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)
A	**Nature of Science in Chemistry**	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	**Matter**	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.**	

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		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.**	
	Atomic structure	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.**	

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		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.**	

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		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.**	
	Chemical Bonding	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.**	

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		SLO: C-09-B-40	Justify the suitability of usage of graphite, diamond and metals for industrial purposes. Some examples may include : **a**.graphite as lubricant or an electrode. **b**. Diamond in cutting tools**. c**. 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: **a.** ionic bonds in binary compounds such as NaBr, NaF, $CaCl_2$ using dot-and cross diagrams and Lewis dot structures b. simple molecules including H_2, Cl_2, O_2, N_2, H_2O, CH_4, NH_3, HCI, CH_3OH, C_2H_4, CO_2, HCN, and similar molecules using dot-and- cross diagrams and Lewis dot structures).	Application	**Summative**	**Question(s) will be asked in annual examination.**	
	Stoichiometry	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 (6.02x10^23) of particles.	Knowledge	**Summative**	**Question(s) will be asked in annual examination.**	

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		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.**	
	Electrochemistry	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.**	

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		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.**	
	Energetics	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 (un-catalyzed 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.**	
	Chemical Equilibrium	SLO: C-09-B-72	Recognize that reversible reaction are shown by symbol (⇌) and may not go to completion.	Understanding	**Summative**	**Question(s) will be asked in annual examination.**	05

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		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.**	
	Acids, Bases Chemistry and pH	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^+ ions and aqueous solutions of alkalis contain OH^- 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.**	

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C	**Periodic Table & Periodicity**	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.**	
	Group Properties and Elements	SLO: C-09-C-09	**Group I Properties** 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	**Group VII Properties** Define Group-VIl, 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.**	

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		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	**Transition elements** 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	**Noble gases** 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	**Properties of metals** Compare the general physical properties of metals and non-metals. (Specifically in terms of, **a**. thermal conductivity, **b**. electrical conductivity, **c**. malleability and ductility. **d**. melting points and boiling points)	Understanding	**Summative**	**Question(s) will be asked in annual examination.**	
D	**Atmosphere**	SLO:C-09-D-01	State that composition of clean, dry air is approximately 78% Nitrogen N_2, 21% Oxygen O_2, and the remainder as a mixture of noble gases and carbon dioxide CO_2.	Knowledge	**Summative**	**Question(s) will be asked in annual examination.**	07

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		SLO:C-09-D-02	State the major sources of air pollutants. (Some examples include: **a.** Carbon dioxide from the complete combustion of carbon-containing fuels, **b.** Carbon monoxide and particulates from the incomplete combustion of carbon-containing fuels, **c**. methane from the decomposition of vegetation and waste gasses from digestion in animals. **d,** Oxides of nitrogen from car engines, **e.** Sulfur dioxide from the combustion of fossil fuels which contain sulfur compounds **f**. 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: **a**. carbon dioxide: higher levels of carbon dioxide leading to increased global warming, which leads to climate change **b**. carbon monoxide: toxic gas **c**. particulates: increased risk of respiratory problems and cancer **d.** methane: higher levels of methane leading to increased global warming, which leads to climate change **e.** oxides of nitrogen: acid rain, photochemical smog and respiratory problems, **f.** 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 : **a**. The absorption, reflection and emission of thermal energy, **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: **a.** 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.** 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_2 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. $CO + 2NO \longrightarrow 2\ C0 + N_2$	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: **a**. dissolved oxygen **b.** metal compounds. **c**. plastics **d**. sewage. **e**. harmful microbes. **f**. nitrates from fertilizers. **g**. 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, : **a.** Dissolved oxygen for aquatic life. **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: **a**. some metal compounds that are toxic, **b**. some plastics that harm aquatic life. **c**. 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. **d**. 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. **a.** Sedimentation and filtration to remove solids. **b.** Use of carbon to remove tastes and odors. **c.** 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	**Fertilizers** 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.**	
E	**Organic Chemistry**	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 $CH_2=CH_2$, CH_3CH_2OH, CH_3COOCH_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 C_4H_{10} as $CH_3CH_2CH_2CH_3$ and $CH_3CH(CH_3)CH_3$; and C_4H_8 as $CH_3CH_2CH=CH_2$ and $CH_3CH=CHCH_3$	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: **a** Having the same functional group. **b**. Having the same general formula. **c.** Differing from one member to the next by a—CH_2— unit. **d**. displaying a trend in physical properties. **e.** 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.**	
	Hydrocarbons	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.**	**07**
		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.**	
	Biochemistry	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.**	**05**
		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)
F	**Scientific Notation/ Standard Form**	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 **cm^3**, **g** and **s** 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 x 10^n where n s a positive or negative integer, and 1 <=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.**	
	Separation Techniques	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)
	Qualitative Analysis	SLO: C-09-F-15	Describe tests to identify important gasses (Some examples include **a.** Ammonia, NH_3, using damp red litmus paper. **b.** Carbon dioxide, CO_2, using limewater. **c.** Chlorine, Cl_2, using damp litmus paper. **d.**. Hydrogen, H_2, using a lighter, splint. **e.** Oxygen, O_2, using a glowing splint. **f.** Sulfur dioxide, SO_2, 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^+ b) sodium, Na^+ c) potassium, K^+ d) calcium, Ca^{2+} e) copper (ll), Cu^{2+} f) barium, Ba^{2+}	Understanding	**Summative for PBA**	**Lab work-Question(s) will be asked in PBA.**	
	Chromatography	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 Rf.	Understanding	**Summative for PBA**	**Lab work-Question(s) will be asked in PBA.**	
G	**Lab and Practical Skills**	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. • Identification of metal ions. • Non-metal ions and gases. • Chemical test for water. • Test-tube reactions of dilute acids, including ethanoic acid.	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)
			• Tests for oxidizing and reducing agents. • Melting points and boiling points. • Displacement reactions of metals and halogens. • Temperature changes during reactions.				
		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,**	

