



**FEDERAL BOARD OF INTERMEDIATE  
AND SECONDARY EDUCATION  
H-8/4, ISLAMABAD**



No.1-10/FBISE/RES/652

30 August, 2024

**Subject: IMPLEMENTATION OF ASSESSMENT FRAMEWORKS AND MODEL QUESTION PAPERS DEVELOPED ON NATIONAL CURRICULUM OF PAKISTAN (NCP) 2022-2023**

In continuation to this office Notifications bearing No.1-10/FBISE/RES/383 dated 14 March 2024 and No.1-10/FBISE/RES/422 dated 19 March 2024 on the subject of Implementation of National Curriculum of Pakistan (NCP) 2022-23, Assessment Frameworks, Model Question Papers along with SLOs Alignment Charts and Tables of Specifications (ToS) at SSC-I and HSSC-I levels in the subjects of English Compulsory, Urdu Compulsory, Pakistan Studies (SSC-I), Islamiyat Compulsory (HSSC-I), Physics, Chemistry, Biology, Mathematics and Computer Science are hereby uploaded on FBISE Website [www.fbise.edu.pk](http://www.fbise.edu.pk). The Weblink is [https://fbise.edu.pk/curriculum\\_model\\_paper.php](https://fbise.edu.pk/curriculum_model_paper.php).

2. It is important to note that the Assessment Frameworks which contain all the SLOs of the curriculum 2022-23 will guide students, teachers and paper setters. Students will receive clear instructions on how to prepare for examinations. Teachers will use the Frameworks to understand what to teach in class and to prepare their students for the final examinations. Similarly, paper setters will use these documents for guidance in creating examination papers. It may be noted that the SLOs of Summative Assessment mentioned in the Assessment Frameworks will be included in the Final Board Examinations, whereas the SLOs of Formative Assessment will NOT be included in the Final Board Examinations; however, they will be part of teaching-learning activity in the class.

3. It is reiterated that the examinations of all the above mentioned subjects will be based on Student Learning Outcomes (SLOs) given in the respective curriculum (Assessment Frameworks) instead of textbooks. Educational institutions, students and teachers may consult the books of publishers reviewed by National Curriculum Council available on its Weblink <https://ncc.gov.pk/SiteImage/Misc/files/Annexures.pdf>. Moreover, the institutions are free to rely on any other valid and reliable instructional/reference material to fulfil the instructional requirements of the SLOs of these subjects.

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ASSESSMENT FRAMEWORK AND MODEL QUESTION PAPER

# CHEMISTRY

## Grade IX

NATIONAL CURRICULUM  
2022-23



FEDERAL BOARD OF  
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**H-8/4, ISLAMABAD**



**ASSESSMENT FRAMEWORK**  
**FOR**  
**CHEMISTRY GRADE-IX**  
**CURRICULUM 2022-23**

# 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-IX. 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-IX 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, Nilore, Islamabad
2. Mr. Naeem Mushtaq, Associate Professor, Islamabad Model College for Boys, G-10/4, Islamabad
3. Ms. Maryum Adeel, Deputy Director, Army Public Schools and Colleges System Secretariat, GHQ, Rawalpindi
4. Mr. Abid Latif, Associate Professor, Army Public School and College (Boys), Ordinance Road, Rawalpindi
5. Ms. Javaria Gull, HOD Chemistry, Pak Turk Maarif International School, H-8/1 Islamabad

The whole work was successfully accomplished under the able supervision and guidance of Syed Junaid Akhlaq, 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 AF.

**MIRZA ALI**  
Director (Research & Academics)  
FBISE, Islamabad

## **ASSESSMENT FRAMEWORK FOR CHEMISTRY GRADE-IX, 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**  
**Details of Content Area/ SLOs ---- Grade-IX (SSC-I)**

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
<b>A</b>	<b>Nature of Science in Chemistry</b>	SLO: C-09-A-01	Define chemistry as the study of matter, its properties, composition and interactions with other matter and energy or study of Earth (solids), Air (gases), Sea (liquids) and sky (plasma) and their interaction with each other.	Knowledge	Summative	Question(s) will be asked in annual examination.	04
		SLO: C-09-A-02	Explain with examples that chemistry has many sub-fields and example, and interdisciplinary fields. (Some examples includes). Biochemistry. Medicinal Chemistry. Polymer Chemistry. Geochemistry. Environmental Chemistry. Analytical Chemistry. Physical Chemistry. Organic Chemistry. Inorganic Chemistry. Nuclear Chemistry. Astrochemistry).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-A-03	Formulate examples of essential question(s) that are important for the branches of Chemistry. e.g. for Analytical Chemistry a question would be 'how can we accurately determine the chemical composition of a sample?')	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-A-04	Differentiate between 'science', 'technology' and 'engineering' by making reference to examples from the physical sciences. (Science is a process of exploring new knowledge methodically through observation and experiments, technology refers to the process of applying scientific knowledge in practical applications, for various purposes. Engineering is the application of knowledge in order to design, build and maintain a product or a process. that solves a problem and fulfills a need. Science provides the fundamental knowledge and understanding whole engineering applies that knowledge to develop practical solutions.	Understanding	Formative	Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.	
<b>B</b>	<b>Matter</b>	SLO: C-09-B-01	Define matter as a substance having mass and occupying space.	Knowledge	Summative	Question(s) will be asked in annual examination	07
		SLO: C-09-B-02	State the distinguishing macroscopic properties of commonly observed states of solids, liquids and gasses in particular density, compressibility and fluidity.	Understanding	Summative	Question(s) will be asked in annual examination.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
		SLO: C-09-B-03	Identify that state is a distinct form of matter (examples could include familiarity with plasma, intermediate states and exotic states e.g. BEC or liquid crystals).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-04	Explain the allotropic forms of solids(some examples may include diamond, graphite, and fullerenes)	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-05	Explain the differences between elements, compounds and mixtures.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-06	Identify solutions, colloids, and suspensions as mixtures and give an example of each.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-07	Explain the effect of temperature on solubility and formation of unsaturated and saturated solutions.	Understanding	Summative	Question(s) will be asked in annual examination.	
	<b>Atomic structure</b>	SLO: C-09-B-08	Explain the structure of the atom as a central nucleus containing neutrons and protons surrounded by electrons in shells.	Understanding	Summative	Question(s) will be asked in annual examination.	13
		SLO: C-09-B-09	State that, orbits (shells) are energy levels of electrons and a larger shell implies higher energy and greater average distance from nucleus.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-10	State that electrons are quantum particles with probabilistic paths whose exact paths and locations cannot be mapped (with reference to the uncertainty principle).	Knowledge	Formative	Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.	
		SLO: C-09-B-11	Explain that a nucleus is made up of protons and neutrons held together by strong nuclear force.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-12	Explain that an atomic model is an aid to understand the structure of an atom.	Understanding	Formative	Question(s) will not be asked in annual examination, however it will be a part of classroom teaching	
		SLO: C-09-B-13	State the relative charge and relative masses of a subatomic particles (an electron, proton and neutron).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-14	Interpret the relationship between a subatomic particle, their mass and charge	Understanding	Summative	Question(s) will be asked in annual examination.	

