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-20]	Record the results of an experiment.	Application	**Summative for PBA**	**Lab work- Question(s) will be asked in PBA.**	
		[SLO: C-09-10-G-21]	Process the results of an experiment to form a conclusion or to evaluate a prediction.	Application	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-22]	Predict expected results.	Understanding	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-23]	Interpret and evaluate experimental observations and data.	Application	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-24]	Process data, including for use in further calculations or for graph plotting.	Application	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-25]	Present data graphically, including the use of best-fit lines where appropriate.	Application	**Formative for PBA**	**Question(s) will not be asked in annual examination,**	

						however it will be a part of Lab work.	
		[SLO: C-09-10-G-26]	Analyze and interpret observations and data, including data presented graphically.	Application	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-27]	Form conclusions justified by reference to observations and data and with appropriate explanation.	Understanding	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-28]	Evaluate the quality of observations and data, identifying any anomalous results.	Application	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-29]	Identify potential sources of error in an experimental design.	Understanding	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-30]	Assess the limitations of an experimental design.	Understanding	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
		[SLO: C-09-10-G-31]	Evaluate experimental arrangements, methods and techniques, including the control of variables.	Application	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	

		[SLO: C-09-10-G-32]	Suggest possible improvements to the apparatus, experimental arrangements, methods or techniques.	Understanding	**Formative for PBA**	**Question(s) will not be asked in annual examination, however it will be a part of Lab work.**	
							Total no. of Periods = 110

Federal Board SSC-II Examination
Model Question Paper Chemistry
(Curriculum 2022-23) Scheme of Studies 2006

ROLL NUMBER					
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
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4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
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Version No.			
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7	7	7	7
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9	9	9	9

Section - A (Marks 12)

Time Allowed: 20 minutes

Section-A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/ overwriting is not allowed. *Do not use lead pencil.*

Invigilator Sign. _____ **Candidate Sign.**_____

Q1. Fill the relevant bubble against each question according to the curriculum. Each part carries one mark.

	Question	A	B	C	D	A	B	C	D
i	A student places a piece of dry ice (solid CO_2) in a sealed container. After a while, the container expands and may even burst. What is the best explanation for this?	The dry ice melted and turned into liquid, increasing volume.	The dry ice reacted with oxygen to form new compounds	The dry ice sublimed, producing gas that increases pressure.	The container absorbed external heat, causing it to burst	○	○	○	○
ii	What is the direction of flow of electrons in an electrolytic cell?	Anode to cathode externally	Anode to cathode internally	Cathode to anode externally	Cathode to anode in the solution	○	○	○	○
iii	In the following reaction, $N_{2(g)}+3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ Which physical factor has the greatest impact on the reaction rate as the reaction progresses?	Temperature	Catalyst	Concentrations	Volume	○	○	○	○
iv	Which cations generally form soluble salts in water?	Sodium (Na^+), Potassium (K^+), and Ammonium (NH_4^+)	Silver (Ag^+), Lead (Pb^{2+}), and Mercury (Hg^{2+})	Barium (Ba^{2+}), Calcium (Ca^{2+}), and Strontium (Sr^{2+})	Iron (Fe^{2+}), Copper (Cu^{2+}), and Zinc (Zn^{2+})	○	○	○	○
v	The products of the reaction of an acid with an insoluble base are?	Salt + CO_2	Salt + O_2	Salt + H_2O	Salt + H_2	○	○	○	○
vi	What are essential conditions used in the manufacture of ammonia in Haber process?	450°C, 2 atm and V_2O_5 as a catalyst	200°C, 2 atm and Fe as a catalyst	200°C, 200 atm and V_2O_5 as a catalyst	450°C, 200 atm and Fe as a catalyst	○	○	○	○
vii	A student plotted a graph of reactant concentration versus time for a chemical reaction. What does a steeper slope indicate?	A slower reaction rate	No reaction taking place	A faster reaction rate	A decrease in activation energy	○	○	○	○

