

**CHEMISTRY**  
**XI**  
**MODEL**  
**PAPER &**  
**SYLLABUS**

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## PREFACE

Ziauddin University Examination Board (ZUEB) was established by the Sindh ACT XLI 2018, with the aim of improving the quality of education. The Board administers examinations for the Secondary School Certificate (SSC) and Higher Secondary School Certificate (HSSC) based on the latest Reviewed National Curriculum by Directorate Curriculum Assessment and Research (DCAR) Sindh. ZUEB has a mandate by Ordinance to offer such examination services to English /Urdu and Sindhi medium candidates for SSC and HSSC from private schools in Sindh. This examination syllabus exemplifies ZUEB's commitment to provincial educational goals

The Examination Board has prepared with the help of subject professors, subject wise syllabus. It is important to make the difference between syllabus and curriculum. The syllabus of a subject is considered as a guide for the subject teacher as well as the students. It helps the students understand the subject in detail. It also helps students to anticipate what is expected from them while preparing for the exams.

This examination syllabus brings together all those cognitive outcomes of the Provincial Curriculum statement which can be reliably and validly assessed. While the focus is on the cognitive domain, particular emphasis is given to the application of knowledge and understanding.

The examination syllabus is uploaded on the ZUEB website. This is done to help affiliated schools in planning their teaching. It is the syllabus, not the prescribed textbook which is the basis of the ZUEB examinations. In addition, the ZUEB examination syllabus is used to develop learning support materials for students and teachers. The examination board stand committed to all students who have embarked upon the SSC, and HSSC courses in facilitating their learning outcomes. Our examination syllabus document ensures all possible support.

On the Ziauddin University Examination Board website a tab e –resource is made available which provides resource material in all subjects both in text form in line with the curriculum and also videos on topics to give students access to learn at their own pace and own time. These 15 to 20 minutes videos are prepared around subject concept / topics. These videos are available to the students for revisiting a lesson taught by their teacher or watch it prior to the lesson and as a reinforcement strategy. The work on videos is in progress and new titles will be uploaded.

*Please look out for the videos on the given website*



Humbly Yours;

**Shahbaz Nasim**  
**HOD ACADEMICS**

## **Rationale For The Reviewed Provincial Curriculum**

The process of revising the National Curriculum 2006 was initiated in August 2004 when newly elected government of Pakistan decided to introduce education reform in the country. The education reform process included the announcement of new National Education Policy. National Education Census and changing the curricula (Ministry of Education, 2009)

In reality, change in secondary school curriculum was initiated in 2006 and as result, scheme of studies for classes I to XII was reviewed and curriculum of 25 compulsory subjects.

The 18th Amendment to the constitution of Pakistan has reconfigured the federal and provincial relationship by abolishing the “concurrent legislative list”. The Act (2010) provides the provinces with strong legislative and financial autonomy in education, health, and other social sectors. Major implication of the 18th Amendment for education is that the curriculum, syllabus, planning, policy, centres of excellence and standards of education will fall under the purview of the provinces. This was a big step forward for education.

In Sindh the Curriculum review team was assigned a task by the School Education Department, Government of Sindh to review the National Curriculum 2006 for all subjects and prepare a revised version that best suits the needs of the students teachers and meets the spirit of the 18<sup>th</sup> amendment. Subject wise curriculum review committees were formed. Curriculum review team critically examined the contextual and textual parts and aligned the different sections horizontally and vertically of the Curriculum. The Bureau of Curriculum (BOC) played vital role in organizing the workshops and meetings at Hyderabad for the completion of task. The positive support from a number of educationists, researchers and teachers helped in completing the mammoth task of curriculum revision. On the DCAR website [http://dcar.gos.pk/BoC\\_Other\\_Pages/curriculum\\_dev.html](http://dcar.gos.pk/BoC_Other_Pages/curriculum_dev.html) the national curriculum as well as the revised curriculums are all placed for easy reference.

The Ziauddin University Examination Board Examination syllabi for SSC and HSSC are prepared with the Sindh Revised curriculum. Up till now following subject text books have been developed as per the revised curriculum.

## AIMS AND OBJECTIVES:

### **AIMS:**

This two-year study of Chemistry aims to develop in all students:

- A scientific understanding of the physical world.
- Cognitive, affective, and psychomotor abilities appropriate to the acquisition and use of Chemical knowledge, understanding, attitude, and skills.
- An appreciation for the products and influences of science and technology, balanced by a Concern for their appropriate application.
- An understanding of the nature and limitations of scientific activity.
- An ability to apply the understanding of chemistry to relevant problems (including those From everyday real-life) and to approach those problems in rational ways.
- Respect for evidence, rationality and intellectual honesty.
- The capacities to express themselves coherently and logically, both orally and in writing, And to use appropriate modes of communication characteristic of scientific work.
- The ability to work effectively with others.

### **OBJECTIVES:**

A statement of objectives relevant to each of the general aims is listed below. The sequence is in no particular order.

#### **Understanding the physical world:**

Students should understand the scientific concepts inherent in the theme for each chapter and be able to:

- state, exemplify, and interpret the concepts.
- use appropriately, fundamental terms and Classification related to the concepts.
- cite, explain or interpret, scientific evidence in support of the concepts.

#### **Using appropriate cognitive, affective and psychomotor abilities:**

Students should show ability to:

- Formulate questions that can be investigated by gathering first or second-hand data.
- Find relevant published background information.
- Formulate hypotheses and make predictions from them.
- Plan an investigation and carry out the planned procedure.
- Use appropriate and relevant motor skills in carrying out investigations.
- Observe phenomena and describe, measure and record these as data.
- Classify, collate and display data.
- Construct and/or interpret visual representations of phenomena and relationships (Diagrams, graphs, flowcharts, physical models).

- Analyze data and draw conclusions.
- Evaluate investigative procedures and the conclusions drawn from such investigations.

**Understanding the nature and limitations of scientific activity:**

For each facet of scientific activity selected for study, students should:

- Describe and exemplify it.
- Use appropriately any fundamental terms and classification related to it.
- Recognize that the problem-solving nature of science has limitations.
- Acknowledge that people engaged in science, a particularly human enterprise, have the Characteristics of people in general.

**Appreciating influences of science and technology:**

Students should:

- Recognize that the technology resulting from scientific activity influences the quality of Life and economic development through or by improvements in medical / health care, Nutrition and agricultural techniques.
- Explain that these influences may be the result of unforeseen consequences, rapid
- Exploitation or rapid cultural changes.
- Realize that advances in technology require judicious applications.

**Respecting evidence, rationality and intellectual honesty:**

Students should:

- Display respect for evidence, rationality and intellectual honesty given the number of emotive issues in the area of chemistry.

**Showing capacities to communicate:**

Students should:

- Comprehend the intention of a scientific communication, the relationship among its parts and its relationship to what they already know.
- Select and use the relevant parts of a communication.
- Translate information from communications in particular modes (spoken, written, tables, Graphs, flowcharts, diagrams) to other modes.
- Structure information using appropriate modes to communicate it.