<b>Domains</b>	<b>Content Area</b>	<b>SLO No.</b>	<b>SLO Description</b>	<b>Cognitive Level</b>	<b>Type of Assessment</b>	<b>Remarks</b>	<b>Time allocation (Periods 1Period =40 minutes)</b>
		SLO: C-09-B-15	Illustrate the path that positively and negatively charged particles would take under the influence of a uniform electric field.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-16	Define proton number/atomic number as the number of protons in the nucleus of an atom.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-17	Explain that the proton number is unique to each element and used to arrange elements in periodic table.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-18	State that radioactivity can change the proton number and alter an atom's identity.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-19	Define nucleon number/atomic mass as sum of number of protons and neutrons in the nucleus of an atom.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-20	Define isotopes as different atoms of the same element that have same number of protons but different neutrons	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-21	State that isotopes can affect molecular mass but not chemical properties of an atom.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-22	Determine the number of protons and neutrons of different isotopes.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-23	Define relative atomic mass as the average mass of isotopes of an element compared to 1/12th of mass of an atom of Carbon-12.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-24	State that isotopes can exhibit radioactivity.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-25	Discuss the importance of isotopes using carbon dating and medical imaging as examples.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-26	Describe the formation of positive (cation) and negative (anion) ions from atoms.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-27	Interpret and use the symbols for atoms and ions.	Knowledge	Summative	Question(s) will be asked in annual examination.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
		SLO: C-09-B-28	Calculate relative atomic mass of an element from relative masses and abundance of isotopes.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-29	Calculate relative atomic mass of an element from relative masses and abundance of all stable isotopes.	Application	Summative	Question(s) will be asked in annual examination.	
	<b>Chemical Bonding</b>	SLO: C-09-B-30	Describe that noble gas electronic configuration, octet and duplet rules help predict chemical properties of main group elements.	Understanding	Summative	Question(s) will be asked in annual examination.	09
		SLO: C-09-B-31	Compare between the formation of cations and anions.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-32	Account for the electropositive and electronegative nature of metals and non-metals.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-33	Define ionic, covalent, coordinate covalent and metallic bonds.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-34	Differentiate between ionic compounds and covalent compounds.(The following points need to be included in the respective, a, ionic bond as strong electrostatic attraction between oppositely charged ions b. Covalent bond as strong electrostatic attraction between shared electrons and two nuclei. C. Metallic bond as strong electrostatic attraction between cloud/sea of delocalized electrons and positively charged cations).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-35	Explain the properties of compounds in terms of bonding and structure.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-36	Compare uses and properties of materials such as strength and conductivity as determined by the type of chemical bond present between their atoms.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-37	Interpret the strength of forces of attraction and their impact on melting and boiling points of ionic and covalent compounds.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-38	Justify the availability of free charged particles (electrons or ions) for conduction of electricity in ionic compounds (solid in molten) covalent compounds and metallic bonds.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-39	Recognize that some substances can ionize when dissolved in water.(e.g. acids dissolves in water and conduct electricity).	Knowledge	Summative	Question(s) will be asked in annual examination.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
		SLO: C-09-B-40	Justify the suitability of usage of graphite, diamond and metals for industrial purposes. Some examples may include : <b>a.</b> graphite as lubricant or an electrode. <b>b.</b> Diamond in cutting tools. <b>c.</b> Metals for wires, and sheets).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-41	Draw the structure of ionic and covalent compounds along with their formation. (some examples can include: <b>a.</b> ionic bonds in binary compounds such as NaBr, NaF, CaCl <sub>2</sub> using dot-and cross diagrams and Lewis dot structures <b>b.</b> simple molecules including H <sub>2</sub> , Cl <sub>2</sub> , O <sub>2</sub> , N <sub>2</sub> , H <sub>2</sub> O, CH <sub>4</sub> , NH <sub>3</sub> , HCl, CH <sub>3</sub> OH, C <sub>2</sub> H <sub>4</sub> , CO <sub>2</sub> , HCN, and similar molecules using dot-and- cross diagrams and Lewis dot structures).	Application	Summative	Question(s) will be asked in annual examination.	
	<b>Stoichiometry</b>	SLO: C-09-B-42	State the formulae of common elements and compounds.	Knowledge	Summative	Question(s) will be asked in annual examination.	12
		SLO: C-09-B-43	Define molecular formula of a compound as the number and type of different atoms in one molecule.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-44	Define empirical formula of a compound as the simplest whole number ratio of different atoms in a molecule.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-45	Deduce the formula and name of a binary ionic compounds from ions given relevant information.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-46	Deduce the formula of a molecular substance from the given structure of molecules.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-47	Use the relationship. Amount of substance = mass / molar mass to calculate number of moles, mass, molar mass, relative mass (atomic/molecular/formula) and number of particles.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-48	Define mole as amount of substance containing Avogadro's number (6.02x10 <sup>23</sup> ) of particles.	Knowledge	Summative	Question(s) will be asked in annual examination.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
		SLO: C-09-B-49	Explain the relationship between a mole and Avogadro's constant.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-50	Construct chemical equations and ionic equations to show reactants forming products, including state symbols.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-51	Deduce the symbol equation with state symbols for a chemical reaction given relevant information.	Application	Summative	Question(s) will be asked in annual examination.	
	<b>Electrochemistry</b>	SLO: C-09-B-52	Define redox reactions as simultaneous oxidation and reduction in terms of oxygen, hydrogen, electrons and changes in oxidation state.	Knowledge	Summative	Question(s) will be asked in annual examination.	12
		SLO: C-09-B-53	Use roman numerals to indicate oxidation number of an element in a compound.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-54	Identify oxidizing and reducing agents in a redox reaction.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-55	Recognize that the oxidation number of elements in their free state is zero.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-56	Derive the formula of ionic compounds from ionic charges and oxidation numbers.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-57	Identify that the oxidation number of monatomic ion is the same as the charge on the ion.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-58	Explain that the sum of the oxidation numbers in a neutral compound is zero.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-59	Explain that the sum of the oxidation numbers in an ion is equal to the charge on the ion.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-60	Identify redox reactions by the colour changes involved when using acidified aqueous potassium manganate (VII) to (II) or aqueous potassium iodide.	Understanding	Summative	Question(s) will be asked in annual examination.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
		SLO: C-09-B-61	Define corrosion and discuss methods to prevent it. (Some examples may include barrier method such as using paint galvanizing, electroplating; sacrificial protection such as using magnesium blocks in ships).	Understanding	Summative	Question(s) will be asked in annual examination.	
	<b>Energetics</b>	SLO: C-09-B-62	Explain the idea of a chemical system and its connection with its surroundings influences energy transfer during a chemical reaction.	Knowledge	Summative	Question(s) will be asked in annual examination.	07
		SLO: C-09-B-63	Differentiate between exothermic and endothermic reactions by giving examples.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-64	State that thermal energy is called enthalpy change and recognize its sign as negative for exothermic and positive for endothermic reactions.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-65	Define activation energy as the minimum energy that colliding particles must have for a successful collision.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-66	Explain that activation energy depends on reaction pathway which can be changed using catalysts or enzyme (detailed pathways not required).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-67	Draw, label and interpret reaction pathway diagram for exothermic and endothermic reaction which includes enthalpy change, activation energy (uncatalyzed and catalyzed), reactants and products.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-68	Recognize that bond breaking is endothermic and bond making is exothermic processes.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-69	Explain that enthalpy change is sum of energies absorbed and released in bond breaking and bond forming.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-70	Calculate enthalpy change of a reaction given bond energy values.	Application	Summative	Question(s) will be asked in annual examination.	
	SLO: C-09-B-71	Explain how respiration (aerobic and anaerobic), an exothermic process, provides energy for biological systems and lipids as reserve stores of energy.	Understanding	Summative	Question(s) will be asked in annual examination.		
	<b>Chemical Equilibrium</b>	SLO: C-09-B-72	Recognize that reversible reaction are shown by symbol ( $\rightleftharpoons$ ) and may not go to completion.	Understanding	Summative	Question(s) will be asked in annual examination.	05