viii	What is the purpose of evaporation in salt purification?	To dissolve the salt completely in water	To remove excess reactants	To concentrate the salt solution and form crystals	To change the salt into a gas	○ ○ ○ ○
ix	How many grams of NaCl are present in 2 moles of sodium chloride? (Molar mass of NaCl = 58.5 g/mol)	58.5 g	117 g	29.25 g	235 g	○ ○ ○ ○
x	Which one of the following compounds is formed by oxidation of ethanol?	Methanoic acid	Ethanoic acid	Pentanoic acid	Butanoic acid	○ ○ ○ ○
xi	Gasohol is a mixture of?	Gas & Alcohol	Gas & Gasoline	Gasoline & Alcohol	Gasoline & aldehyde	○ ○ ○ ○
xii	Which of the following equations will take place at the anode during the electrolysis of an aqueous $CuSO_4$ solution?	$Cu^{2+} + 2e^- \rightarrow Cu$	$2H^+ + 2e^- \rightarrow H_2$	$4OH^- - 4e^- \rightarrow H_2O + O_2$	$SO_4^{2-} \rightarrow SO_2 + O_2 + 2e^-$	○ ○ ○ ○

Federal Board SSC-II Examination
Chemistry Model Question Paper
(Curriculum 2022-2023) Scheme of Studies 2006

Time allowed: 2:40Hours Total Marks Section B & C: 53

Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**. Write your answers on the allotted /given spaces.

SECTION – B (Marks 33)

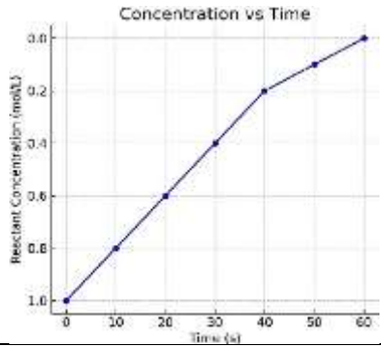
Q. 2	**Attempt the following questions**			**(11x3 = 33)**	
(i)	Based on the given standard electrode potential (E°) values, arrange the following metals in order of increasing reactivity. Explain how electrode potential relates to metal reactivity. $Mg^{2+} + 2e^- \rightarrow Mg$ E°= -2.37 $Cu^{2+} + 2e^- \rightarrow Cu$ E°= +0.34 $Ni^{2+} + 2e^- \rightarrow Ni$ E°= -0.25	1+2	OR	A gas sample has a volume of 72 dm^3 at room temperature and pressure. How many moles of gas does it contain?	03
(ii)	The Contact Process is an industrial method for sulfuric acid production. a. Write the balanced symbol equation for conversion of sulfur dioxide to sulfur trioxide in the Contact process. b. Identify the sources of sulfur dioxide and oxygen in this process. c. What are the typical conditions for the conversion of sulfur dioxide to sulfur trioxide?	1+1 +1	OR	a. What is molarity? How can you convert molarity to g/dm^3? b. What is the molarity of a solution made by dissolving 98 g of H_2SO_4 in 1 dm^3 of water? (Molar mass of H_2SO_4 = 98 g/mol)	1.5+ 1.5
(iii)	A sample of calcium carbonate ($CaCO_3$) contains 20 grams of calcium. What is the mass of carbon dioxide (CO_2) produced when the calcium carbonate is heated?	03	OR	Draw structural formula of following a. Pent-2-ene b. But-1-ol c. Pentanoic acid	1+1+ 1
(iv)	a. What is a polymer? b. Name the basic building blocks of polymers. c. Which polymer is commonly used to make plastic bottles?	1+1 +1	OR	Draw the structure showing how protein molecule is formed, clearly highlighting the peptide linkages within the structure.	2+1
(v)	Write the chemical equations for the reactions of: a. Zinc with steam. b. Magnesium with hydrochloric acid. c. Sodium with cold water.	1+1 +1	OR	a) What are the reactants in a hydrogen-oxygen fuel cell? b) Which electrode in a hydrogen-oxygen fuel cell undergoes oxidation c) Write the overall reaction equation for a hydrogen-oxygen fuel cell.	03
(vi)	a. What is esterification? Provide a general reaction equation to illustrate the process. b. Why is esterification considered a condensation reaction?	2+1	OR	How does the lattice structure of salts contribute to their physical properties?	03
(vii)	Complete the following reactions: a. CH_3-CH_2-Br + alcoholic KOH → Y b. Y + Br_2 → Z	1.5 + 1.5	OR	Why are SO_2 and CO_2 classified as acidic oxides and CuO and CaO considered basic oxides?	1.5+ 1.5