**Working with others:**

Students should actively participate in group work and:

- Share the responsibility for achieving the group task.
- Show concern for the fullest possible involvement of each group.

**ZIAUDDIN UNIVERSITY EXAMINATION BORD**  
**SLOs CATEGORIZATION**  
**XI-Chemistry**  
**Detailed Syllabus**

UNIT	Students' learning outcomes: Students should be able to:	Categorization		
		K	U	A
<b>Unit 1</b>	<b>Weightage 8 %</b>	<b>Stoichiometry</b>		
	Describe mole and Avogadro's Number with examples (Understanding)		*	
	Determine Avogadro's Number and give relationship between mole and Avogadro's Number (Applying)			*
	Define rounding off data, Exponential notation and their practical applications involving numerical. (Understanding)		*	
	Perform stoichiometric calculations with balanced equations using moles, representative particles, masses and volumes of gases (at STP) (Analyzing).			*
	Identify the limiting reactant in a reaction. (Analyzing)			*
	Knowing the limiting reactant in a reaction, calculate the maximum amount of product(s) produced and the amount of any unreacted excess reactant. (Analyzing)			*
	Given information from which any two of the following may be determined, calculate theoretical yield, actual yield, percentage yield. (Understanding)		*	
	Calculate theoretical yield and the percent yield by using the balanced equation, the amounts of reactants and the actual yield. (Applying)			*
<b>Unit 2</b>	<b>Weightage 8 %</b>	<b>Atomic Structure</b>		
	Describe properties of sub atomic particles (Understanding)		*	
	Summarize Bohr's atomic theory (Applying)			*
	Use Bohr's model for calculating radii of orbits. (Understanding)		*	
	Use Bohr's atomic model for calculating energy, frequency and wave Number of radiation emitted or absorbed by electron. (Applying)			*
	Describe spectrum and relate discrete line spectrum of hydrogen to energy levels of electrons in the hydrogen atom. (Applying)			*
	Explain production, properties, types and uses of X-rays. (Understanding)		*	
	Uses of nuclear radiation in health, agricultural etc. (Applying)			*
	Define photon as a unit of radiation energy. (Remembering)	*		
	Describe the concept of orbitals. (Understanding)		*	
	Explain the significance of quantized energies of electrons. (Applying)			*
	Distinguish among principal energy levels, energy sub levels, and		*	

	atomic orbitals.(Understanding)			
	Describe the general shapes of s, p, and d orbitals. (Understanding)		*	
	Describe the hydrogen atom using the Quantum Theory. (Understanding)		*	
	Use the Aufbau Principle, the Pauli Exclusion Principle, and Hund's Rule to writethe electronic configuration of the elements. (Applying)			*
	Describe the orbits of hydrogen atom in order of increasing energy. (Understanding)		*	
	Explain the sequence of filling of electrons in many electron atoms. (Applying)			*
	Describe radioactivity and uses of Nuclear radiation daily life. (Understanding)		*	
<b>Unit3</b>				
<b>Weightage 10 % Theories of Covalent Bonding and Shapes of Molecules</b>				
	Describe the features of sigma and pi bonds. (Understanding)		*	
	Use VSEPR and VBT theories to describe the shapes of simple covalent molecules.(Applying)			*
	Describe the shapes of simple molecules using orbital hybridization. (Applying)			*
	Determine the shapes of some molecules from the number of bonded pairs and lonepairs of electrons around the central atom. (Analyzing)			*
	Define bond energies and explain how they can be used to compare bond strengths of different chemical bonds. (Analyzing)			*
	Predict the molecular polarity from the shapes of molecules. (Applying)			*
	Describe how knowledge of molecular polarity can be used to explain some physicaland chemical properties of molecules. (Analyzing)			*
	Describe the change in bond lengths of hetero-nuclear molecules due to difference inElectronegativity values of bonded atoms. (Understanding)		*	
	Explain what is meant by the term ionic character of a covalent bond.(Understanding)		*	
<b>Unit 4</b>				
<b>Weightage 11 % States of Matter I: Gases</b>				
	List the postulates of Kinetic Molecular Theory. (Remembering)	*		
	Describe the motion of particles of a gas according to Kinetic Theory. (Applying)			*
	State the values of standard temperature and pressure (STP). (Remembering)			*
	Relate temperature to the average kinetic energy of the particles in a substance.(Applying)			*
	Use Kinetic Theory to explain gas pressure. (Applying)			*
	Describe the effect of change in atmospheric pressure on the weather.			



	(Applying)			*
	Describe the effect of change in temperature on the volume of gas. (Applying)			*
	Explain the significance of absolute zero, giving its value in degree Celsius and Kelvin. (Understanding)		*	
	State and explain the significance of Avogadro's Law. (Understanding)		*	
	Derive Ideal Gas Equation using Boyle's, Charles' and Avogadro's law. (Understanding)		*	
	Explain the significance and different units of ideal gas constant. (Understanding)		*	
	Distinguish between real and ideal gases. (Understanding)		*	
	Explain why real gases deviate from the gas laws. (Analyzing)			*
	Define and describe the properties of Plasma. (Applying)			*

**Unit 5      Weightage 7 %                      States of Matter 2: Liquid**

	Describe simple properties of liquids e.g., diffusion, compression, expansion, motion of molecules, spaces between them, intermolecular forces and kinetic energy based on Kinetic Molecular Theory. (Understanding)		*	
	Explain applications of dipole-dipole forces, hydrogen bonding and London forces. (Applying)			*
	Explain physical properties of liquids such as evaporation, vapour pressure, boiling point, viscosity and surface tension. (Understanding)	*		
	Use the concept of Hydrogen bonding to explain the following properties of water: high surface tension, high specific heat, low vapor pressure, high heat of vaporization, and high boiling point. And anomalous behaviour of water when its density shows maximum at 4 degrees centigrade (Applying)			*
	Define molar heat of fusion and molar heat of vaporization. (Remembering)	*		
	Describe how heat of fusion and heat of vaporization affect the particles that make up matter. (Understanding)		*	
	Relate energy changes with changes in intermolecular forces. (Applying)			*
	Define dynamic equilibrium between two physical states. (Remembering)	*		
	Describe liquid crystals and give their uses in daily life. (Applying)			*
	Differentiate liquid crystals from pure liquids and crystalline solids. (Applying)			*

