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

No.1-10/FBISE/RES/334 14 March, 2025

NOTIFICATION

Assessment Frameworks for Practical Based Assessment (PBA) containing lists of experiments/praticals along with instructions and Model Question Papers (Composite) in the subjects of Physics, Chemistry, Biology and Computer Science at SSC and HSSC levels based on National Curriculum of Pakistan 2022-23 (Scheme of Studies 2006) are hereby notified for implementation with effect from Annual Examinations 2026 and onwards.

2. The Assessment Frameworks for Composite PBA (Scheme of Studies 2006) are available at FBISE website. The weblink is **https://www.fbise.edu.pk/curriculum_model_paper.php .**

(MIRZA ALI)
Director (Test Development)
Ph: 051-9269504
Email: director@fbise.edu.pk

Heads of all Institutions affiliated with FBISE
at SSC & HSSC levels

Distribution:

1. Director General, Federal Directorate of Education, G-9/4, Islamabad
2. Director General, FGEI, Directorate (Cantonments/ Garrisons), Sir Syed Road, Rawalpindi Cantt
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15. The Director Regional Office (North), The City School, Street 7, NPF, Sector E-11/4, Islamabad
16. Roots International Schools and Colleges, Head Office, Main Service Road West, Opp. G-13/4, IBD
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18. The Citizen Foundation, Plot No. 20, Sector # 14, Near Brookes Chowrangi, Korangi Industrial Area, Karachi
19. Director, Maarif Pak Turk School & College, Head office, H-8/1 Islamabad
20. Director Education, PAEC Headquarter, K-Block Islamabad
21. All HODs, FBISE, Islamabad
22. Director IT (with the request to upload the same on FBISE website and social media)
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24. Incharge, FBISE, Sub-Office, Gilgit
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29. Chat Room. FBISE, Islamabad

ASSESSMENT FRAMEWORK

FOR PRACTICAL BASED ASSESSMENT (PBA) - COMPOSITE

CHEMISTRY

SSC LEVEL

NATIONAL CURRICULUM OF PAKISTAN (2022-23)

SCHEME OF STUDIES 2006

WE WORK FOR EXCELLENCE

FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION (FBISE), ISLAMABAD

Table of Contents

S. No	Contents	Page No.
1.	Acknowledgement	1
2.	About the PBA Assessment Framework	2
3.	Guidelines/instructions for teachers/paper setters	3
4.	List of Experiments aligned with SLOs (Composite PBA)	4
5.	Model Question Paper Chemistry SSC (COMPOSITE)	7

ACKNOWLEDGEMENT

It is a great honour that we at the Federal Board of Intermediate and Secondary Education (FBISE) have developed the Assessment Framework (AF) for the Practical Based Assessment (PBA) of Chemistry at the Secondary School Certificate (SSC) level. The primary objective of the Assessment Framework is to optimize the Student Learning Outcomes (SLOs) of curriculum 2022-23 that are associated with practical concepts and laboratory work. This comprehensive framework has been crafted meticulously by subject matter and assessment experts who conducted an in-depth review of all learning outcomes of SSC level Chemistry curriculum.

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

The Assessment Framework for Practical Based Assessment (PBA) will serve as a guiding document for students, teachers, and paper setters. Students will receive clear directions for preparing themselves for the PBA examinations. Similarly, teachers will use it as a guide to perform laboratory work and to prepare students for the final PBA examinations. Paper setters of PBA will also seek guidance from this document and prepare PBA paper accordingly for annual examinations. It may be noted that only those students will be able to attempt the PBA paper who have performed all the practicals in laboratory.

Following subject as well as assessment experts remained constantly engaged in the development of the Assessment Framework for PBA:

1. Dr. Shaista Sabir, Associate Professor, PAEC Model College for Girls, Nilore, Islamabad
2. Mr. Naeem Mushtaq, Associate Professor, Islamabad Model College for Boys, G-10/4, Islamabad
3. Mrs. Adeela Asim, Assistant Professor, Islamabad Model College for Girls, F-7/2, Islamabad
4. Ms. Javeria Gul, HOD Chemistry, Pak Turk Muaarif International School, Islamabad
5. Mrs. Aliya Sajid, Lecturer, Army Public School & College, Pasban, Rawalpindi

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

MIRZA ALI
Director (Test Development)
FBISE, Islamabad

ABOUT THE PBA ASSESSMENT FRAMEWORK

To ensure clarity and precision in the understanding of Practical Based Assessment (PBA) Question Paper, the Student Learning Outcomes (SLOs) have been categorized into two distinct groups: formative for PBA and summative for PBA in the separately composed Assessment Frameworks for Classes SSC-I and SSC-II. Subsequently, all the SLOs of SSC-I and SSC-II meant for summative PBA have been translated into workable and functional composite lists of major and minor experiments which are part of this booklet. This extraction of lists of experiments helps in effectively measuring student progress and understanding of the scientific concepts linked with laboratory work. These experiments must be performed by the students under the supervision of their teachers in the laboratories in order to prepare themselves for the PBA Examinations.