(viii)	a. Why is petroleum considered a mixture? Give three examples of a hydrocarbon found in petroleum.	1.5 + 1.5	OR	Ethene and ethane are hydrocarbons which belong to different classes. How can they be distinguished? Write at least two tests in each case for the support of your answer.	1+2
(ix)	Give reactions to illustrate how unburned hydrocarbons contribute to the formation of peroxyacetyl nitrates (PANs) ? .	1+1 +1	OR	a. What are the primary fossil fuels used for energy production? b. Identify the fossil fuel that is mainly composed of methane. Among coal, petroleum, and natural gas, which is considered the cleanest-burning fuel	1+1 +1
(x)	Vitamins are important for our health. Summarize their sources and importance in health.	1.5 + 1.5	OR	Explain the combustion process of alcohols and discuss why they are considered cleaner fuels compared to fossil fuels?	1.5 + 1.5
(xi)	Zinc plating is carried out to prevent iron from corrosion. Describe its complete process and chemical reactions taking place at anode and cathode.	1.5 + 1.5	OR	How will you explain the formation of ethanol by: a. Fermentation and catalytic addition of steam. Explain your answer with balanced chemical equations.	1.5+ 1.5

Section – C (Marks 20)

Note: Attempt all questions. Marks for each question are given. (4 x 05=20)

Q.3	Identify the functional groups in the following compounds: a. $HCOOCH_3$ b. CH_3-C ≡ C-CH_3 c. C_3H_6 d. $C_4H_{11}OH$	1×4	O R	Describe the general chemical properties of metals with reference to their reactivity with: i. **Dilute acids** ii. **Cold water** iii. **Steam** iv. **Oxygen** Provide **balanced chemical equations** to illustrate each type of reaction.	1× 4
Q.4	Carbon dioxide (CO_2) is produced by the reaction of carbon monoxide (CO) with oxygen gas (O_2) according to the balanced equation: $2CO_{(g)} + O_{2(g)} \rightarrow 2CO_{2(g)}$ If **28 g of carbon monoxide (CO)** reacts with an excess of oxygen gas, answer the following: a. Calculate the number of moles of carbon monoxide (CO) used. b. Determine the number of moles of carbon dioxide (CO_2) produced. c. Find the mass of carbon dioxide (CO_2) formed. Calculate the volume of carbon dioxide (CO_2) produced at room temperature and pressure (RTP), where 1 mole of gas = 24 dm^3.	1.5 ×4		A student is working in a lab and has been assigned a task to examine an unknown hydrocarbon. The compound has been isolated from a crude oil sample and has a molar mass of 70 g/mol. He obtained the following data: - Mass of carbon: 10.0 g - Mass of hydrogen: 3.0 g - Mass of nitrogen: 2.0 g Calculate its empirical and molecular formula.	4+ 2

