



# Delhi Public School, Howrah

PERIODIC TEST - II (2024-2025)

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.

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

SECTION: A		MARKS
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.	What is the mass percent of carbon in calcium carbonate? (a) 34% (b) 27% (c) 12% (d) 28%	1
2.	Which one will have maximum numbers of water molecules? (a) 18 molecules of water (b) 1.8 grams of water (c) 18 grams of water (d) 18 moles of water	1
3.	The total number of orbitals in a shell having principal quantum number $n$ is (a) $2n$ (b) $n^2$ (c) $2n^2$ (d) $n+1$	1
4.	Quantum numbers $n=2, l=1$ represent (a) 1s orbital (b) 2s orbital (c) 2p orbital (d) 3d orbital	1
5.	The least electron affinity is found in (a) Kr (b) O (c) N (d) B	1
6.	Which oxide of N is isoelectronic with $\text{CO}_2$ (a) $\text{NO}_2$	1

	(b) NO (c) N <sub>2</sub> O (d) N <sub>2</sub> O <sub>3</sub>	
7.	Find the molecule with the maximum dipole moment (a) CH <sub>4</sub> (b) NH <sub>3</sub> (c) CO <sub>2</sub> (d) NF <sub>3</sub>	1
8.	Hydrogen bonds are formed in many compounds e.g., H <sub>2</sub> O, HF, NH <sub>3</sub> . The boiling point of such compounds depends to a large extent on the strength of hydrogen bond and the number of Hydrogen bonds. The correct decreasing order of the boiling points of above compounds is (a) HF > H <sub>2</sub> O > NH <sub>3</sub> (b) H <sub>2</sub> O > HF > NH <sub>3</sub> (c) NH <sub>3</sub> > HF > H <sub>2</sub> O (d) NH <sub>3</sub> > H <sub>2</sub> O > HF	1
9.	Which of the following cannot be represented by resonance structures? (a) Dimethyl ether (b) Nitrate anion (c) Carboxylate anion (d) Toluene	1
10.	The oxidation number of an element in a compound is evaluated on the basis of certain rules. Which of the following rules is not correct in this respect?  (a) The oxidation number of hydrogen is always +1. (b) The algebraic sum of all the oxidation numbers in a compound is zero. (c) An element in the free or the uncombined state bears oxidation number zero. (d) In all its compounds, the oxidation number of fluorine is – 1.	1
11.	The oxidation number of iron in Fe <sub>3</sub> O <sub>4</sub> is (a) +2 (b) +3 (c) 8/3 (d) (a) & (b) both	1
12.	In which of the following compounds, 'Mn' exhibits highest oxidation state? (a) KMnO <sub>4</sub> (b) K <sub>2</sub> MnO <sub>4</sub> (c) MnO <sub>2</sub> (d) MnO	1
	<b>Q. no 13 to 16 are Assertion - Reasoning based questions.</b> <b>These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:</b>  (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.	<b>Assertion:</b> The lesser the lattice enthalpy more stable is the ionic compound. <b>Reason:</b> The lattice enthalpy is greater, for ions of highest charge and smaller radii.	1
14.	<b>Assertion:</b> IUPAC name of compound CH <sub>3</sub> CH = CH – CHO is but–2– enal. <b>Reason:</b> Functional group gets preference over multiple in IUPAC name of a compound.	1
15.	<b>Assertion:</b> pi– bond stronger than sigma bond. <b>Reason:</b> The extent of overlapping in sigma bond is greater than in pi– bond.	1
16.	<b>Assertion:</b> Though the central atom of both NH <sub>3</sub> and H <sub>2</sub> O molecule are sp <sup>3</sup> hybridized, yet H–N–H bond angle is greater than that of H–O–H. <b>Reason:</b> This is because nitrogen atom has one lone pair and oxygen atom has two lone pairs.	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. | Although ionic compounds have so many numbers of cations which are positive charged, still those are stable, why?   | 2 |
| 18. | What do you mean by disproportionation reaction?  | 2 |
| 19. | Fluorine, Chlorine and Bromine are put in one group on the basis of their similar properties.<br>(a) What are those similar properties?<br>(b) What is the common name of this group or family? | 2 |
| 20. | If the binding energy of the electron in a hydrogen atom is 13.6 eV, calculate the energy required to remove the electron from the first excited state of $\text{Li}^{2+}$ .                    | 2 |
| 21. | Draw the structure of any one of the following compounds.<br>(a) hex-3-enoic acid<br>(b) 2-chloro-2-methylbutan-1-ol  | 2 |