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 (Inclusive Scheme of Studies 2024)

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.			
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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

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.

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
(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	O	O	O	O
(ii)	Which of the following elements has the largest atomic size?	Fluorine	Oxygen	Chlorine	Bromine	O	O	O	O
(iii)	Identify the covalent compound.	MgO	CaO	H_2O	KF	O	O	O	O
(iv)	Suggest the correct reagents in the reduction of alkyl halides.	Al_2O_3 at 35^0C	Conc.H_2SO_4 at 170^0C	Zn + Dust	Zn + HCl	O	O	O	O
(v)	Identify which of the following element in the given reaction is oxidized $H_2S+Cl_2 \rightarrow 2HCl + S$	H	Cl	S	S and Cl_2	O	O	O	O
(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	O	O	O	O
(vii)	Predict which one of the following pairs has the same mass?	1 mole of N_2O and 1 mole of CO_2	1 mole of H_2 and 1 mole NH_3	1 mole of H_2O and 1 mole of H_2O_2	1 mole of H_2SO_4 and 1 mole of HNO_3	O	O	O	O
(viii)	What is the usual effect of an exothermic reaction on the temperature of the surroundings?	Temperature decreases	Temperature remains the same	Temperature increases	Temperature becomes zero	O	O	O	O
(ix)	Chlorine has two isotopes: • Cl-35 (abundance = 75%) • Cl-37 (abundance = 25%) What is the relative	36.0	35.5	37.0	34.5	O	O	O	O

	atomic mass of chlorine?					
(x)	What is the purpose of using catalytic converters in vehicles?	To increase fuel consumption	To reduce harmful gases in exhaust	To make cars run faster	To add more sulfur dioxide to the air	○ ○ ○ ○
(xi)	Which compound is most likely to damage marble buildings due to the reaction with acid rain?	$CaSO_4$	$Ca(NO_3)_2$	$CaCO_3$	CaC_2O_4	○ ○ ○ ○
(xii)	Suggest which statement about solubility is **INCORRECT**?	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.	○ ○ ○ ○

Federal Board SSC-I Examination
Model Question Paper Chemistry

Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)

Time allowed: 2.40 hours Total Marks: 48

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 30)

Q.2 Attempt the following questions. (10x3 = 30)

Q#	Question	Marks		Question	Marks
(i)	a. What type of energy change occurs during bond breaking? Name the process. b. Write one difference between bond breaking and bond making in terms of energy change.	1+2	**OR**	Identify the functional groups in the following compounds: a) CH_3COOH b) CH_3CHO c) CH_3CH_2OH	1+1+1
(ii)	Predict reactions of Cl_2 with following halide ions. a. Br^{-1} b. I^{-1}	1+1+1	**OR**	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	**OR**	Identify oxidizing agents in each of the following reactions. a. $2NH_3+3CuO \rightarrow 3Cu+N_2+3H_2O$ b. $2FeCl_2+Cl_2 \rightarrow 2FeCl_3$	1.5+1.5
(iv)	How do following water pollutants effect living organisms? 1. House hold wastes 2. Agricultural wastes 3. Metals	1+1+1	**OR**	How can sunlight be important in substitution reaction of methane with chlorine? Explain with reactions.	1+2
(v)	Give three examples of transition metals where they act as catalysts.	1+1+1	**OR**	What are the primary nutrients provided by urea, ammonium salts, and nitrates when used as fertilizers?	1+1+1
(vi)	Differentiate between molecular formula and structural formula using the example of structural isomers of C_4H_{10}.	1.5+1.5	**OR**	Identify the group and period number of the following unknown elements. a. $^{12}_{6}\boldsymbol{A}$ b. $^{39}_{19}\boldsymbol{B}$ c. $^{19}_{9}\boldsymbol{C}$	1+1+1
(vii)	Consider following equilibrium. $CoCl_2.2H_2O(s) + Heat \rightleftharpoons CoCl_2(g) + H_2O(g)$ 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	**OR**	Describe carbohydrates as more efficient source of energy than fats and proteins.	03
(viii)	Give the ways a closed system contribute to the establishment of equilibrium in reversible reactions?	03	**OR**	Define Bronsted-Lowry acids and bases with two examples each.	03