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
		SLO: C-09-B-73	Describe how changing the physical conditions of a chemical equilibrium system can redirect reversible reactions. a. effect of heat on hydrated compounds b. addition of water to anhydrous substances in particular copper(II) sulfate and cobalt (II) chloride	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-74	State that reversible reaction can achieve equilibrium in a closed system when rate of forward and backward reactions are equal.	Knowledge	Summative	Question(s) will be asked in annual examination.	
	<b>Acids, Bases Chemistry and pH</b>	SLO: C-09-B-75	Define Bronsted-Lowry acids as proton donors and Bronsted-Lowry bases as proton acceptors.	Knowledge	Summative	Question(s) will be asked in annual examination.	09
		SLO: C-09-B-76	Recognize that aqueous solutions of acids contain H <sup>+</sup> ions and aqueous solutions of alkalis contain OH <sup>-</sup> ions.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-77	Define a strong acid and bases as an acid or base that completely dissociates in aqueous solution and weak acid and base that partially dissociates in aqueous solution. (Some examples include: Student writing symbol equations to show these for hydrochloric acid, sulphuric acid, nitric acid, and ethanoic acid.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-78	Formulate dissociation equations for an acid or base in aqueous solution.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-79	Recognize that bases are oxides or hydroxides of metals and that alkalis are water-soluble bases.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-80	Describe the characteristic properties of acids in terms of their reactions with metals, bases and carbonates.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-81	Identify the characteristic properties of bases in terms of their reactions with acids and ammonium salts.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-82	Define acid rain.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-B-83	Discuss effects of acid rain and relate them with properties of acids.	Application	Summative	Question(s) will be asked in annual examination.	



Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
<b>C</b>	<b>Periodic Table &amp; Periodicity</b>	SLO: C-09-C-01	Define the periodic table as an arrangement of elements in periods and groups in order of increasing proton number / atomic number.	Knowledge	Summative	Question(s) will be asked in annual examination.	20
		SLO: C-09-C-02	Identify the group or period or block of an element using its electronic configuration (only the idea of subshells related to the blocks can be introduced).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-03	Explain the relationship between group number and the charge of ions formed from elements in the group in terms of their outermost shells.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-04	Explain similarities in the chemical properties of elements in the same group in terms of their electronic configuration.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-05	Identify trends in group and periods, given information about the elements, including trends for atomic radius, electron affinity, electronegativity, ionization energy, metallic character, reactivity and density.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-06	Use terms alkali metals, alkaline earth metals, halogens, noble gases, transition metals, lanthanides and actinides in reference to the periodic table.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-07	Predict the characteristic properties of an element in a given group by using knowledge of chemical periodicity.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-08	Deduce the nature, possible position in the Periodic Table and the identity of unknown elements from given information about their physical and chemical properties.	Application	Summative	Question(s) will be asked in annual examination.	
	<b>Group Properties and Elements</b>	SLO: C-09-C-09	<b>Group I Properties</b> Define Group 1, Alkali metals as relatively soft metals with general trends down the group limited to decreasing melting point, increasing density and increasing reactivity.	Knowledge	Summative	Question(s) will be asked in annual examination.	10
		SLO: C-09-C-10	Predict properties of other elements in group I, given information about the elements.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-11	Predict properties of elements in group I in order of reactivity given relevant information.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-12	<b>Group VII Properties</b> Define Group-VII, halogens as diatomic non-metals with general trends limited to increasing density, and decreasing reactivity.	Knowledge	Summative	Question(s) will be asked in annual examination.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
		SLO: C-09-C-13	Identify the appearance of halogens as fluorine as pale yellow gas, chlorine as yellow-green gas, bromine as red-brown liquid, iodine as grey black solid.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-14	Explain the displacement reactions of halogens with other halide ions and also as reducing agents.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-15	Predict the properties of elements in group VII, given information about the elements.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-16	Analyze the relative thermal stabilities of the hydrogen halides and explain these in terms of bond strengths.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-17	<b>Transition elements</b> Describe Transition elements as metals that: have high densities, high melting points, variable oxidation numbers, form colored compounds and act as catalysts for industrial purposes. (some examples include catalysts being used are the Haber process, catalytic converters, Contact process and manufacturing of margarine).	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-18	<b>Noble gases</b> Define the Group 18 noble gases as unreactive, monatomic gases.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-19	Explain this (Nobel gases) in terms of electronic configuration.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-C-20	<b>Properties of metals</b> Compare the general physical properties of metals and non-metals. (Specifically in terms of, <b>a.</b> thermal conductivity, <b>b.</b> electrical conductivity, <b>c.</b> malleability and ductility. <b>d.</b> melting points and boiling points)	Understanding	Summative	Question(s) will be asked in annual examination.	
		<b>D</b>	<b>Atmosphere</b>	SLO:C-09-D-01	State that composition of clean, dry air is approximately 78% Nitrogen N <sub>2</sub> , 21% Oxygen O <sub>2</sub> , and the remainder as a mixture of noble gases and carbon dioxide CO <sub>2</sub> .	Knowledge	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
		SLO:C-09-D-02	State the major sources of air pollutants. (Some examples include: <b>a.</b> Carbon dioxide from the complete combustion of carbon-containing fuels, <b>b.</b> Carbon monoxide and particulates from the incomplete combustion of carbon-containing fuels, <b>c.</b> methane from the decomposition of vegetation and waste gasses from digestion in animals. <b>d.</b> Oxides of nitrogen from car engines, <b>e.</b> Sulfur dioxide from the combustion of fossil fuels which contain sulfur compounds <b>f.</b> Ground level ozone from reactions of oxides of nitrogen, from car engines, and volatile organic compounds, in presence of light).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO:C-09-D-03	State the adverse effects of air pollutants (Some examples include: <b>a.</b> carbon dioxide: higher levels of carbon dioxide leading to increased global warming, which leads to climate change <b>b.</b> carbon monoxide: toxic gas <b>c.</b> particulates: increased risk of respiratory problems and cancer <b>d.</b> methane: higher levels of methane leading to increased global warming, which leads to climate change <b>e.</b> oxides of nitrogen: acid rain, photochemical smog and respiratory problems, <b>f.</b> sulfur dioxide: acid rain and haze).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO:C-09-D-04	Explain how the greenhouse gasses carbon dioxide and methane cause global warming? (Some examples include : <b>a.</b> The absorption, reflection and emission of thermal energy, <b>b.</b> Reducing thermal energy loss to space).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO:C-09-D-05	Describe the role of sulfur in the formation of acid rain and its impact on the environment.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO:C-09-D-06	Describe the strategies to reduce the effects of major environmental issues. (Some examples include: <b>a.</b> climate change: planting trees, reduction in livestock farming, decreasing use of fossil fuels, increasing use of hydrogen and renewable energy, e.g. wind, solar. <b>b.</b> acid rain: use of catalytic converters in vehicles, reducing emissions of sulfur dioxide by using low sulfur fuels and flue gas desulfurization with calcium oxide).	Application	Summative	Question(s) will be asked in annual examination.	
		SLO:C-09-D-07	Describe the role of NO and NO <sub>2</sub> in the formation of acid rain, both directly and through their catalytic role in the oxidation of atmospheric sulfur dioxide.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO:C-09-D-08	Explain how oxides of nitrogen form in car engines and describe their removal by catalytic converters, e.g. $\text{CO} + 2\text{NO} \longrightarrow 2\text{CO} + \text{N}_2$	Understanding	Summative	Question(s) will be asked in annual examination.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
		SLO:C-09-D-09	Define photosynthesis as the reaction between carbon dioxide and water to produce glucose and oxygen in the presence of chlorophyll and using, energy from light.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO:C-09-D-10	Analyze how to use tools to reduce personal exposure to harmful pollutants. (Some examples include the usage of masks, air quality indices and CO detectors).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO:C-09-D-11	Identify high risk situations in life including those where long-term exposure to these pollutants can lead to respiratory issues and reduction in quality and longevity of life.	Understanding	Summative	Question(s) will be asked in annual examination.	
	Environmental Chemistry-Water	SLO: C-09-D-12	Investigate chemical tests for the presence of water using anhydrous copper (II) sulfate.	Understanding	Summative for PBA (Practical Based Assessment)	Lab work-Question(s) will be asked in PBA	06
		SLO: C-09-D-13	Explain how to test the purity of water using melting point and boiling point.	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA	
		SLO: C-09-D-14	Distinguish between Distilled water and tap water with their applications in practical chemistry.	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA	
		SLO: C-09-D-15	State that water from natural sources may contain useful and harmful substances. (Some examples include: <b>a.</b> dissolved oxygen <b>b.</b> metal compounds. <b>c.</b> plastics <b>d.</b> sewage. <b>e.</b> harmful microbes. <b>f.</b> nitrates from fertilizers. <b>g.</b> phosphates from fertilizers and detergents)	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-D-16	Recognize that some naturally occurring substances in water are beneficial. (Some examples include, : <b>a.</b> Dissolved oxygen for aquatic life. <b>b.</b> Some metal compounds provide essential minerals for life.)	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-D-17	Recognize that some naturally occurring substances in water are potentially harmful. (Some examples include: <b>a.</b> some metal compounds that are toxic, <b>b.</b> some plastics that harm aquatic life. <b>c.</b> sewage that contains harmful microbes	Understanding	Summative	Question(s) will be asked in annual examination.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
			which cause diseases. <b>d.</b> nitrates and phosphates that lead to deoxygenation of water and damage to aquatic life. Details of the eutrophication process are not required).				
		SLO: C-09-D-18	Explain the treatment of the domestic water supply. (Some examples of this includes. <b>a.</b> Sedimentation and filtration to remove solids. <b>b.</b> Use of carbon to remove tastes and odors. <b>c.</b> chlorination to kill microbes).	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-D-19	Describe various water-borne diseases and the steps that can be taken to avoid them.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-D-20	Identify the negative effects of water pollutants on life and the ways to avoid them.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-D-21	Explain water scarcity as an important issue faced by Pakistan and the ways in which it can be resolved.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-D-22	<b>Fertilizers</b> State that urea, ammonium salts and nitrates are used as fertilizers.	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-D-23	Explain the use of NPK fertilizers to provide the elements nitrogen, phosphorus and potassium for improved plant growth.	Understanding	Summative	Question(s) will be asked in annual examination.	
<b>E</b>	<b>Organic Chemistry</b>	SLO: C-09-E-01	Describe organic molecules as either straight-chained, branched or cyclic.	Understanding	Summative	Question(s) will be asked in annual examination.	12
		SLO: C-09-E-02	State that a structural formula is an unambiguous description of the way the atoms in a molecule are arranged, including $\text{CH}_2=\text{CH}_2$ , $\text{CH}_3\text{CH}_2\text{OH}$ , $\text{CH}_3\text{COOCH}_3$ .	Knowledge	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-E-03	Identify and draw structural formulae for molecules.	Application	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-E-04	Interpret general formulae of compounds in the same homologous series including alkanes, alkenes, alkynes, alcohols and carboxylic acids.	Understanding	Summative	Question(s) will be asked in annual examination.	
		SLO: C-09-E-05	Define structural isomers as compounds with the same molecular formula, but different structural formulae, including $\text{C}_4\text{H}_{10}$ as $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_3$ ; and $\text{C}_4\text{H}_8$ as $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$ and $\text{CH}_3\text{CH}=\text{CHCH}_3$	Understanding	Summative	Question(s) will be asked in annual examination.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)	
		SLO: C-09-E-06	Identify a functional group as an atom or group of atoms that determine the chemical properties of a homologous series, including alcohols, aldehydes, ketones, phenols, carboxylic acids, amine, esters, and amide.	Knowledge	Summative	Question(s) will be asked in annual examination.		
		SLO: C-09-E-07	Describe the general characteristics of a homologous series (These can include: <b>a</b> Having the same functional group. <b>b</b> . Having the same general formula. <b>c</b> . Differing from one member to the next by a—CH <sub>2</sub> — unit. <b>d</b> . displaying a trend in physical properties. <b>e</b> . Sharing similar chemical properties).	Understanding	Summative	Question(s) will be asked in annual examination.		
		SLO: C-09-E-08	State that a saturated compound has molecules in which all carbon-carbon bonds are single bonds.	Knowledge	Summative	Question(s) will be asked in annual examination.		
		SLO: C-09-E-09	State that an unsaturated compound has molecules in which one or more carbon—carbon bonds are not single bonds.	Knowledge	Summative	Question(s) will be asked in annual examination.		
	<b>Hydrocarbons</b>	SLO: C-09-E-10	State that the bonding in alkanes is single covalent and that alkanes are saturated hydrocarbons.	Knowledge	Summative	Question(s) will be asked in annual examination.	<b>07</b>	
		SLO: C-09-E-11	Describe the properties of alkanes as being generally unreactive, except in terms of combustion and substitution by chlorine.	Understanding	Summative	Question(s) will be asked in annual examination.		
		SLO: C-09-E-12	State that in a substitution reaction one atom or group of atoms is replaced by another atom or group of atoms.	Knowledge	Summative	Question(s) will be asked in annual examination.		
		SLO: C-09-E-13	Describe the substitution reaction of alkanes with chlorine as a photochemical reaction, and draw the structural or displayed formulae of the products, limited to monosubstitution.	Understanding	Summative	Question(s) will be asked in annual examination.		
		SLO: C-09-E-14	Describe, using symbol equations, preparation of alkanes from cracking of larger hydrocarbons, hydrogenation of alkenes and alkynes, and reduction of alkyl halides.	Understanding	Summative	Question(s) will be asked in annual examination.		
	<b>Biochemistry</b>	SLO: C-09-E-15	Explain the importance and basics of nutrition and healthy eating.	Understanding	Summative	Question(s) will be asked in annual examination.	<b>05</b>	
		SLO: C-09-E-16	Recognize the main biomolecules; carbohydrates, proteins, lipids and nucleic acids, their sources, along with the required daily intake for young adults.	Understanding	Summative	Question(s) will be asked in annual examination.		
			SLO: C-09-E-17	Identify carbohydrates as a source of energy.	Understanding	Summative	Question(s) will be asked in annual examination.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
<b>F</b>	<b>Scientific Notation/ Standard Form</b>	SLO: C-09-F-01	Explain that units are standardized for better communication and collaboration. (Some examples may include: In the field of chemistry, the International System of Units (SI) is used to measure physical quantities such as mass, volume, and temperature. This standardized system ensures that chemists worldwide can use the same units to measure and communicate their results, facilitating communication and collaboration in the field. -Without standardized units, it would be difficult for chemists to compare their results with one another, and it would be challenging to develop consistent and accurate scientific models. For example, imagine if one chemist measured the mass of a substance in grams, while another used ounces. The two measurements would be difficult to compare and combine, potentially leading to inaccurate or inconsistent results.)	Understanding	Formative	Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.	02
		SLO: C-09-F-02	Identify SI units for abstract and physical quantities. (Some examples include mass, time and amount of matter.)	Understanding	Formative	Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.	
		SLO: C-09-F-03	Apply the concept that units can be combined with terms for magnitude, especially kilo, deci, and milli.	Understanding	Formative	Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.	
		SLO: C-09-F-04	Justify why chemists use <b>cm<sup>3</sup></b> , <b>g</b> and <b>s</b> as more practical units when working with small amounts in lab.	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA.	
		SLO: C-09-F-05	Explain with examples how different tools and techniques can be used to manage accuracy and precision for inherent errors that arise during measurement.	Knowledge	Formative	Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.	
		SLO: C-09-F-06	Use the standard form $A \times 10^n$ where n is a positive or negative integer, and $1 \leq A < 10$ .	Understanding	Formative	Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.	
		SLO: C-09-F-07	Convert quantitative values into and out of the scientific notation form.	Application	Formative	Question(s) will not be asked in annual examination,	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
						however it will be a part of classroom teaching.	
		SLO: C-09-F-08	Calculate with values in standard form.	Application	Formative	Question(s) will not be asked in annual examination, however it will be a part of classroom teaching.	
		SLO: C-09-F-09	Identify appropriate apparatus for the measurement of time, temperature, mass and volume, including: a. stop watches. b. thermometers. c. balances, d. burettes, e. volumetric pipettes, f. measuring cylinders. g. gas syringes.	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA.	
		SLO: C-09-F-10	Suggest advantages and disadvantages of experimental methods and apparatus.	Application	Formative for PBA	Question(s) will not be asked in annual examination, however it will be a part of Lab work.	
	<b>Separation Techniques</b>	SLO: C-09-F-11	Define important terms associated with creating chemical solutions.(Some examples include: a. Solvent as a substance that dissolves a solute. b. Solute as a substance that is dissolved in a solvent. c. Solution as a mixture of one or more solutes dissolved in a solvent. d. Saturated solution as a solution containing the maximum concentration of a solute dissolved in the solvent at a specified temperature. e. Residue as a substance that remains after evaporation, distillation, filtration or any similar process. f. Filtrate as a liquid or solution that has passed through a filter).	Knowledge	Summative for PBA	Lab work-Question(s) will be asked in PBA.	08
		SLO: C-09-F-12	Explain methods of separation and purification (some example include: a. Using a suitable solvent. b. Filtration. c. Crystallization. d. simple distillation & fractional distillation).	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA.	
		SLO: C-09-F-13	Suggest suitable separation and purification techniques, given information about the substances involved, and their usage in daily life.	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA.	
		SLO: C-09-F-14	Identify substances and assess their purity using melting point and boiling point information.	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA.	



Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)	
	<b>Qualitative Analysis</b>	SLO: C-09-F-15	Describe tests to identify important gasses (Some examples include <b>a.</b> Ammonia, NH <sub>3</sub> , using damp red litmus paper. <b>b.</b> Carbon dioxide, CO <sub>2</sub> , using limewater. <b>c.</b> Chlorine, Cl <sub>2</sub> , using damp litmus paper. <b>d.</b> Hydrogen, H <sub>2</sub> , using a lighter, splint. <b>e.</b> Oxygen, O <sub>2</sub> , using a glowing splint. <b>f.</b> Sulfur dioxide, SO <sub>2</sub> , using acidified aqueous potassium manganite (VII)).	Application	Summative for PBA	Lab work-Question(s) will be asked in PBA.	04	
		SLO: C-09-F-16	Explain the use of a flame test to identify important cations:(Some examples include: a) lithium, Li <sup>+</sup> b) sodium, Na <sup>+</sup> c) potassium, K <sup>+</sup> d) calcium, Ca <sup>2+</sup> e) copper (II), Cu <sup>2+</sup> f) barium, Ba <sup>2+</sup>	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA.		
	<b>Chromatography</b>	SLO: C-09-F-17	Describe how paper chromatography is used to separate mixtures of soluble substances, using a suitable solvent.	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA.	06	
		SLO: C-09-F-18	Describe the use of locating agents when separating mixtures in Chromatography containing colorless substances.(For context, knowledge of specific locating agents is not required)	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA.		
		SLO: C-09-F-19	Interpret simple chromatograms (For context, students should identify: a) unknown substances by comparison with known substances, b) pure and impure substances)	Application	Summative for PBA	Lab work-Question(s) will be asked in PBA.		
		SLO: C-09-F-20	State and use the equation for R <sub>f</sub> .	Understanding	Summative for PBA	Lab work-Question(s) will be asked in PBA.		
	<b>G</b>	<b>Lab and Practical Skills</b>	SLO: C-09-10-G-01	Explain, with examples, the types of chemical hazards in the lab and suggest safety precautions. (Types of chemical hazards to be identified: flammable or explosive hazards, corrosive hazards, toxic hazards, reactive hazards, radiation hazards and asphyxiation hazards).	Understanding	Formative for PBA	Question(s) will not be asked in annual examination, however it will be a part of Lab work.	10
			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,	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
						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. <ul style="list-style-type: none"> <li>• Identification of metal ions.</li> <li>• Non-metal ions and gases.</li> <li>• Chemical test for water.</li> <li>• Test-tube reactions of dilute acids, including ethanoic acid.</li> </ul>	Application	Summative for PBA	Lab work-Question(s) will be asked in PBA.	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
			<ul style="list-style-type: none"> <li>• Tests for oxidizing and reducing agents.</li> <li>• Melting points and boiling points.</li> <li>• Displacement reactions of metals and halogens.</li> <li>• Temperature changes during reactions.</li> </ul>				
		SLO: C-09-10-G-13	Carry out separation and purification techniques. (This may include: <ul style="list-style-type: none"> <li>• Filtration.</li> <li>• Crystallization.</li> <li>• Simple distillation, fractional distillation.</li> <li>• Chromatography.</li> <li>• Electrolysis).</li> </ul>	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,	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
						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,	