**Unit 6**

**Weightage 8 %                      States of Matter III: Solids**

	Describe simple properties of solids e.g., diffusion, compression,			
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	expansion, motion of molecules, spaces between them, intermolecular forces and kinetic energy based on kinetic molecular theory. (Understanding)		*	
	Differentiate between amorphous and crystalline solids. (Understanding)		*	
	Describe properties of crystalline solids like geometrical shape, melting point, cleavage planes, crystal growth, anisotropy, symmetry, isomorphism, polymorphism, allotropy and transition temperature. (Understanding)		*	
	Use Sulphur to define allotropy. (Understanding)		*	
	Explain the significance of the unit cell to the shape of the crystal using NaCl as an example. (Applying)			*
	Name three types of packing arrangements and draw or construct models of them. (Applying)			*
	Name three factors that affect the shape of an ionic crystal. (Understanding)		*	
	Define lattice energy. (Remembering)	*		
	Differentiate between ionic, covalent, molecular and metallic crystalline solids. (Applying)			*
	Explain the low density and high heat of fusion of ice. (Understanding)		*	
	Define and explain molecular and metallic solids. (Understanding)		*	
<b>Unit 7 Weightage 7 % Chemical Equilibrium</b>				
	Define chemical equilibrium in terms of a reversible reaction. (Remembering)	*		
	Write both forward and reverse reactions and describe the macroscopic characteristics of each. (Understanding)		*	
	State the necessary conditions for equilibrium and the ways that equilibrium can be recognized. (Understanding)		*	
	Write the equilibrium expression for a given chemical reaction. (Understanding)		*	
	Relate the equilibrium expression in terms of concentration, partial pressure, number of moles and mole fraction. (Applying)			*
	Write expression for reaction quotient. (Understanding)		*	
	Determine if the equilibrium constant will increase or decrease when temperature is changed, given the equation for the reaction. (Applying)			*
	Determine the reactants or products are favored in a chemical reaction, given the equilibrium constant. (Analyzing)			*
	State Le Chatelier's Principle and be able to apply it to systems in equilibrium with changes in concentration, pressure, temperature, or the addition of catalyst. (Applying)			*
	Explain industrial applications of Le Chatelier's Principle using Haber's process as an example. (Analyzing)			

				*
	Define and explain solubility product. (Understanding)		*	
	Define and explain common ion effect giving suitable examples. (Applying)			*
<b>Unit 8</b>	<b>Weightage 7 %</b>	<b>Acid Base &amp; Salt</b>		
	Define Bronsted and Lowery concepts for acids and bases (Remembering)	*		
	Identify conjugate acid-base pairs of Bronsted-Lowery acid and base (Analyzing)			*
	Explain ionization constant of water (Understanding)		*	
	Calculate pH, pOH in aqueous medium using Kw values. (Applying)			*
	Define and explain leveling effect. (Understanding)		*	
	Define Lewis acid and base with suitable examples (Remembering)	*		
	Define a buffer and make buffer solutions. (Applying)			*
	Show with equations how a buffer system works. (Applying)			*
	Applications of salts like NaCl, KCl, KI, NaHCO <sub>3</sub> , MgSO <sub>4</sub> , etc. (in tabular form)(Applying).			*
	Use the concept of hydrolysis to explain why aqueous solutions of some salts are acidic or basic. (Applying)			*
	Use concept of hydrolysis to explain why the solution of a salt is not necessarily neutral. (Understanding)		*	
<b>Unit 9</b>	<b>Weightage 7 %</b>	<b>Chemical Kinetics</b>		
	Define chemical kinetics. (Remembering)	*		
	Explain the terms rate of reaction, rate equation, order of reaction, rate constant and rate determining step. (Understanding)		*	
	Determine the order of reaction (Applying)			
	Calculate units of rate constant. (Applying)			
	Explain effects of concentration, temperature and surface area on reaction rates.(Applying)			*
	Explain why powdered zinc reacts faster. (Analyzing)			*
	Explain what is meant by the terms activation energy and activated complex.(Understanding)		*	
	Relate the ideas of activation energy and the activated complex to the rate of a reaction. (Applying)			*
	Illustrate the collision theory to explain how the rate of a chemical reaction is influenced by the temperature, concentration, size of molecules. (Applying)			*
	Illustrate a potential energy diagram for a reaction, discuss the reaction mechanism for the reaction. (Applying)			*
	Define terms catalyst, catalysis, homogeneous catalysis and heterogeneous catalysis.(Understanding)		*	
	Enlist examples of catalyst in tabular form (Understanding)		*	

	Explain that a catalyst provides a reaction pathway that has low activation energy.(Applying)			*
	Describe enzymes as biological catalysts. (Understanding)*		*	
<b>Unit 10 Weightage 10 % Solutions and Colloids</b>				
	List the characteristics of colloids and suspensions that distinguish them from solutions. (Understanding)		*	
	Define hydrophilic and hydrophobic molecules. (Remembering)	*		
	Explain the nature of solutions in liquid phase giving examples of completely miscible, partially miscible and immiscible liquid-liquid solutions. (Applying)			*
	Explain the effect of temperature on solubility. (Understanding)		*	
	Express solution concentration in terms of mass percent, molality, molarity, parts per million, billion and trillion and mole fraction. (Remembering)	*		
	Define Raoult's Law with suitable examples (Understanding)		*	
	Define the term colligative property. (Remembering)	*		
	List some colligative properties of liquids (Understanding)		*	
	Describe on a particle basis why a solution has a lower vapor pressure than the pure solvent. (Applying)			*
	Explain on a particle basis how the addition of a solute to a pure solvent causes an elevation of the boiling point and depression of the freezing point of the resultant solution. (Applying)			*
	Explain osmotic pressure, reverse osmosis and give their daily life applications. (Applying)			*
	Define thermodynamics. (Remembering)	*		
	Define the terms system, surrounding, boundary, state of system, state function, internal energy, enthalpy, entropy, heat of formation, standard heat of formation (Remembering)	*		
	Classify reactions as exothermic and endothermic. (Analyzing)			*
	Relate change in enthalpy to the heat of reaction and heat of combustion of a reaction.(Applying)			*
	Relate change in internal energy of a system with thermal energy at constant volume and constant pressure. (Applying)			*
	Explain Hess's Law with examples. (Understanding)		*	
	Apply Hess's Law to construct simple energy cycles. (Applying)			*
	Explain reaction pathway diagram in terms of enthalpy changes of the reaction. (BornHaber's Cycle) (Applying)			*
	Give the characteristics of a Redox reaction. (Understanding)		*	

	Determine oxidation and reduction in terms of a change in oxidation number.(Applying)			*
	Determine the oxidation number of an atom of any element in a pure substance.(Applying)			*
	Enlist the oxidizing and reducing agents. (Remembering)	*		
	Balance redox reactions that take place in acid solutions. (Applying)			*
	Break a redox reaction into oxidation and reduction half reactions. (Applying)			*
	Balance the redox equation by using half-cell reaction method. (Applying)			*
	Define cathode, anode, electrode potential and S.H.E. (Standard HydrogenElectrode). (Remembering)	*		
	Identify the substance oxidized and the substance reduced in batteries. (Applying)			*
	Describe the cell potential and how it is determined. (Understanding)		*	
	Describe the reaction that occurs when a lead storage battery is recharged. (Applying)			*
	Illustrate how a fuel cell produces electrical energy. (Applying)			*
	Explain the types and uses of batteries in daily life. (Applying)			*