(ix)	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	**OR**	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
(x)	Define isotopes of an element. Write isotopes of hydrogen, give their atomic and mass numbers.	1+2	**OR**	Define following branches of chemistry. a. Astrochemistry b. Geochemistry c. Physical chemistry	1+1+1

SECTION– C (Marks18)

Note: Attempt all questions. Marks of all question are equal. **(3x6 = 18)**

Q.3	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	**OR**	Draw the dot-and- cross diagrams and Lewis dot structures for the following compounds. HCN, MgO, C_2H_4	2+2+2
Q.4	Describe reactions of HCl with the following. A. Zn B. NaOH C. Na_2CO_3	2x3	**OR**	How alkanes can be prepared from the following and also mention the type of reactions in each case. A. $CH_3 – C = CH_2$ B. CH_3-C≡C-CH_3 C. $CH_3CH_2CH_2Cl$	2x3
Q.5	Define solubility. How can it be affected by the change in temperature? Explain with graph.	1+2+3	**OR**	Identify sources of lipids and their recommended daily intake for young adults.	3+3

SLOs of Model Paper

Chemistry--- Grade—IX (SSC-I)

Sr. N0	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-B-62. Explain the idea of a chemical system and its connection with its surroundings influences energy transfer during chemical reaction.	01	B	K
(ix)	SLO: C-09-B-28: Calculate relative atomic mass of an element from relative masses and abundance of isotopes,	01	B	A
(x)	SLO: C-09-D-06: Describe the strategies to reduce the effects of major environmental issues (Some examples include: a. 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. 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	01	D	A
(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 30)

Sr No	SLO	Marks	Domain	Cognitive level		SLO	Marks	Domain	Cognitive level
(i)	SLO: C-09-B-68 Recognize that bond breaking is endothermic and bond making is exothermic processes.	1 + 2	B	**K**	**OR**	SLO: C-09-E-06: Identify functional group as an atom or group of atoms that determine the chemical properties of a homologous series including that for alcohols, aldehydes, ketones, phenols, carboxylic acids, amine, esters, and amide.	a1+1 +1	E	K
(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**	**OR**	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**	**OR**	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-17 Recognize that some naturally occurring substances in water are potentially harmful. (Some examples include: **a**. some metal compounds that are toxic, **b**. some plastics that harm aquatic life. **c**. sewage that contains harmful microbes which cause diseases. **d**. 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**	**OR**	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
(v)	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**	**OR**	SLO: C-09-D-22 State that urea, ammonium salts and nitrates are used as fertilizer.	1+1 +1	D	**K**
(vi)	SLO: C-09-E-05: Define structural isomers as compounds with the same molecular formula, but different structural formulae, including C_4H_{10} as CH_3-CH_2-CH_2-CH_3 and CH-CH(CH_3)-CH; and C_4H_8 as CH_3-CH,CH=CH_2 and CH_3-CH=CH-CH_3	1.5 + 1.5	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**
(vii)	SLO: C-09-B-73: Describe how changing the physical conditions	1+1 +1	B	**K**	**OR**	SLO: C-09-E-17 Identify carbohydrates as a source of energy.	03	E	K

	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(ll) sulfate and cobalt (11) chloride								
(viii)	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
(ix)	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
(x)	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 18)

Note: Attempt the following questions.

Sr. No	SLO	Marks	Domain	Cognitive level		SLO	Marks	Domain	Cognitive level
Q.3	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**	**OR**	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, $CaCl_2$ using dot-and-cross diagrams	2+ 2+ 2	B	**A**
Q.4	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**	**OR**	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**

Q.5	SLO: C-09-B-07 Explain the effect of temperature on solubility and formation of unsaturated and saturated solutions	1+2+3	B	**U**	**OR**	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	3+3	E	**U**