



Delhi Public School, Howrah

PERIODIC TEST - I (2025-2026)

CLASS-XI

Care must be taken not to write anything on the question paper. All the questions must be attempted in the correct sequence.

SUBJECT: CHEMISTRY (CODE-043)

TIME: 3 HOURS

F.M.: 70

General Instructions:

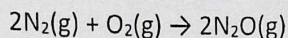
Read the following instructions carefully.

- ((A) There are 33 questions in this question paper with internal choice.
- ((B) SECTION A consists of 16 multiple choice questions carrying 1 mark each.
- ((C) SECTION B consists of 5 short answer questions carrying 2 marks each.
- ((D) SECTION C consists of 7 short answer questions carrying 3 marks each.
- (e) SECTION D consists of 2 case - based questions carrying 4 marks each.
- (f) SECTION E consists of 3 long answer questions carrying 5 marks each.
- (g) All questions are compulsory.
- (h) Use of log tables and calculators is not allowed.

SECTION: A		
The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.		
1.	Which element has the highest electron gain enthalpy? (A) Oxygen (B) Chlorine (C) Fluorine (D) Sulphur	1
2.	Which of the following observations led Rutherford to propose the nuclear model of the atom? (A) Most α -particles passed through the gold foil undeflected (B) Electrons revolve around the nucleus (C) Electrons are negatively charged (D) Atoms are indivisible	1
3.	Which noble gas has the smallest atomic size? (A) Ne (B) He (C) Ar (D) Kr	1
4.	Which of the following has the highest first ionization enthalpy? (A) B (B) Be (C) C (D) N	1
5.	Which statement is not true regarding isotopes? (A) They have different number of neutrons (B) They differ in chemical properties (C) They have same number of electrons (D) They have the same atomic number	1
6.	Identify the pair of compounds that obey the law of multiple proportions: (A) HCl and HBr (B) CO and CO ₂ (C) CH ₄ and C (D) NaCl and KCl	1

7.	What is the mass percent of carbon in carbon dioxide? (A) 0.034% (B) 27.27% (C) 3.4% (D) 28.7%	
8.	Which orbital has quantum numbers $n=3, l=2$? (A) 3s (B) 3p (C) 3d (D) 4f	1
9.	Which pair of elements do not belong to the same group? (A) Na, Rb (B) K, Ca (C) Li, Na (D) B, Ga	1
10.	Which orbital will be filled exact before 5d? (A) 4p (B) 6s (C) 5s (D) 4f	1
11.	The IUPAC name of element with atomic number 115 is: (A) Ununpentium (B) Ununpenium (C) Ununpentum (D) Livermorium	1
12.	What is the SI unit of molarity? (A) mol/kg (B) mol/m ³ (C) mol/L (D) L/mol	1
	Q. no 13 to 16 are Assertion - Reasoning based questions. These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below: (A) Both A and R are true and R is the correct explanation of A. (B) Both A and R are true and R is not the correct explanation of A. (C) A is true but R is false. (D) A is false but R is true.	
13.	Assertion (A): Fluorine has less negative electron gain enthalpy than chlorine. Reason (R): Fluorine has higher electronegativity than chlorine.	1
14.	Assertion (A): Elements in the same group have similar chemical properties. Reason (R): They have same number of valence electrons.	1
15.	Assertion (A): First ionization enthalpy of nitrogen is greater than oxygen. Reason (R): Nitrogen has stable half-filled p-orbitals.	1
16.	Assertion (A): Combustion of 1 mole of methane gives 2 moles of water. Reason (R): In the combustion of methane, hydrogen is one of the products.	1
	SECTION: B This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.	
17.	(A) Write the electronic configuration of chromium ($Z=24$) and explain the anomaly. OR (B) Write quantum numbers for the 19th electron of potassium.	2
18.	A sample of compound contains 40% carbon, 6.7% hydrogen and 53.3% oxygen by mass. Calculate empirical formula by showing steps of calculation.	2

44.8 L of dinitrogen reacted with 22.4 L of dioxygen and 44.8 L of nitrous oxide was formed. The reaction is given below:



Which law is being obeyed in this experiment? Write the statement of the law?

20. "All transition elements are d-block elements, but all d-block elements are not transition elements." Explain the statement. 2

21. Write the significance of quantum numbers 'm' and 's'. 2

SECTION: C

This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.

22. If two elements can combine to form more than one compound, the masses of one element that combine with a fixed mass of the other element, are in whole number ratio.
(A) Which law is related to the aforementioned statement?
(B) Give an example related to this law. Explain with proper justification. 3

23. (A) Write the statement of 'Heisenberg's uncertainty principle'.
(B) Calculate the uncertainty in velocity of a particle of mass 100 mg if uncertainty in position is 1×10^{-5} m. 3

24. (A) The first ionisation enthalpy of magnesium is higher than that of sodium. On the other hand, the second ionisation enthalpy of sodium is very much higher than that of magnesium. Explain the reason of difference with electronic configuration of both the elements. 3

OR

(B) Explain with suitable example why cation is smaller and anions larger in radii than their parent atoms.