## Class- XI

Chapter	Weightage %
Chapter 1: Stoichiometry	8
Chapter 2: Atomic Structure	8
Chapter 3: Theories of Covalent Bonding and Shapes of Molecules	10
Chapter 4: State of Matter I: Gases	11
Chapter 5: State of Matter II: Liquids	7
Chapter 6: States of Matter III: Solids	8
Chapter 7: Chemical Equilibrium	7
Chapter 8: Acids, Bases and Salts	7
Chapter 9: Chemical Kinetics	7
Chapter 10: Solutions and Colloids	10
Chapter 11: Thermochemistry	9
Chapter 12: Electrochemistry	8
<b>Total:</b>	<b>100</b>

**Ziauddin University Examination Board**  
**Grade XI-Chemistry**  
**Table of Specification (TOS)**

S.No	Strand	Chapter Name	Weightage %	Marks Distribution	MCQs (Sec # A)	CRQs (Sec # B)	ERQs (Sec # C)
1.	Physical Chemistry	Stoichiometry	8	09	01	02	-----
2.		Atomic Structure	8	13	01	01	01
3.	Inorganic Chemistry	Theories of Covalent Bonding and Shapes of Molecules	10	14	02	01	01
4.	States of Matter	State of Matter I: Gases	11	14	02	01	01
5.		State of Matter II: Liquids	7	05	01	01	-----
6.		States of Matter III: Solids	8	05	01	01	-----
7.		Chemical Equilibrium	7	13	01	01	01
8.	Analytical Chemistry	Acids, Bases and Salts	7	06	02	01	-----
9.		Chemical Kinetics	7	05	01	01	-----
10.		Solutions and Colloids	10	10	02	02	-----
11.		Thermochemistry	9	14	02	01	01
12.		Electrochemistry	8	13	01	01	01
<b>TOTAL QUESTIONS HAS TO BE GIVEN</b>					<b>17</b>	<b>14</b>	<b>03</b> (Two Parts of each question)
<b>TOTAL MARKS DISTRIBUTION</b>				<b>85</b>	<b>17</b>	<b>36</b>	<b>32</b>
<b>TOTAL WEIGHTAGE</b>			<b>100 %</b>	<b>20 %</b>		<b>40 %</b>	<b>40 %</b>

**Ziauddin University Examination Board**

**Grade: XI -Chemistry**

**Scheme of assessment**

**Maximum marks: 85**

**PAPER SETTING SCHEME FOR ANNUAL 2023 EXAMINATION**

**SECTION A (MULTIPLE CHOICE QUESTIONS) 20 %**

**OBJECTIVES**

**Total Marks: 17**

It consists of

- Multiple choice questions ===== 17 MCQs
- Given MCQs will be = 17 MCQs
- All MCQs to be answered

**SECTION "B" (SHORT ANSWER QUESTIONS) 40 %**

**SUBJECTIVE**

**Total Marks: 36**

- It consists of **14** Questions.
- To attempt **09 (Nine)** questions (**9 x 4 = 36**)
- **Note:** Each question carry **04** marks.

**SECTION "C" (DETAILED ANSWER QUESTIONS) 40 %**

**SUBJECTIVE**

**Total Marks: 32**

- It consists of **Three** questions
- To attempt **02** questions (**2 x 16 = 32**)
- Each question consists of **Two** parts (a & b)
- **Note:** Each part carry **08** marks.

# BLOOMS TAXONOMY WITH EXAMPLES

## Conclusion

If you are a teacher looking for ways to engage your students in learning, this LIST of questions might be interesting for your classroom practice. Bloom's Taxonomy question stems can help elicit higher-order thinking skills and promote critical thinking among learners at different taxonomy levels. These question stems can also encourage students to think about their knowledge through reflection before answering questions.

## ACTION WORDS FOR COGNITIVE LEVELS

<b>Knowledge</b>	<b>Understand</b>	<b>Apply</b>	<b>Analyze</b>	<b>Evaluate</b>	<b>Create</b>
	 <small>UNDERSTAND</small>				
define	explain	solve	analyze	reframe	design
identify	describe	apply	appraise	criticize	compose
describe	interpret	illustrate	judge	evaluate	create
label	paraphrase	modify	support	order	plan
list	summarize	use	compare	compare	combine
name	classify	calculate	decide	classify	formulate
state	compare	change	discriminate	contrast	invent
match	differentiate	choose	recommend	distinguish	hypothesize
recognize	discuss	demonstrate	summarize	infer	substitute
select	distinguish	discover	assess	separate	write
examine	extend	experiment	choose	explain	compile
locate	predict	relate	convince	select	construct
memorize	associate	show	defend	categorize	develop
quote	contrast	sketch	estimate	connect	generalize
recall	convert	complete	grade	differentiate	integrate
reproduce	demonstrate	construct	measure	divide	modify
tabulate	estimate	dramatize	predict	order	organize
tell	express	interpret	rank	prioritize	prepare



Copy	identify	manipulate	score	survey	produce
discover	indicate	paint	select	calculate	rearrange
duplicate	infer	prepare	test	conclude	rewrite
enumerate	relate	teach	argue	correlate	adapt
listen	restate	act	conclude	deduce	anticipate
observe	select	collect	consider	devise	arrange
omit	translate	compute	critique	diagram	assemble
read	ask	explain	debate	dissect	choose
recite	cite	list	distinguish	estimate	collaborate
record	discover	operate	editorialize	evaluate	facilitate
repeat	generalize	practice	justify	experiment	imagine
retell	group	simulate	persuade	focus	intervene
visualize	illustrate	transfer	rate	illustrate	make
	judge	write	weigh	organize	manage
	observe			outline	originate
	order			plan	propose
	report			question	simulate
	represent			test	solve
	research				support
	review				test
	rewrite				validate
	show				



**MODEL PAPER 2023**

**GRADE: XI**

**SUBJECT: CHEMISTRY**

**Annual Examination 2023**  
**PRE-ENGINEERING / PRE-MEDICAL**

Total Time 3 hour.