Domains	Content Area	SLO No.	SLO Description	Cognitive Level	Type of Assessment	Remarks	Time allocation (Periods 1Period =40 minutes)
						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 periods =175

**Note: PBA STANDS FOR PRACTICAL BASED ASSESSMENT**



# Federal Board SSC-I Examination

## Chemistry Model Question Paper

(Curriculum 2022-2023)

### 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.*

ROLL NUMBER					
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

Version No.			
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Candidate Sign. \_\_\_\_\_

Invigilator Sign. \_\_\_\_\_

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

	Question					A	B	C	D
		A	B	C	D	A	B	C	D
(i)	Suggest the primary focus of organic chemistry?	The behavior of inorganic salts	The study of carbon-based molecules and their reactions	The study of metals and alloys	The properties of gases and their interactions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(ii)	Which of the following elements has the largest atomic size?	Fluorine	Oxygen	Chlorine	Bromine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(iii)	Identify the covalent compound.	MgO	CaO	H <sub>2</sub> O	KF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(iv)	Suggest the correct reagents in the reduction of alkyl halides.	Al <sub>2</sub> O <sub>3</sub> at 35°C	Conc.H <sub>2</sub> SO <sub>4</sub> at 170°C	Zn + Dust	Zn + HCl	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(v)	Identify which of the following element in the given reaction is oxidized H <sub>2</sub> S+Cl <sub>2</sub> →2HCl + S	H	Cl	S	S and Cl <sub>2</sub>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(vi)	Why is the proton number unique to each element and used to arrange elements in the periodic table?	Protons determine the mass of the element	Protons define the atomic number of the element	Protons dictate the number of neutrons in the nucleus	Protons indicate the number of electrons in the atom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(vii)	Predict which one of the following pairs has the same mass?	1 mole of N <sub>2</sub> O and 1 mole of CO <sub>2</sub>	1 mole of H <sub>2</sub> and 1 mole NH <sub>3</sub>	1 mole of H <sub>2</sub> O and 1 mole of H <sub>2</sub> O <sub>2</sub>	1 mole of H <sub>2</sub> SO <sub>4</sub> and 1 mole of HNO <sub>3</sub>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(viii)	Element X belongs to Group VII of the periodic table. Which of the following properties is most likely associated with Element X?	High reactivity with water.	Has electropositive character.	Exists as a diatomic gas at room temperature.	Forms covalent compounds with metals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(ix)	Identify the compound which is unsaturated.	CH <sub>3</sub> CH <sub>2</sub> OH	CH <sub>4</sub>	CH <sub>3</sub> CH=CH <sub>2</sub>	CH <sub>3</sub> CH <sub>2</sub> NH <sub>2</sub>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(x)	General formula of carboxylic acid is	RCHO	ROR	RCOOH	RCOR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(xi)	Which compound is most likely to damage marble buildings due to the reaction with acid rain?	CaSO <sub>4</sub>	Ca(NO <sub>3</sub> ) <sub>2</sub>	CaCO <sub>3</sub>	CaC <sub>2</sub> O <sub>4</sub>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(xii)	Suggest which statement about solubility is <b>INCORRECT</b> ?	It refers to the ability of a solute to dissolve in a solvent	It is measured in grams per liter of solvent	It is affected by temperature, pressure, and the nature of the solute and solvent.	It is independent of temperature.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



# Federal Board SSC-I Examination

## Model Question Paper Chemistry

(Curriculum 2022-23)

Time allowed: 2.40 hours

Total Marks: 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)	Write equation(s) which represents the dissociation of H <sub>2</sub> SO <sub>4</sub> in water.	1.5+ 1.5	<b>OR</b>	Draw structural formula of following molecules. a. Benzene b. Ethanol c. Propanone	1.+1 +1
(ii)	Predict reactions of Cl <sub>2</sub> with following halide ions. a. Br <sup>-1</sup> b. I <sup>-1</sup>	1+1+ 1	<b>OR</b>	Determine neutron and proton number of following elements. a. $^{27}_{13}X$ b. $^{36}_{18}Y$ c. $^{64}_{30}Z$	1.5+ 1.5
(iii)	Compare following properties of liquid Crystals with liquids. a. Molecular arrangement b. Fluidity	1.5+ 1.5	<b>OR</b>	Identify oxidizing agents in each of the following reactions. a. 2NH <sub>3</sub> +3CuO→3Cu+N <sub>2</sub> +3H <sub>2</sub> O b. 2FeCl <sub>2</sub> +Cl <sub>2</sub> →2FeCl <sub>3</sub>	1.5+ 1.5
(iv)	How do NO and NO <sub>2</sub> contribute to the chemical reactions that lead to acid rain?	1.5+ 1.5	<b>OR</b>	How can exothermic reactions be distinguished from endothermic reactions. Explain by giving examples.	1.5+ 1.5
(v)	How do following water pollutants effect living organisms? 1. House hold wastes 2. Agricultural wastes 3. Metals	1+1+ 1	<b>OR</b>	How can sunlight be important in substitution reaction of methane with chlorine? Explain with reactions.	1+2
(vi)	Give three examples of transition metals where they act as catalysts.	1+1+ 1	<b>OR</b>	What are the primary nutrients provided by urea, ammonium salts, and nitrates when used as fertilizers?	1+1 +1
(vii)	Write general formulas of the following homologous series. Give one example in each case. a) Alkanes b) Alkenes c) Alcohols	1+1+ 1	<b>OR</b>	Identify the group and period number of the following unknown elements.  a. $^{12}_6A$ b. $^{39}_{19}B$ c. $^{19}_9C$	1+1 +1
(viii)	Consider following equilibrium. CoCl <sub>2</sub> .2H <sub>2</sub> O( s) + Heat $\rightleftharpoons$ CoCl <sub>2</sub> (g) + H <sub>2</sub> O(g) Predict the direction of reaction when following changes are applied on this system at equilibrium. a. Heating the system. b. Addition of water c. Removal of water	1+1+ 1	<b>OR</b>	Describe carbohydrates as more efficient source of energy than fats and proteins.	03
(ix)	Give the ways a closed system contribute to the establishment of equilibrium in reversible reactions?	03	<b>OR</b>	Define Bronsted-Lowry acids and bases with two examples each.	03
(x)	Calculate the number of atoms in each of the following samples. a. 3.4 moles of nitrogen gas b. 15 g of Sodium metal	2+1	<b>OR</b>	How does the energy profile diagram for an endothermic reaction differ from that of an exothermic reaction in terms of activation energy and enthalpy change?	1.5+ 1.5
(xi)	Define isotopes of an element. Write isotopes of hydrogen, give their atomic and mass numbers.	1+2	<b>OR</b>	Define following branches of chemistry. a. Astrochemistry b. Geochemistry c. Physical chemistry	1+1 +1