25. The following data are obtained when dinitrogen and dioxygen react to form different compounds: 3

Mass of N ₂ (g)	Mass of O ₂ (g)
14	16
14	32
28	32
28	80

(A) Which law of chemical combination is obeyed? State the law.
(B) Explain how this law is verified through the data.

26. The electronic configuration of an element is $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$.
(A) Identify the element.
(B) State its group and period.
(C) Predict its chemical nature. 3

27. Chlorophyll present in green leaves of plants absorbs light at 4.620×10^{14} Hz.
(A) Calculate the wavelength of radiation in nanometer.
(B) Which part of the electromagnetic spectrum does it belong to? 3

28. (A) Calculate the wavelength of an electron having kinetic energy of 3.0×10^{-25} J.
(B) Discuss the significance of this result in the context of wave-particle duality of matter. 3

SECTION: D

The following questions are case-based questions. Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage carefully and answer the questions that follow.

29. In the modern periodic table, elements are arranged in order of increasing atomic numbers which is related to the electronic configuration. Depending upon the type of orbitals receiving the last electron, the elements in the periodic table have been divided into four blocks, viz, s, p, d and f. The modern periodic table consists of 7 periods and 18 groups. Each period begins with the filling of a new energy shell. In accordance with the Aufbau principle, the seven periods (1 to 7) have 2, 8, 8, 18, 18, 32 and 32 elements respectively. The seventh period is still incomplete and scientists are working on it.
(A) Which quantum number is primarily responsible for determining the period number of an element?
(B) Name the block to which the element with electronic configuration $[\text{Xe}] 4f^{14} 5d^6 6s^2$ belongs.
(C) Which period and block does the element with atomic number 58 belong to? 4

OR

(C) Why are the f-block elements placed separately at the bottom of the periodic table?

30.	The concept of mole provides a bridge between the atomic and macroscopic worlds. It allows chemists to count particles by weighing them. One mole of any substance contains 6.022×10^{23} entities (Avogadro's number). Molar mass is the mass of one mole of a substance. This concept is crucial for stoichiometric calculations. It helps in determining the masses of reactants and products involved in a chemical reaction using balanced equations. We can also calculate percentage composition by knowing the molar mass. (A) 'Mole' is the unit of which quantity? (B) What is the unit of 'Molar mass'? (C) What is the number of atoms in 0.25 moles of CO_2? OR (C) Calculate the percentage composition of each element in Na_2SO_4.	4
	SECTION: E The following questions are long answer type and carry 5 marks each. All questions have an internal choice.	
31.	i. (A) What do you mean by molarity? (B) Calculate the molarity of NaOH in the solution prepared by dissolving its 4 g in enough water to form 250 mL of the solution. (given, Na=23u, O=16u, H=1u). (C) Analyse the effect of temperature on molarity and molality. OR ii. Calcium carbonate reacts with aqueous HCl to give CaCl_2 and CO_2 according to the reaction given below, $\text{CaCO}_3 (\text{s}) + 2\text{HCl} (\text{aq}) \rightarrow \text{CaCl}_2 (\text{aq}) + \text{CO}_2 (\text{g}) + \text{H}_2\text{O} (\text{l})$ (A) What mass of CaCl_2 will be formed when 250 mL of 0.76 M HCl reacts with 1000 g of CaCO_3? (B) Name the limiting reagent. (C) Calculate the number of moles of CaCl_2 formed in the reaction.	5
32.	Write the name as instructed below (<u>any five</u>): (A) The scientist who arranged elements in triads based on similar chemical properties and noted that the atomic mass of the middle element was nearly the average of the other two. (B) The group in the modern periodic table to which the element with atomic number 117 would belong. (C) The element in period 2 that has the highest first ionisation enthalpy. (D) The property that increases from left to right in a period and decreases down a group, influencing an atom's ability to attract electrons in a chemical bond. (E) The law which states that the physical and chemical properties of elements are a periodic function of their atomic numbers. (F) The special name of group 11.	5
33.	i. (A) Calculate the energy and frequency of the radiation emitted when an electron jumps from $n=3$ to $n=2$ in a hydrogen atom. (B) Out of electron and proton which one will have, a higher velocity to produce matter waves of the same wavelength? Explain it. (C) What is another name of 3rd last shell? OR ii. (A) Which of the following will not show deflection from the path on passing through an electric field? Proton, cathode rays, electron, neutron (B) Calculate the total number of angular nodes and radial nodes present in 3p orbital. (C) Describe 'Pauli's exclusion principle'.	5