Total Marks

85

Time: 30 min

**Section 'A' M.C.Qs (Multiple Choice Question)**

Marks: 17

**Note: This section consists of 17 questions. Attempt all M.C.Qs. Each carries 1 marks.**

**Q 1: Choose the correct answers for each from the given options:**

**1. Rate of reaction depends upon:**

- a. Concentration
- b. Temperature
- c. Catalyst
- d. All of these

**2. What is the pOH of a solution if pH is 8?**

- a. 6
- b. 7
- c. 8
- d. 9

**3. The  $sp^3$  hybrid orbital are:**

- a. Non-polar
- b. Co-planer
- c. Linear
- d. None of these

**4. Which of the following compound does not contain dipole moment?**

- a.  $NH_3$
- b. HCl
- c.  $CCl_4$
- d.  $H_2O$

**5. The amount of heat required to convert one mole of solid directly into gaseous state is called:**

- a. Heat of vaporization
- b. Heat of formation
- c. Heat of Sublimation
- d. Heat of Neutralization

**6.  $3.01 \times 10^{23}$  molecules of oxygen gas at S.T.P occupy a volume of:**

- a.  $22.4 \text{ dm}^3$
- b.  $224 \text{ dm}^3$
- c.  $11.2 \text{ dm}^3$
- d.  $2.24 \text{ dm}^3$

- 7. In electrolytic cell the cathode is the electrode where:**
- Oxidation occurs
  - Reduction occurs
  - Both Oxidation and Reduction
  - Neutralization occurs
- 8. When  $\alpha = \beta = \gamma$ ,  $\alpha = \beta = \gamma = 90^\circ$  the crystal structure is:**
- Tetragonal
  - Monoclinic
  - Triclinic
  - cubic
- 9. 1 calorie equal to \_\_\_\_\_ Joule.**
- 4.31
  - 0.04
  - 4.98
  - 4.0
- 10. The factor  $E + PV$  is known as \_\_\_\_\_.**
- Heat content
  - Change in Enthalpy
  - Work done
  - None of these
- 11. A very high value of  $K_c$  indicates that product are \_\_\_\_\_.**
- very stable
  - very unstable
  - Moderately stable
  - None of these
- 12. During balancing the equation by ion electron method, charge is balanced by:**
- $H^+$
  - $-OH$
  - Ion
  - Electrons
- 13. Principal and azimuthal quantum number values for 3d orbital are:**
- $n=3, l=1$
  - $n=2, l=1$
  - $n=3, l=2$
  - $n=3, l=0$
- 14. The sum of mole fraction is always equal to:**
- one
  - Two
  - Three
  - Zero
- 15. Under similar condition  $CH_4$  gas diffuse \_\_\_\_\_ times faster than  $SO_2$  gas.**
- 1.5 times
  - 2 times
  - 4 times
  - 16 times
- 16. The properties of solution which depends upon the no. of particles of solute are called**
- Colligative properties
  - Intensive properties
  - Qualitative properties
  - Physical properties
- 17. Hydrogen bond is not found in:**
- $H_2O$
  - $CH_4$
  - $NH_3$
  - HF

X-----X-----X



MODEL PAPER 2023

GRADE: XI

SUBJECT: CHEMISTRY

Annual Examination 2023

PRE-ENGINEERING / PRE-MEDICAL

Time: 1 hour 30 min.

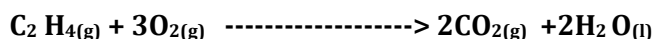
Max. Marks: 68

Section 'B' (Short Answer Questions)

Note: Attempt any Nine (09) questions from this section. All questions carry equal marks.

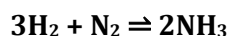
Max Marks: 36

1. Complete the combustion of  $C_2H_4$  in the give reaction



Calculate the mass of  $CO_2$  when **10g** of  $C_2H_4$  burned completely with **24g** of oxygen.

2. Ammonia is manufactured from hydrogen & nitrogen by the Haber process.



If **23g** of ammonia is produced from **23g** of hydrogen then what is the percentage yield?

3. Calculate the wave number of an electron when it jump from  $4^{th}$  orbit to P-fund series. ( $R_H = 1.0967 \times 10^7 \text{ m}^{-1}$ )
4. Write the main postulates of any **One (01)** of the following theories.
- Molecular orbital theory (MOT)
  - Valance bond theory (VBT)
  - Valance shell electron pair repulsion theory (VSEPR)
5. State Boyle's & Charle's law. Also derive the relation for general gas equation.

OR

1.40 dm<sup>3</sup> volume of a gas collected over a hydrogen gas at a temperature of 27 °C and pressure of 900 torr. Calculate the mass of dry hydrogen gas at STP. (Vapour pressure of gas at 27 °C is 21 torr.)

6. Define hydrogen bonding. Also write any five (05) applications of hydrogen bonding.
7. Define any **four** of the following.
- Anisotropy
  - Isomorphism
  - Polymorphism
  - Crystalline solid
  - Amorphous solid

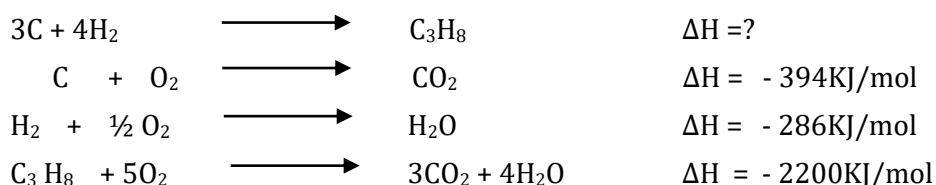
- Ionic radius
- State Le-Chatelier's principle. Explain the industrial application of Le-Chatelier's principle using Haber's Process or contact process.
  - Define buffer solution. Write any four application of buffer solution.
  - Find the Rate law, order of reaction and rate constant from the following data.



S. no	Conc [ $\text{CH}_3\text{COOC}_2\text{H}_5$ ]	Conc [ $\text{H}_2\text{O}$ ]	Rate ( $\text{Ms}^{-1}$ )
1	0.1	0.1	$4 \times 10^{-3}$
2	0.2	0.1	$16 \times 10^{-3}$
3	0.1	0.2	$4 \times 10^{-3}$

- A solution is prepared by mixing **46g** ethanol & **180g** water calculate the mole fraction of both components.
- What do ideal and non-ideal solution mean? State Raoult law and derive its Mathematical expression.
- Give the oxidation number of:
  - Cr in  $\text{K}_2\text{Cr}_2\text{O}_7$
  - O in  $\text{OF}_2$
  - Mn in  $\text{MnO}_4^{-1}$
  - N in  $\text{NCl}_3$

- Calculate the heat of formation for the formation of propane.



(Atomic masses: H = 1, N = 14, C = 12, , Na = 23, O = 16  $N_A = 6.02 \times 10^{23}$  R = 0.0821 atm.dm<sup>3</sup>/mol.K)

## SECTION C

### DETAILED-ANSWER QUESTIONS

**NOTE: ATTEMPT ANY TWO (02) QUESTIONS FROM THIS SECTION.**

**M.Marks: 32**

- (a) Write the main postulates of Bohr's atomic theory & Derive the relation for Radius **OR** Energy of **n<sup>th</sup>** orbit of a hydrogen atom.

$$r = \frac{n^2 h^2}{4\pi^2 m Z e^2}$$

- Draw the MOT diagram of  $\text{N}_2$  molecule and also write its characteristics.

- (a) Define real & Ideal gas. Derive van der Waal equation for real gases by correcting volume & pressure.

- State the law of equilibrium. Derive the expression of  $K_c$  from the following reaction.



- (a) Define electrode potential. How can the electrode potential of **zinc (Zn)** electrode be determined by coupling it with S.H.E in the voltaic cell?