### SECTION– C (Marks20)

**Note:** Attempt all questions. Marks of each question are given along with each question.

<b>Q.3</b>	Predict the trend of atomic size, ionization energy and electronegativity of group IIA of periodic table by using knowledge of chemical periodicity.	2+2+2	<b>OR</b>	Draw the dot-and- cross diagrams and Lewis dot structures for the following compounds. HCN, MgO, C <sub>2</sub> H <sub>4</sub>	2+2+2
<b>Q.4</b>	Describe reactions of HCl with the following. A. Zn B. NaOH C. Na <sub>2</sub> CO <sub>3</sub>	2x3	<b>OR</b>	How alkanes can be prepared from the following and also mention the type of reactions in each case. A. CH <sub>3</sub> – CH = CH <sub>2</sub> B. CH <sub>3</sub> -C≡C-CH <sub>3</sub> C. CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> Cl	2x3
<b>Q.5</b>	Write down the formula of following compounds.  a. Ferric chloride b. Sodium sulphate c. Magnesium chloride d. Sulphur dioxide	4	<b>OR</b>	Define oxidation and reduction in terms of: a. oxygen and hydrogen b. gain and loss of electrons (change in oxidation state).	2+2
<b>Q.6</b>	Define solubility. How can it be affected by the change in temperature? Explain with graph.	1+1+2	<b>OR</b>	Identify sources of lipids and their recommended daily intake for young adults.	2+2



**SLOs of Model Paper**  
**Chemistry--- Grade—IX (SSC-I)**

Sr. NO	SLOs	Marks	Domain	Cognitive level
(i)	SLO: C-09-A-02 Explain with examples that chemistry has many subfields and example, and interdisciplinary fields.	01	A	U
(ii)	SLO: C-09-C-05 Identify trends in group and periods, given information about the elements, including trends for atomic radius, electron affinity, electronegativity, ionization energy, metallic character.	01	C	U
(iii)	SLO: C-09-B-34 Differentiate between ionic compounds and covalent compounds.	01	B	U
(iv)	SLO: C-09-E-14 Describe, using symbol equations, preparation of alkanes from cracking of larger hydrocarbons, hydrogenation of alkenes and alkynes, and reduction of alkyl halide.	01	E	U
(v)	SLO: C-09-B-57 Identify that the oxidation number of monatomic ion is the same as the charge on the ion.	01	B	K
(vi)	SLO: C-09-B-17 Explain that the proton number is unique to each element and used to arrange elements in periodic table.	01	B	U
(vii)	SLO: C-09-B-47 Use the relationship amount of substance = mass / molar mass to calculate number of moles, mass, molar mass, relative mass (atomic/molecular/formula) and number of particles.	01	B	A
(viii)	SLO: C-09-C-08. Deduce the nature, possible position in the Periodic Table and the identity of unknown elements from given information about their physical and chemical properties.	01	B	A
(ix)	SLO: C-09-E-09 State that an unsaturated compound has molecules in which one or more carbon—carbon bonds are not single bond.	01	E	K
(x)	SLO: C-09-E-04 interpret general formulae of compounds in the same homologous series including alkanes, alkenes, alkynes, alcohols and carboxylic acids.	01	E	U
(xi)	SLO: C-09-D-05. Describe the role of sulfur in the formation of acid rain and its impact on the environment.	01	B	U
(xii)	SLO: C-09-B-07 Explain the effect of temperature on solubility and formation of unsaturated and saturated solutions.	01	B	U

**Cognitive Level**

\*K= Knowledge

\*U= Understanding

\*A= Application

**SECTION – B (Marks 33)**

Sr No	SLO	Marks	Domain	Cognitive level		SLO	Marks	Domain	Cognitive level
(i)	SLO: C-09-B-78 Formulate dissociation equations for an acid or base in aqueous solution.	1.5 + 1.5	B	A	<b>OR</b>	SLO: C-09-E-03 Identify and draw structural formulae for molecules.	1+1 +1	E	A
(ii)	SLO: C-09-C-14 Explain the displacement reactions of halogens with other halide ions and also as reducing agents.	1.5 + 1.5	C	U	<b>OR</b>	SLO: C-09-B-22. Determine the number of protons and neutrons of different isotopes.	1.5 + 1.5	B	U
(iii)	SLO: C-09-B-03 Identify that state is a distinct form of matter (examples could include familiarity with plasma, intermediate states and exotic states e.g. BEC or liquid crystals).	1.5 + 1.5	B	U	<b>OR</b>	SLO: C-09-B-54 Identify oxidizing and reducing agents in a redox reaction.	1.5 + 1.5	B	U
(iv)	SLO: C-09-D-07 Describe the role of NO and NO <sub>2</sub> in the formation of acid rain, both directly and through their catalytic role in the oxidation of atmospheric sulfur dioxide.	1.5 + 1.5	D	U	<b>OR</b>	SLO: C-09-B-63 Differentiate between exothermic and endothermic reactions by giving examples.	1.5 + 1.5	B	U
(v)	SLO: C-09-D-17 Recognize that some naturally occurring substances in water are potentially harmful. (Some examples include: <b>a.</b> some metal compounds that are toxic, <b>b.</b> some plastics that harm aquatic life. <b>c.</b> sewage that contains harmful microbes which cause diseases. <b>d.</b> nitrates and phosphates that lead to deoxygenation of water and damage to aquatic life. Details of the eutrophication process are not required).	1+1 +1	D	U	<b>OR</b>	SLO: C-09-E-13 Describe the substitution reaction of alkanes with chlorine as a photochemical reaction, and draw the structural or displayed formulae of the products, limited to mono substitution	1+ 2	E	U
(vi)	SLO: C-09-C-17. Describe Transition elements as metals that: have high densities, high melting points, variable oxidation numbers, form colored compounds and act as catalysts for industrial purposes. (some examples include catalysts being used are the Haber process, catalytic converters, Contact process and manufacturing of margarine).	1+1 +1	C	K	<b>OR</b>	SLO: C-09-D-22 State that urea, ammonium salts and nitrates are used as fertilizer.	1+1 +1	D	K