Q.5	a. What does the rate of reaction mean, and how can it be measured? b. How can a graph of "time vs. reactant concentration" be used to determine the rate of reaction? c. Interpret the given graph and explain how the reaction rate changes over time. 	2+2 +2	O R	Metals X, Y, and Z were tested for their reactivity with dilute acid and water. The results are given below: ➢ Metal X reacts with cold water, forming hydrogen gas. ➢ Metal Y does not react with water but reacts with hydrochloric acid, producing bubbles of hydrogen gas. Metal Z does not react with water or acid. A arrange these metals in order of reactivity and explain how the observations support your answer.	3+ 3
Q.6	a) Draw a schematic diagram for the electrolysis of dilute copper(II) sulphate using inert or copper electrodes. b) Label the anode, cathode, electrolyte, and the direction of ion movement. Describe the observations and products formed at each electrode	1+1 +2	O R	A polymer is formed by the reaction between a dicarboxylic acid and a diamine. a) What type of polymerization occurs in this reaction? Explain. b) Determine the structure of the repeating unit in the resulting polymer. c) Identify the functional group that forms during the polymerization process. Name a well-known synthetic polyamide and mention one of its applications.	04

FBISE SSC-II Examination

Chemistry Model Question Paper

(Curriculum 2022-23) Scheme of Studies 2006

Alignment of Questions with Curriculum Student Learning Outcomes

Q 1: Parts No	SLOs	Domain	Cognitive level	Marks
i.	[SLO: C-10-B-08] Discuss applications of sublimation around us. (Examples may include: solid air fresheners and 3D printing)	B	U	1
ii.	[SLO: C-10-B-17] Identify and label in simple electrolytic cells, the anode (+), cathode (-), electrolyte and direction of flow of electrons in external circuit.	B	K	1
iii.	[SLO: C-10-B-30] Describe the physical parameters that may be affected by the rate of, reaction including change in mass, temperature, and formation of gas.	B	U	1
iv.	[SLO: C-10-B-38] Describe the general solubility rules for salts. (These are: a. sodium, nitrate, potassium and ammonium salts are soluble b. chlorides are soluble except lead and silver. c. carbonates are insoluble except sodium, potassium and ammonium d. hydroxides are insoluble except sodium, potassium, ammonium and calcium (partially).	B	U	1
v.	[SLO: C-10-B-39] Describe the preparation, separation and purification of soluble salts by reactions of acids with alkali (titration), excess metal, excess insoluble base, excess insoluble carbonate.	B	U	1
vi.	SLO: C-10-C-08 State the typical conditions for the conversion of sulfur dioxide to sulfur trioxide in the Contact process as 450°C, 200kPa /atm and a Vanadium(V) oxide catalyst.	C	K	1
vii.	SLO: C-10-B-31 Interpret data, including graphs, for investigating rate of reaction.	B	U	1
viii.	SLO: C-10-B-39. Describe the preparation, separation and purification of soluble salts by reactions of acids with alkali (titration), excess metal, excess insoluble base, excess of insoluble carbonate.	B	U	1
ix.	SLO: C-10-B-12. Calculate stoichiometric relationships between substances relationships (specifically: ● reacting masses, limiting reactants, ● volume of gasses at r.t.p., ● volumes of solution and concentrations of solutions in g/dm3 or mol/dm3, including conversion between cm and dm^3)	B	U	1
x.	[SLO: C-10-E-21] Describe the formation of ethanoic acid by the oxidation of ethanol: with acidified aqueous potassium manganate (VII) & by bacterial oxidation during vinegar production.	E	U	1
xi.	[SLO: C-10-E-17] Discuss the applications of alcohols as fuels, including their advantages and disadvantages over fossil fuels.	E	U	1
xii.	[SLO: C-10-B-24] A Construct ionic half-equations for reaction at either electrode.	B	A	1

SECTION – B (Marks 33)