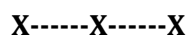
OR

Balance the following redox reaction by ion electron method.



(b) Define Born-Haber cycle. Explain the various step of Born- Haber cycle for the formation of CsF along with the graphical representation. Also find its lattice energy ( $\Delta H_{LE}$ )

$$\begin{aligned} \Delta H_f &= -553.3 \text{ KJ/mol} & \Delta H_s &= 76.5 \text{ KJ/mol} & \Delta H_{IE} &= 375.5 \text{ KJ/mol} & \Delta H_D &= 157 \text{ KJ/mol} \\ \Delta H_{EA} &= -328.2 \text{ KJ/mol} & \Delta H_{LE} &= ? \end{aligned}$$



**HSC PART I EXAMINATION  
MARKS BREAKUP GRID FOR EXAMINATION 2023**

**GROUP: PRE-MEDICAL**

<b>SUBJECT</b>	<b>THEORY</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
ISLAMIC EDUCATION /CIVICS	50	-	50
PHYSICS	85	15	100
CHEMISTRY	85	15	100
BIOLOGY	85	15	100
<b>TOTAL</b>	<b>505</b>	<b>45</b>	<b>550</b>

**GROUP: PRE-ENGINEERING**

<b>SUBJECT</b>	<b>THEORY</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
ISLAMIC EDUCATION /CIVICS	50	-	50
PHYSICS	85	15	100
CHEMISTRY	85	15	100
MATHEMATICS	100	--	100
<b>TOTAL</b>	<b>520</b>	<b>30</b>	<b>550</b>

**GROUP: COMPUTER SCIENCE/ GENERAL SCIENCE**

<b>SUBJECT</b>	<b>THEORY</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
ISLAMIC EDUCATION /CIVICS	50	-	50
PHYSICS	85	15	100
COMPUTER SCIENCE	75	25	100
MATHEMATICS	100	--	100
<b>TOTAL</b>	<b>510</b>	<b>40</b>	<b>550</b>

## **GROUP: COMMERCE (Private/Regular)**

<b>SUBJECT</b>	<b>THEORY</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
ISLAMIC EDUCATION /CIVICS	50	-	50
ECONOMICS	75	-	75
P.O.C	75	-	75
ACCOUNTING	100	--	100
BUSINESS MATHEMATICS	50		50
<b>TOTAL</b>	<b>550</b>	<b>---</b>	<b>550</b>

## **GROUP: HUMANITIES (Private/Regular)**

**(Any Three Elective)**

<b>SUBJECT</b>	<b>THEORY</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
ISLAMIC EDUCATION /CIVICS	50	-	50
COMPUTER STUDIES	75	25	100
ISLAMIC STUDIES	100		100
MATHEMATICS	100	-	100
SOCIOLOGY	100	--	100
ECONOMICS	100		100
EDUCATION	100		100
CIVICS	100		100
<b>TOTAL</b>	<b>550</b>	<b>---</b>	<b>550</b>





Class: XI

MODAL PAPER FOR EXAMINATION 2024

Time Allowed: 20 minutes

SUBJECT: CHEMISTRY

Q1:

(SECTION "A")

Marks: 17

Note: Attempt all questions from section 'A'. Each question carries ONE mark.

- Oxidation number of Cr in  $\text{Na}_2\text{Cr}_2\text{O}_7$  is:  
A. +8                      B. +12                      C. +3                      D. +6
- Gas is more ideal at.  
A.  $100^\circ\text{C}$  and 1 atm .    B.  $0^\circ\text{C}$  and 1 atm .    C.  $0^\circ\text{C}$  and 2 atm.    D.  $100^\circ\text{C}$  and 2 atm
- Milk is an example of this type of colloid.  
A. Gel                      B. Aerosol                      C. Emulsion                      D. Foam
- The principle involved in the liquefaction of gas is .  
A. Charles Law                      B. Henry law .                      C. Joule Thomson effect.    D. le-chatlier's principle
- $K_p = K_c$  when  $\Delta n$  is equal to .  
A. zero.                      B. 1.                      C. -1.                      D. 2
- Which of the following is not state function of a system ?  
A. pressure                      B. enthalpy                      C. internal energy                      D. work done
- Principal and Azimuthal quantum number values for 3d orbitals are.  
A.  $n = 2, l = 1$ .                      B.  $n = 3, l = 2$ .                      C.  $n = 3, l = 3$                       D.  $n = 2, l = 3$ .
- YBT tell us about all of the following facts except.  
A. bond length.                      B. bond strength.                      C. bond energy.                      D. bond order
- Galvanized rod of iron is coated with.  
A. nickel                      B. zinc                      C. Chromium                      D. carbon
- Which of the following molecules possesses strongest London forces  
A.  $\text{H}_2$                       B. He                      C.  $\text{CH}_4$                       D. Ne
- Which of the following set is categorized in to partially miscible liquid pair.  
A. Benzene and water    B. Methanol and water    C. phenol and water    D. benzene and toluene
- The number of carbon atoms in 1 mole of sugar ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) are approximately:  
A.  $6 \times 10^{23}$                       B.  $24 \times 10^{23}$                       C.  $60 \times 10^{23}$                       D.  $72 \times 10^{23}$
- Which oxide is amphoteric in nature?  
A.  $\text{K}_2\text{O}$                       B.  $\text{CO}_2$                       C.  $\text{CaO}$                       D.  $\text{Al}_2\text{O}_3$
- Sonic reaction is classified into:  
A. slow reaction                      B. reversible reaction    C. fast reaction                      D. moderate reaction
- The Sum of mole fraction of components of a solution is equal to:  
A. 0.0                      B. 1.0                      C. 10                      D. 100
- Under similar conditions  $\text{CH}_4$  gas diffuses, \_\_\_\_\_ times faster than  $\text{SO}_2$  gas.  
A. 1:5 times                      B. 2 times                      C. 4 times                      D. 16 times
- Line spectrum is used as a tool for the identification of :  
A. colours                      B. electrons                      C. elements                      D. molecules