(vii)	SLO: C-09-E-04 Interpret general formulae of compounds in the same homologous series including alkanes, alkenes, alkynes, alcohols and carboxylic acids.	1+1 +1	E	U	OR	SLO: C-09-C-02 Identify the group or period or block of an element using its electronic configuration.	1+1 +1	C	U
(viii)	SLO: C-09-B-73 Describe how changing the physical conditions of a chemical equilibrium system can redirect reversible reactions. a. effect of heat on hydrated equilibrium b. addition of water to anhydrous substances in particular copper(II) sulfate and cobalt (II) chloride	1+1 +1	B	K	OR	SLO: C-09-E-17 Identify carbohydrates as a source of energy.	03	E	K
(ix)	SLO: C-09-B-74 State that reversible reaction can achieve equilibrium in a closed system when rate of forward and backward reactions are equal.	03	B	K	OR	SLO: C-09-B-75 Define Bronsted-Lowry acids as proton donors and Bronsted-Lowry bases as proton acceptors.	03	B	K
(x)	SLO: C-09-B-47 Use the relationship amount of substance = mass / molar mass to calculate number of moles, mass, molar mass, relative mass (atomic/molecular/formula) and number of particles.	1.5 + 1.5	B	A	OR	SLO: C-09-B-67 Draw, label and interpret reaction pathway diagram for exothermic and endothermic reaction which includes enthalpy change, activation energy (un-catalyzed and catalyzed), reactants and products.	1.5 + 1.5	B	A
(xi)	SLO: C-09-B-20 State that Define isotopes as different atoms of the same element that have same number of protons and different neutrons.	1+ 2	B	K	OR	SLO: C-09-A-02.Explain with examples that chemistry has many sub-fields and example, and interdisciplinary fields.(Some examples includes).Biochemistry. Medicinal Chemistry. Polymer Chemistry. Geochemistry. Environmental Chemistry. Analytical Chemistry. Physical Chemistry. Organic Chemistry. Inorganic Chemistry. Nuclear Chemistry. Astrochemistry).	1+1 +1	A	K

### **SECTION – C (Marks 20)**

**Note: Attempt the following questions.**

Sr. No	SLO	Marks	Domain	Cognitive level		SLO	Marks	Domain	Cognitive level
<b>Q.3</b>	SLO: C-09-C-07 Predict the characteristic properties of an element in a given group by using knowledge of chemical periodicity	2+2+ 2	C	A	<b>OR</b>	SLO: C-09-B-41 Draw the structure of ionic and covalent compounds along with their formation. (some examples can include: a. ionic bonds in binary compounds such as NaBr, NaF, CaCl <sub>2</sub> using dot-and-cross diagrams	2+ 2+ 2	B	A
<b>Q.4</b>	SLO: C-09-B-80 Describe the characteristic properties of acids in terms of their reactions with metals, bases and carbonates.	2+2+ 2	B	U	<b>OR</b>	SLO: C-09-E-14 Describe, using symbol equations, preparation of alkanes from cracking of larger hydrocarbons, hydrogenation of alkenes and alkynes, and reduction of alkyl halides	2+2 +2	E	U
<b>Q.5</b>	SLO: C-09-B-42 State the formulae of common elements and compounds	04	B	K	<b>OR</b>	SLO: C-09-B-52 Define redox reactions as simultaneous oxidation and reduction in terms of oxygen, hydrogen, electrons and changes in oxidation state	2+2	B	K
<b>Q.6</b>	SLO: C-09-B-07 Explain the effect of temperature on solubility and formation of unsaturated and saturated solutions	1+1+ 2	B	U	<b>OR</b>	SLO: C-09-E-16 Recognize the main biomolecules; carbohydrates, proteins, lipids and nucleic acids. their sources, along with the required daily intake for young adults	2+ 2	E	U

**Table of Specification of the Model Paper Chemistry----- Grade – IX (SSC-I)**

<b>Content Domains</b>	<b>Nature of Science in Chemistry</b>	<b>Matter</b>	<b>Atomic Structure</b>	<b>Chemical Bonding</b>	<b>Stoichiometry</b>	<b>Electrochemistry</b>	<b>Energetics</b>	<b>Chemical Equilibrium</b>	<b>Acids, Bases chemistry and pH</b>	<b>Periodic Table and Periodicity</b>	<b>Group Properties and Elements</b>	<b>Environmental Chemistry-Air</b>
<b>Cognitive Levels</b>												
<b>Knowledge</b>	Q2(xi/s) (3)		Q2(xi/f) (3)		Q5(f) (4)	Q1(v) (1) Q5(s) (4)		Q2(ix/f) (3) Q2(viii/f) (3)	Q2(ix/s)(3)		Q2(vi/f) (3)	
<b>Understanding</b>	Q1(i) (1)	Q2(iii/f) (3) Q1(xii) (1) Q6(f) (4)	Q1(vi) (1) Q2(ii/f) (3)	Q1(iii) (1)		Q2(iii/s) (3)	Q2(iv/s) (3)		Q4(f) (6)	Q2(vii/s) (3) Q1(ii) (1)	Q2(ii/s) (3)	Q1(xi) (1) Q2(iv/f) (3)
<b>Application</b>				Q3(s) (6)	Q1(vii) (1), Q2(x/f) (3)		Q2(x/s) (3)		Q2(i/f)(3)	Q3(f) (6) Q1(viii) (1)		
<b>Total</b>	04	08	07	07	08	08	06	06	12	11	<b>06</b>	04
<b>Percentage</b>	<b>03</b>	<b>07</b>	<b>06</b>	<b>06</b>	<b>07</b>	<b>07</b>	<b>05</b>	<b>05</b>	<b>10</b>	<b>10</b>	<b>05</b>	<b>03</b>

Cont....

**Table of Specification of the Model Paper Chemistry----- Grade – IX (SSC-I)**

<b>Content Domains Cognitive Levels</b>	<b>Environmental Chemistry- Water</b>	<b>Organic Chemistry</b>	<b>Hydrocarbons</b>	<b>Biochemistry</b>	<b>Scientific Notation/Standard Form</b>	<b>Separation Techniques</b>	<b>Qualitative Analysis</b>	<b>Chromatography</b>	<b>Total marks for each Assessment Objective</b>	<b>%age</b>
<b>Knowledge</b>	Q2(vi/s) (3)	Q 1(ix) (1)		Q2(viii/s) (3)	<b>Formative for theory and only two, SLO C-09-F-04 and SLO C-09-F-09 are Summative for PBA</b>	<b>Summative for PBA</b>	<b>Summative for PBA</b>	<b>Summative for PBA</b>	34	29 %
<b>Understanding</b>	Q2(v/f) (3)	Q2(vii/f) (3)	Q 1(iv) (1) Q 1(x) (1) Q2(v/s) (3) Q4 (s)(6)	Q6(s) (4)					58	49 %
<b>Application</b>		Q2(i/s) (3)							26	22 %
<b>Total marks for each Topic/Subtopic</b>	06	07	11	07	00	00	00	00	118	-
<b>Percentage</b>	<b>05</b>	<b>06</b>	<b>09</b>	<b>06</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	-	<b>100%</b>

**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  $\pm 5\%$  variation.
- 4 While selecting alternative questions for Short Response Questions (SRQs) and Extended Response Questions (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    Q2 ( i / s ) 3



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