The Assessment Framework for Practical Based Assessment (PBA) will act as a comprehensive guide for students, teachers, and paper setters. Students will receive clear instructions in order to perform experiments in the laboratory and prepare themselves for the PBA examination. Teachers will use the same to strategize the optimal use of the laboratory for performing experiments (major and minor).

The Model Question Paper for Practical Based Assessment (PBA), along with clear instructions, has also been developed and made part of this booklet to provide a structured format for upcoming examinations. The model question paper ensures consistency and fairness, offering students a comprehensive understanding of PBA examination.

All the experiments have been aligned with their corresponding SLOs marked summative for PBA. The purpose of this alignment is to explain how the experiments relate with their corresponding summative SLOs for PBA.

Instructions for paper setters have also been included before the PBA model question paper, providing self-explanatory guidance on the selection and nature of each question which is part of the model paper.

Guidelines/instructions for teachers/paper setters:

i. The paper will consist of two sections i.e section A and B.

ii. Section A will include Major Practicals. This section will have two questions, each question carrying 6 marks having parts in it, and each question will be performance / calculation/procedures/observations based encompassing a single practical.

iii. Section B will include Minor Practicals. This section will also have two questions, each carrying 4 marks having parts in it. Each question may be based on single or multiple practicals.

iv. The weightage of section A will be 60% i.e 12 marks, while that of section B will be 40 % i.e 8 marks.

v. In Practical Based Assessment (PBA), there will be no marks for practical notebooks and viva voce. However, students may record procedures, observations, apparatus and calculation etc on any type of plain papers/work sheets / practical folders for their future memory of all aspects of practical performance in order to attempt the PBA Examination amicably.

vi. It may be noted that performance of all the prescribed practicals is mandatory in the laboratory during the whole academic session because only those students will be able to attempt the PBA who have performed the practicals in the laboratory as per requirement of each practical.

vii. MCQs will not be included/assessed in the Practical Based Assessment paper.

viii. Questions carrying 0.5 marks will not be included/assessed as single part in any section of the PBA paper.

List of Experiments aligned with SLOs (Composite PBA)
For SSC Annual Examination 2026 & onwards
Chemistry Curriculum (2022-23)-Scheme of Studies 2006

Note: In the Practical-Based Assessment (PBA), questions will be taken/developed from the list of experiments provided below, aligned with the summative SLOs listed in the corresponding column.			
Section A (60% of practical marks — 12 Marks)			
	No.	**List of Experiments**	**Aligned SLOs**
Major experiments	1.	Separation of mixture of water and alcohols by fractional distillation	**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 e) fractional distillation)
			SLO:C-09-F-13 Suggest suitable separation and purification techniques, given information about the substances involved, and their usage in dally life
	2.	Separate given mixture of inks by paper chromatography	**SLO:C-09-F-17** Describe how paper chromatography is used to separate mixtures of soluble substances, using a suitable solvent.
	3.	Separate the Pb^{2+} and Cd^{2+} ions by paper chromatography	**SLO:C-09-F-18** Describe the use of locating agents when separating chromatography in mixtures containing colorless substances.
			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)
			SLO:C-09-F-20 State and use the equation for Rf
	4.	Determine the exact molarity of the NaOH solution Volumetrically	**SLO: C-10-B-13** Calculate concentration of a solution in a titration using empirical data
			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.
			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