END OF SECTION A

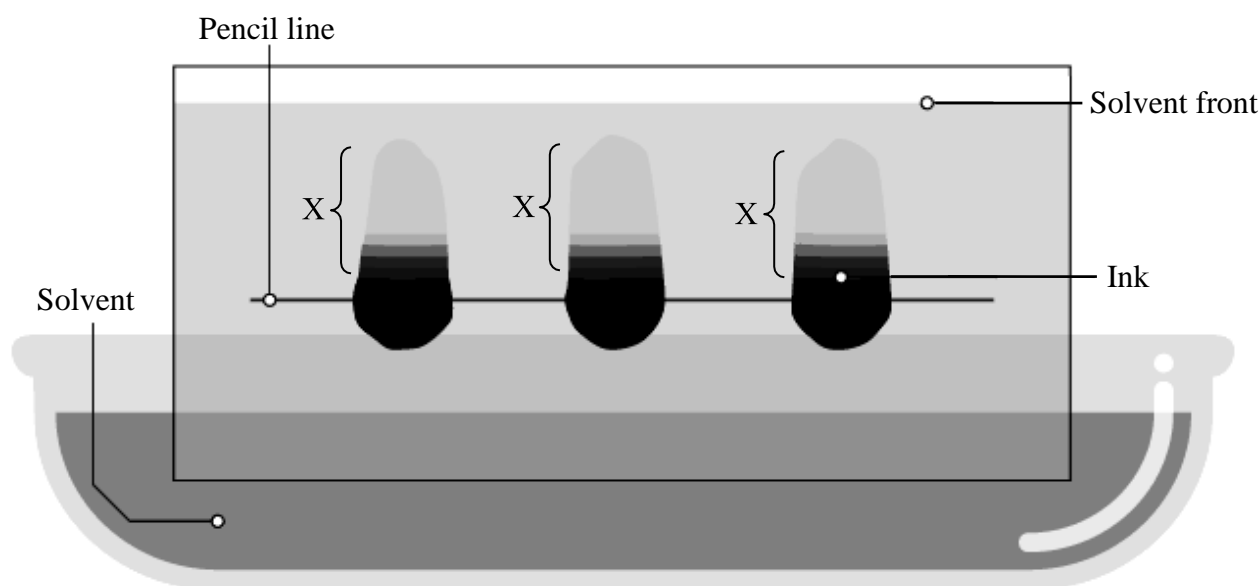
1. A student carries out a gravimetric analysis of 25 mL solution of  $\text{BaCl}_2$  to estimate the amount of  $\text{Ba}^{2+}$  ions present in a solution. Assume the molecular weight of  $\text{Ba}^{2+}$  salt formed and weight of  $\text{Ba}^{2+}$  ion is 253.4 g and 137.4 g, respectively.

With the observation during the experiment, he concluded the following.

Weight of Filter Paper	Weight of Filter Paper + Precipitates of $\text{Ba}^{2+}$ Salt Formed
1.0 g	1.6 g

With reference to the given observation, the amount of  $\text{Ba}^{2+}$  ions obtained in 25 mL of the solution will be

- A. 0.60 g  
B. 0.33 g  
C. 1.11 g  
D. 0.54 g
2. The given diagram shows the separation of different colours present in an ink by using paper chromatography.



The component X that goes farther away from the pencil line is

- A. highly soluble in solvent.  
B. the main component of ink.  
C. present in greater concentration.  
D. strongly attached with filter paper.

3. In a solution of copper(II) ions, dilute HCl is added and then H<sub>2</sub>S gas is passed through it. The copper(II) will be precipitate out in the form of
- A. cuprous ion.
  - B. hydride ions.
  - C. chloride ions.
  - D. sulphide ions.

4. Addition of HCl gas to the aqueous solution of NaCl will suppress the dissociation of
- A. sodium ions.
  - B. chloride ions.
  - C. hydroxide ions.
  - D. hydronium ions.

5. The concentration of commercial grade sulphuric acid is 18.4 M.

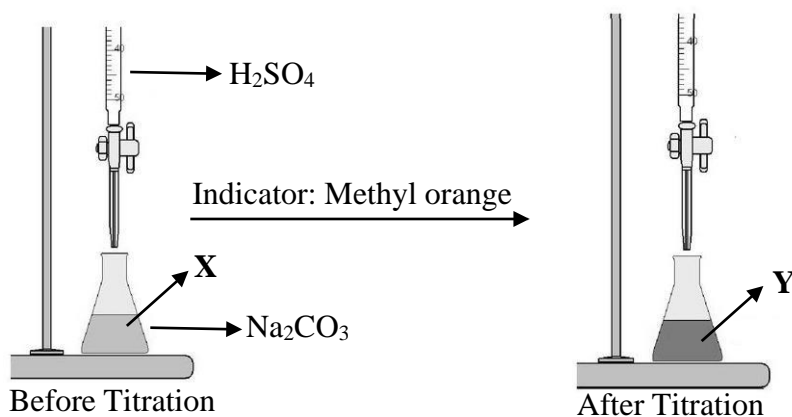
To prepare 250 cm<sup>3</sup> of 0.2 M sulphuric acid solution from the given solution, the volume of sulphuric acid required will be

- A. 0.002 cm<sup>3</sup>
  - B. 0.014 cm<sup>3</sup>
  - C. 2.717 cm<sup>3</sup>
  - D. 14.72 cm<sup>3</sup>
6. A student had to estimate the amount of NaOH present in a laundry soap. For this purpose, he prepared 250 cm<sup>3</sup> of a soap solution from the entire sample. He used 10 cm<sup>3</sup> of this solution and titrated it against 0.5 M H<sub>2</sub>SO<sub>4</sub> by using phenolphthalein. The end point was obtained at 1.4 cm<sup>3</sup>.

The amount of NaOH present in the given sample would be

- A. 0.07 g
- B. 1.4 g
- C. 2.8 g
- D. 5.6 g

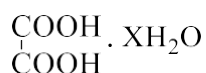
7. Consider the given set-up for the titration of sodium carbonate with sulphuric acid. X and Y represents the colour of an indicator.



The option that CORRECTLY indicates X and Y is

	X	Y
A	yellow	red
B	red	orange
C	pink	colourless
D	orange	yellow

8. Consider the given structure of hydrated oxalic acid.



If 500 cm<sup>3</sup> of 0.05 M solution contains 3.15 g of oxalic acid, then the water of crystallisation present in the structure of oxalic acid will be

(Note:  $^1_1\text{H}$ ,  $^{12}_6\text{C}$  and  $^{16}_8\text{O}$ )

- A. 0  
 B. 1  
 C. 2  
 D. 3
9. Na<sub>2</sub>CO<sub>3</sub> can be considered as all of the following EXCEPT that it is a
- A. weak base.  
 B. hygroscopic.  
 C. primary standard.  
 D. strong electrolyte.

10. Nabeel has titrated a solution of  $\text{C}_2\text{O}_4\text{H}_2 \cdot 2\text{H}_2\text{O}$  of unknown concentration against 10 mL of 0.1 M NaOH solution. He calculated that the concentration of  $\text{C}_2\text{O}_4\text{H}_2 \cdot 2\text{H}_2\text{O}$  is 0.05 M.

He performed the same experiment after two days using same solutions but he obtained a different result. After that, he standardised the same solution of NaOH against 0.1 M of HCl and the calculated concentration of NaOH was 0.8 M.

(**Note:** The entire analysis was carried out at room temperature and the indicator used was phenolphthalein.)