Sr No	SLO	Domain	Cognitive level		SLO	Domain	Cognitive level
(i)	[SLO: C-10-B-27] Use the voltage data given for voltaic cells to determine order of reactivity of any two metals	B	A	**OR**	[SLO: C-10-E-01] Name and draw the structural and displayed formulae of unbranched alkanes, alkenes, alcohols, and carboxylic acids. (Include but-1-ene and but-2-ene, propan-1- ol, propan2-0, butan-1-ol and butan-2-ol).	B	A
(ii)	SLO: C-10-C- 08 State the typical conditions for the conversion of sulfur dioxide to sulfur trioxide in the Contact process as 450°C, 200kPa /atm and a Vanadium(V) oxide catalyst.	C	K	**OR**	SLO: C-10-B-11 Define concentration, use both g/dm^3 and mol/dm^3 and convert between them.	B	K
(iii)	[SLO: C-10-B-12] A Calculate stoichiometric relationships between substances relationships (specifically: ● reacting masses, limiting reactants, ● volume of gasses at r.t.p., ● volumes of solution and concentrations of solutions in g/dm^3 or mol/dm^3, including conversion between cm and dm^3)	B	A	**OR**	SLO: C-10-B-10 Use the molar gas volume, 24 dm^3 at room temperature a pressure, in calculations involving gases.	E	A
(iv)	[SLO: C-10-E-25] Define polymers as large molecules built up from many smaller molecules called monomers.	E	K	**OR**	[SLO: C-10-E-37] Draw the general structure of proteins.	E	K
(v)	SLO: C-10-C-11 Identify the general chemical properties of metals, limited to their reactions with dilute acids, cold water, steam and oxygen.	C	K	**OR**	[SLO: C-10-B-20] State that hydrogen- oxygen fuel cell uses hydrogen and oxygen to produce electricity with water as the only chemical product.	B	K
(vi)	SLO: C-10-E-22 Describe the reaction of a carboxylic acid with an alcohol using an acid catalyst to form an ester.	E	U	**OR**	SLO: C-10-B-36 Describe that under normal conditions, ionic compounds are usually solids with lattice structures.	B	**U**
(vii)	SLO: C-10-E-09 Describe, using symbol equations, preparation of alkenes by elimination reaction in halogenoalkanes and	E	U	**OR**	[SLO: C-10-C-10] Classify oxides as acidic, including SO_2, and CO_2, basic, including CuO and CaO, or amphoteric, limited to Al_2O_3 and ZnO, related to	C	**U**

	alcohols. SLO: C-10-E-08 Describe the properties of alkenes in terms of addition reactions with: a. bromine or aqueous bromine				metallic and non-metallic character.		
(viii)	[SLO: C-10-E-12] Describe separation of petroleum into useful fraction by fractional distillation.	E	U	**OR**	SLO: C-10-E-07 Describe the test to distinguish between saturated and unsaturated hydrocarbons by their reaction with aqueous bromine and $KMnO_4$.	E	U
(ix)	SLO: C-10-C-01 **Nitrogen and Sulfur** Recognize that atmospheric oxides of nitrogen (NO and NO_2) can react with unburned hydrocarbons to form peroxyacetyl nitrate, PAN, which is a component of photochemical smog.	C	K	**OR**	SLO: C-10-F-01 Name fossil fuels; coal, natural gas and petroleum.	F	K
(x)	[SLO:C-10-E-40] U Explain vitamins, their sources and their importance to health.	E	U	**OR**	[SLO: C-10-E-16] U Describe the combustion of alcohols.	E	U
(xi)	[SLO:C-10-B-25] U Describe the electroplating and its applications.	B	U	**OR**	[SLO: C-10-E-15) U Describe the manufacture of ethanol. Fermentation of aqueous glucose at 25-35 ^{O}C in the presence of yeast and in the absence of oxygen. catalytic addition of steam to ethane at 300 ^{O}C and 6000kPa / 6atm in the presence of an acid catalyst including a comparison of the advantages and disadvantages of the two methods)	E	U

SECTION – C (Marks 20)

Note: Attempt the following questions.