	5.	Detection and confirmation of gases. **a**. Ammonia, NH_3, using damp red litmus paper. **b**. Carbon dioxide, CO_2, using limewater. **c.** Chlorine, Cl_2, using damp litmus paper.	**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 lighted splint e. oxygen, O_2, using a glowing splint f. sulfur dioxide, SO_2, using acidified aqueous potassium manganate(VIl))
			SLO: C-09-10-G-10 Describe tests (qualitative, gas tests, other tests)
Section B (40% of Practical Marks — 08 Marks)			
Minor Practicals	**Sr. No.**	**Minor Experiments (Part – II)**	**SLO Description**
	1.	Separate naphthalene from the given mixture of sand and salt by sublimation	**SLO: C-10-B-08** Discuss applications of sublimation around us.
			SLO: C-09-10-G-13 Carry out separation and purification techniques
	2.	Identify following metal ions by flame test. **(Na^+ K^+, Ca^{2+}, Cu^{2+} and Ba^{2+})**	**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+}
	3.	Prepare pure crystals of $CuSO_4.5H_2O$	**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 e) fractional distillation)
			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).
	4.	Determine the melting point of Naphthalene	**SLO:C-09-F-14** Identify substances and assess their purity using melting point and boiling point information
	5.	Determine the boiling point of Ethyl Alcohol	**SL:C-09-F-14** Identify substances and assess their purity using melting point and boiling point information

	6.	Demonstrate a metal displacement reaction in aqueous medium.	**SLO:C-09-G-12** Carry out the following tests under supervision: - identification of metal ions, non-metal ions and gases - chemical test for water - test-tube reactions of dilute acids, including ethanoic acid - tests for oxidising and reducing agents - melting points and boiling points - displacement reactions of metals and halogens - temperature changes during reactions
	7.	Investigate chemical tests for the presence of water using anhydrous copper(II) sulfate	**SLO: C-09-10-G-12** Carry out the following tests under supervision: - identification of metal ions, non-metal ions and gases - chemical test for water - test-tube reactions of dilute acids, including ethanoic acid - tests for oxidising and reducing agents - melting points and boiling points - displacement reactions of metals and halogens - temperature changes during reactions
			SLO: C-09-D-12 Investigate chemical tests for the presence of water using anhydrous copper(II) sulfate
	8.	Test the purity of water using melting point and boiling point	**SLO: C-09-D-13** Explain how to test the purity of water using melting point and boiling point
			SLO: C-09-D-14 Distinguish between Distilled water and tap water with their applications in practical chemistry
			SLO:C-09-F-14 Identify substances and assess their purity using melting point and boiling point information

NOTE: The SLO: C-09-10-G-06 to SLO:C-09-10-G-09 are valid for all experiments.

The SLO: C-09-10-G-10, C-09-10-G-14 to SLO:C-09-10-G-20 will be the part of experiments where applicable.

Model Questions Paper Chemistry SSC (COMOSITE)
FOR ANNUAL EXAMINATION 2026 & ONWARDS
Practical Based Assessment (PBA)
Chemistry Curriculum 2022-23 and Scheme of Studies 2006

Total Marks: 20 Time: 2 hours

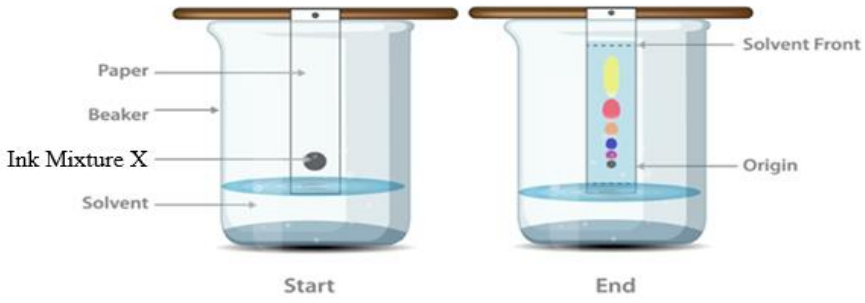
Note: Attempt all questions and write answers within provided spaces on E-Sheet.

SECTION A (6 x 2 = 12)

Q No.1 Ali, a Grade 10 student, is tasked with separating the components of a mixture of inks using paper chromatography in the school laboratory. He has been provided with the following materials:

- Chromatography paper
- A pencil
- A capillary tube
- Beakers
- A solvent (water/alcohol mixture)
- Ink samples (Mixture X)

Ali is instructed to follow the standard procedure for paper chromatography and analyze his results to identify the composition of mixture X.



a. Ali begins by drawing a baseline on the chromatography paper. Where should Ali draw the line, and why should he use a pencil instead of a pen? [1]