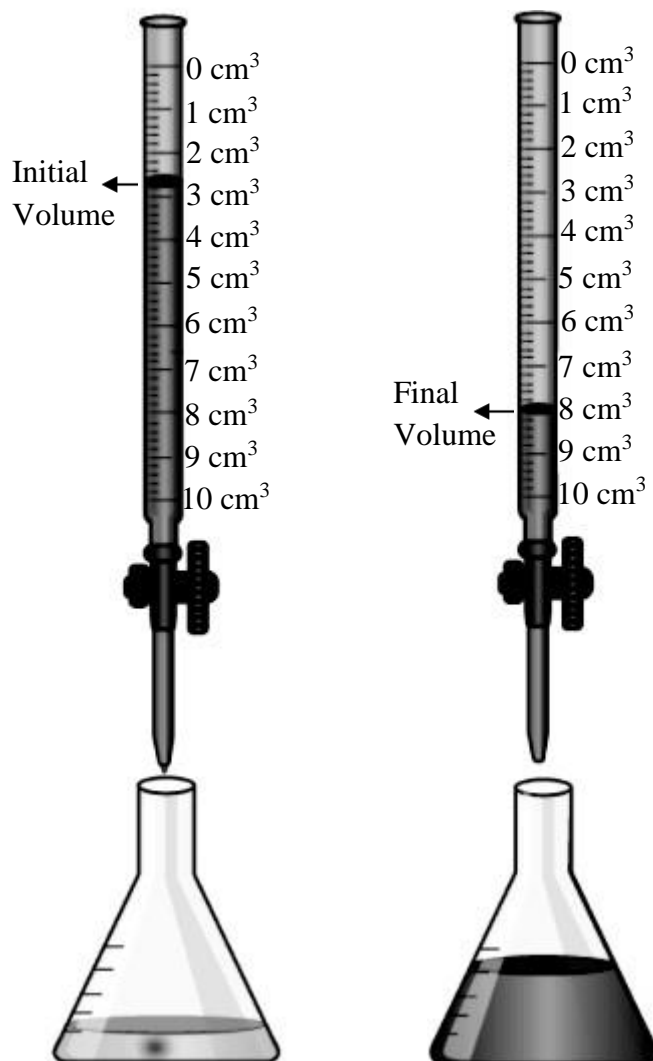
After analysing the given situation, it can be concluded that the secondary standard solution was

- A. HCl
  - B. NaOH
  - C.  $\text{C}_2\text{O}_4\text{H}_2 \cdot 2\text{H}_2\text{O}$  of 0.05 M concentration.
  - D.  $\text{C}_2\text{O}_4\text{H}_2 \cdot 2\text{H}_2\text{O}$  of unknown concentration.
11. 13.7 kcal is the heat of neutralisation that remains constant when a strong acid reacts with a strong base because
- A. water absorbs extra heat evolved.
  - B. strong acids and bases ionise completely.
  - C. a soluble salt is formed as the end product.
  - D. 1-gram equivalent of acid and bases are always used.
12. A small volume of  $\text{H}_2\text{SO}_4$  is used in the standardisation of  $\text{KMnO}_4$  along with the standard solution of oxalic acid.

The presence of  $\text{H}_2\text{SO}_4$  ensures that it

- A. is used as an oxidising agent.
- B. acts as a dehydrating agent.
- C. works as an indicator.
- D. produces a catalyst.

13. The given set up shows the initial and final burette readings, in which  $\text{FeSO}_4$  solution of an unknown concentration is titrated against the standard  $\text{KMnO}_4$  solution.



The volume of  $\text{KMnO}_4$  that will be used to estimate the amount of iron present in the given sample is

- A. 5.4 cm<sup>3</sup>
- B. 5.2 cm<sup>3</sup>
- C. 7.8 cm<sup>3</sup>
- D. 8.0 cm<sup>3</sup>

14. If a solution mixture of  $K_2C_2O_4$  and  $K_2SO_4$  is titrated against a standard solution of  $KMnO_4$ , then which of the following reactions will take place?

- A.  $SO_4^{-2}$  will reduce to  $SO_2$
- B.  $SO_4^{-2}$  will reduce to  $SO_3$
- C.  $C_2O_4^{-2}$  will reduce to  $CO_2$
- D.  $MnO_4^{-1}$  will reduce to  $MnO_2$

15.  $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$  is classified as a

- A. double salt.
- B. neutral salt.
- C. complex salt.
- D. hygroscopic salt.



**Class: XI HIGHER SECONDARY SCHOOL CERTIFICATE ANNUAL (II) EXAMINATION 2024**

**Time: 2 hours 40 minutes SUBJECT: CHEMISTRY (SECTION "B" AND SECTION "C")**

**Total Marks 68**

**SECTION "B" (SHORT ANSWER QUESTIONS)**

**36 Marks**

**Q2:** Attempt any **NINE-PART** questions from this section. Each question carries **FOUR** marks.

- i. State Hess's law and write any one application.
- ii. Calculate the No of moles and molecule in 36 gm of  $H_2SO_4$  (molecular mass of  $H_2SO_4$  is 98)
- iii. What is plasma? Give its significance in daily life.
- iv. Define the following
  - i) Stoichiometry
  - ii) exponential notation
  - iii) molar volume
  - iv) radio activity
- v. Calculate the wave number of photon when electron of a hydrogen atom jumps from 4<sup>th</sup> orbit to 2<sup>nd</sup> orbit (value of  $R_H=1.09678 \times 10^7$ )
- vi. Differentiate between Continuous and Line spectrum.
- vii. Determine the PH of 0.1 M NaOH solution at 25°C.
- viii. Write down any four postulates of VSEPR theory.
- ix. Laughing gas ( $N_2O$ ) at 30°C and 820 torr pressure occupies a volume of 10.32dm<sup>3</sup> Calculate the volume that it will occupy at standard temperature and pressure.
- x. Discuss the factor affecting on rate of reaction.
- xi. How can you define an electrochemical series? Give its properties.
- xii. The ratio of the rates of diffusion of two gases A and B is 1.5:1 If the relative molecular mass of gas A is 16 Find out the relative molecular mass of gas B?
- xiii. State Rout's law and derive its formula.
- xiv. How can we determine the electrode potential of zinc?
- xv. Give reason of the following (Any two).
  - i) A falling drop of liquid is spherical
  - ii) Evaporation is a cooling process
  - iii) Density of water is highest at 4°C

**SECTION "C" (DETAILED ANSWER QUESTIONS)**

**32 Marks**

Note: Attempt any **two-part** question from this section each question carries **sixteen** marks. draw diagram where necessary.

**Q3.**

- a) State and derive Boyle's law
- b) Derive the expression for energy of electron
- c) State and explain Dalton's law of partial pressure. Give practical application of Dalton's law.

**Q4.**

- a) Write down the electronic configuration of the following
  - i) Fe(Z=26)
  - ii) Br(Z=35)
  - iii)  $Ca^{+2}$  (Z=20)
- b) Discuss viscosity and its factors?
- c) What are X-rays? How are they produced? Give their properties and uses.

**Q5.**

- a) State Le Chatlier's principle and explain with any industrial process
- b) State and derive law of equilibrium?
- c) State the postulate of Bohr's atomic theory

**END OF PAPER**