No	SLO	Domain	Cognitive level		SLO	Domain	Cognitive level
Q.3	SLO: C-10-E-02 State the type of compound present given the chemical name ending in - ane, -ene, -yne, -ol, or -oic acid or from a molecular, structural or displayed formula. SLO: C-10-E-03 Name and draw the displayed formulae of the unbranched esters which can be made from unbranched alcohols and carboxylic acids, each containing up to four carbon atoms.	E	**K**	**OR**	SLO: C-10-C-11 Identify the general chemical properties of metals, limited to their reactions with dilute acids, cold water, steam and oxygen.	C	**K**
Q.4	SLO: C-10-B-12 Calculate stoichiometric relationships between substances relationships (specifically: ● reacting masses, limiting reactants, ● volume of gasses at r.t.p., ● volumes of solution and concentrations of solutions in g/dm3 or mol/dm3, including conversion between cm and dm^3)	B	**A**	**OR**	SLO: C-10-B-14 Calculate empirical formula and molecular formula from appropriate data.	B	**A**
Q.5	SLO: C-10-B-31 Interpret data, including graphs, for investigating rate of reaction.	B	**U**	**OR**	SLO: C-10-C-12 Arrange metals in order of reactivity given relevant information.	C	**U**
Q.6	SLO: C-10-B-22 Identify the products formed at electrodes and describe the observations made during the electrolysis of dilute copper sulphate using inert electrode or copper electrode.	B	**U**	**OR**	SLO: C-10-E-28 U Deduce the structure or repeating unit of a condensation polymer from given monomers and vice versa, limited to: a. polyamides from a dicarboxylic acid and a diamine polyesters from a dicarboxylic acid and a diol	E	**U**

Table of Specification of the Model Paper Chemistry Grade – X (SSC-II)

Content Domains / Cognitive Levels	History of Chemistry	Matter	Stoichiometry	Electrochemistry	Kinetics	Salts	Nitrogen, Sulphur and Metals	Oxides	Basics of Organic Chemistry	Hydrocarbons	Hydroxy Compounds	Carbonyl Compounds	Polymers	Bio-chemistry	Energy	Total Marks	%age
Knowledge			Q2(ii/s)(3)	Q1(ii)(1) Q2(v/s)(3)			Q2(ii/f)(3) Q2(ix/f) (3) Q3(s)(4) Q1(vi) (1)	Q2(v/f) (3)		Q3(f)(4)			Q2(iv/ f)(3)	Q2(iv/ s)(3)	Q2(ix/ s)(3)	34	29
Understanding		Q1(i)(1)		Q2(xi/f)(3) Q6(f)(4)	Q1(iii)(1) Q1(vii) (1) Q5(f)(6)	Q1(iv) (1) Q1(v) (1) Q2(vi/ s) (3) Q1(vii i)(1)	Q5(s)(6)	Q2(vii/s) (3)		Q2(vii/f) (3) Q2(viii/ f)(3) Q2(viii/ s) (3)	Q2(xi/s) (3) Q2(x/s) (3) Q1(xi) (1)	Q2(vi/f) (3) Q1(x)(1)	Q6(s)(4)	Q2(x/f) (3)		58	49
Application			Q1(ix)(1) Q2(iii/f)(3) Q2(i/s)(3) Q4(f)(6) Q4(s)(6)	Q2(i/f)(3) Q1(xii)(1)					Q2(iii/s) (3)							26	22
Total		1	10	16	8	9	6	12	11	6	9	6	7	6	11	118	100
Percentage																	

Note:

1 This ToS does not reflect policy, but it is particular to this model question paper.

2 Proportionate / equitable representation of the content areas may be ensured.

3 The percentage of cognitive level is 30%, 50%, and 20% for knowledge, understanding, and application, respectively with **± 5%** variation.

4 While selecting alternative questions for SRQs and ERQs, it must be kept in mind that:

- Difficulty levels of the two alternative questions of the internal choice will be same
- SLOs of the two alternative questions of the internal choice must be different

Key: Question Number (part/ first choice) marks example: Q2 (i / f)3

Question Number (part/ second choice) marks example: Q2 (i / s) 3

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