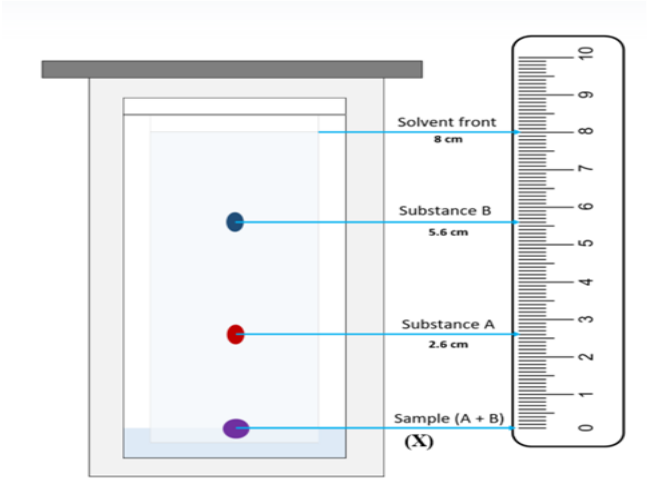
b. Ali used a capillary tube to apply small spots of X (mixture of inks). How can he ensure that the spots are properly placed for effective separation? [1]

c. After applying the ink spots, Ali placed the chromatography paper into a beaker with the solvent. What must Ali check to ensure the setup is correct before starting the experiment? [1]

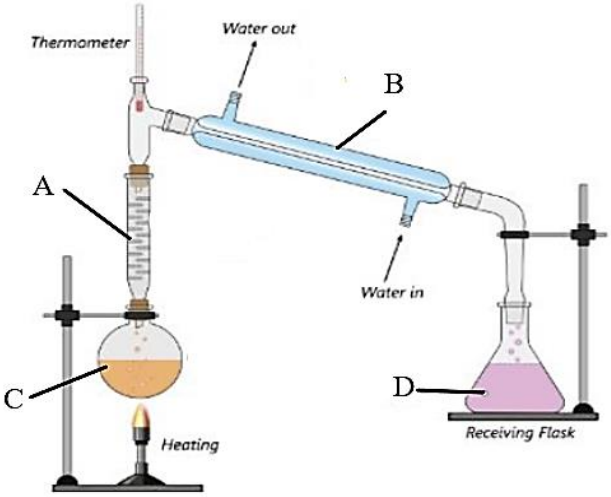
d. How can Ali determine when the experiment is complete, and what should he do immediately after removing the paper from the beaker? [1]

e. Ali observed that X separates into two distinct spots. What conclusion can Ali draw about the composition of X? [1]

f. Perform the necessary calculations to Calculate the Rf values for substance A and B. [1]



Q No.2 In the school laboratory, students are tasked with separating a mixture of water and alcohol using fractional distillation. The arrangement of the apparatus is shown in the figure below.



a. Label the components A, B, C and D. [1]

b. What is the purpose of the component labelled as `A` in this setup, and how does it improve the separation process? [1]

c. As you begin heating the mixture, which component (water or alcohol) will vaporize first, and why? [1]

d. During the experiment, the thermometer stabilizes at around 78°C. What does this indicate, and which liquid is being collected at this temperature? [1]

e. How can you confirm that the distillate collected at 78°C is alcohol and not water? [1]

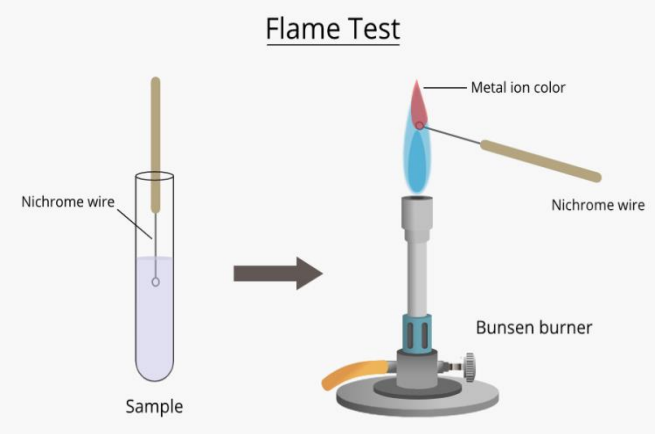
f. How would you adjust the heat source to ensure a steady and controlled distillation process? [1]

SECTION B (4x2 = 08)

Q No.3 A student **Y** is working in the school laboratory to identify metal ions using the flame test. He is provided with:

- Solid samples of salts containing $Na^{+,}$ K^{+}, Ca^{2+},Cu^{2+}, and Ba^{2+} ions.
- A clean platinum/nichrome wire.
- Concentrated hydrochloric acid (for cleaning the wire).
- A Bunsen burner.
- Safety equipment (goggles, gloves).

Y must perform the flame test for each sample and record the flame color to identify the metal ion.



a. What is the purpose of cleaning the nichrome/platinum wire before testing a new sample. Why is this step important. [1]

b. Describe how **Y** should hold the wire in the Bunsen burner flame to observe the colour effectively. If **Y** observes a yellow flame while testing, which metal ion is likely present in the sample? [1]

c. A student, **Z** is setting up an experiment to measure the boiling point of ethanol. He repeats the experiment 3 times to calculate the average. His determined boiling points are 70ºC, 71ºC, 70.5ºC. The true boiling point of ethanol is 78ºC. How would you describe his work in terms of accuracy and precision? [1]

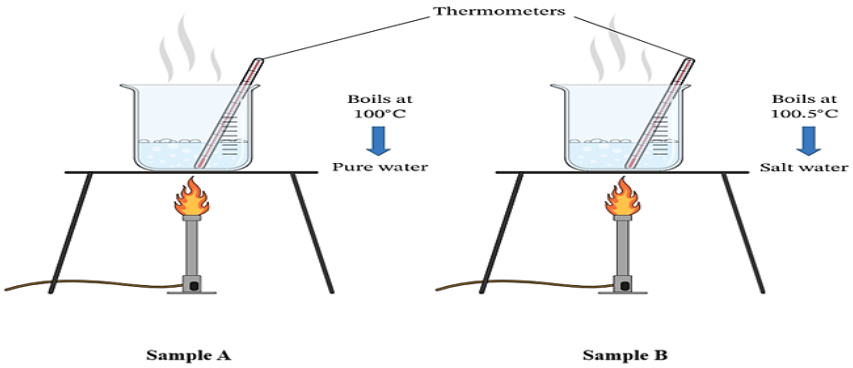
d. Design an experiment to separate a mixture of substances using sublimation. [1]

Q No.4

a. A group of students is conducting an experiment to test the purity of water by determining its melting and boiling points. They have two samples: **Sample A**, which they suspect is pure water, and **Sample B**, which they suspect contains impurities.

The students use a thermometer to measure the temperature at which both samples melt and boil. They perform the following steps:

They boil both samples separately in an open container on a Bunsen burner and record the temperature at which the samples start to boil.



Here are the results:

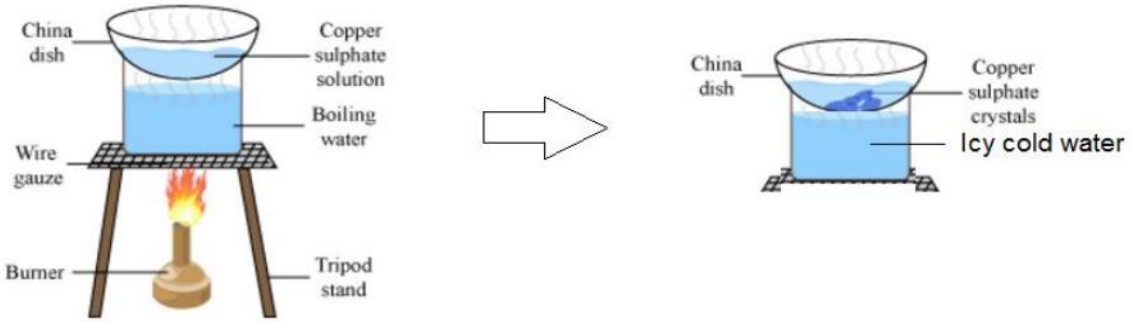
Sample A melts at 0°C and boils at 100°C.
Sample B melts at -2°C and boils at 102°C.

- Explain the significance of the results if pure water has a melting point of 0°C and a boiling point of 100°C at standard atmospheric pressure. [1]

- How can the experiment help determine whether a water sample is contaminated with substances like salt or other solutes? [1]

b. The metal displacement reactions involve the displacement of one metal ion from a solution by another metal. Students were provided with the zinc and copper solution to perform the experiment. What is the expected outcome of adding zinc metal to copper (II) sulphate solution? [1]

c. The image below shows crystals of Copper Sulphate forming during the cooling of the solution. Explain how the rate of cooling affects the size of the crystals. [1]



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