**SECTION: C**

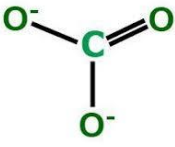

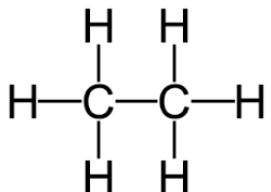
**This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.**

- |     |   |   |
|-----|---|---|
| 22. | A compound contains 4.07% hydrogen, 24.27 % carbon and 71.65 % chlorine. Its molar mass is 98.96 g. What are its empirical and molecular formulas?  | 3 |
| 23. | Which orbitals can overlap to form a sigma bond and which orbitals can do so to form a $\pi$ bond? Show diagram.  | 3 |
| 24. | An element has 2 electrons in its N shell.<br>(a) What is its atomic number?<br>(b) State its position in periodic table<br>(c) Is it a metal or a non-metal?   | 3 |
| 25. | Show that the circumference of the Bohr orbit for the hydrogen atom is an integral multiple of the de Broglie wavelength associated with the electron revolving around the orbit.   | 3 |
| 26. | Balance the equation<br>$\text{MnO}_4^- + \text{I}^- \rightarrow \text{Mn}^{2+} + \text{I}_2 + \text{H}_2\text{O}$ by ion electron method in acidic medium.<br><b>OR</b><br>Balance the equation by oxidation number method:<br>$\text{KMnO}_4 + \text{KI} + \text{H}_2\text{SO}_4 \rightarrow \text{MnSO}_4 + \text{K}_2\text{SO}_4 + \text{I}_2 + \text{H}_2\text{O}$ | 3 |
| 27. | How many molecules approximately do you expect to be present in a small crystal of sugar ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) which weighs 10 mg?  | 3 |
| 28. | An atom of an element contains 29 protons and 35 neutrons. Deduce<br>(a) electronic configuration of the element.<br>(b) number of electrons with same spin.<br>(c) number of unpaired electrons.   | 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. | Carbon compounds show the phenomenon of isomerism. The phenomenon of existence of two or more compounds possessing the same molecular formula but different properties is known as isomerism. Such compounds are called as isomers. It shows mainly two types of isomerism structural and stereo isomerism. Compounds having same molecular formula and structure are classified as structural isomers. Compounds that have same composition and sequence of covalent compounds but differ in relative position of the atom in space are called stereo isomers.<br>(a) Do isomers have same chemical & physical properties? Justify.<br>(b) Give an example of position isomerism.<br>(c) Classify the following pairs as position, chain, functional isomers or metamers.<br>(i) Diethyl amine and methylpropylamine<br>(ii) Ethanol and dimethyl ether.<br><b>OR</b><br>(c) Draw the chain isomers of $\text{C}_5\text{H}_{12}$ . | 4 |
|-----|---|---|

30.	<p>Redox reactions are important class of reactions which are taking place in our daily life. Metals are good reducing agents because they can lose electrons easily whereas non-metals are good oxidising agents which can gain electrons easily. In electrolytic cells, electricity is passed to bring about redox reaction. All rechargeable batteries act as electrolytic cells while recharging. Electrochemical cells produce electricity as a result of redox reaction. Salt bridge is used in electrochemical cell to complete internal circuit and prevents accumulation of charges.</p> <p>(a) In an electrochemical cell, Oxidation takes place at _____ and Reduction takes place at _____</p> <p>(b) What is direction of flow of current and electrons in cathode &amp; anode?</p> <p>(c) <math>4.E^{\circ}_{Zn^{2+}/Zn} = -0.76V</math>, What is meaning of -ve value of reduction potential?</p> <p style="text-align: center;"><b>OR</b></p> <p>(c) What is meant by 'Salt Bridge'? Give its function.</p>	<b>4</b>
<p><b>SECTION: E</b></p> <p><b>The following questions are long answer type and carry 5 marks each. All questions have an internal choice.</b></p>		
31.	<p>(a) The wavelength range of the visible spectrum extends from violet (400 nm) to red (750 nm). Express these wavelengths in frequencies (Hz).</p> <p>(b) Write two demerits of Bohr's theory.</p> <p style="text-align: center;"><b>OR</b></p> <p>(a) Calculate the energy associated with the first orbit of <math>He^+</math>. What is the radius of this orbit? (Given, <math>E_{H1} = -2.18 \times 10^{-18} J</math>, <math>r_{H1} = 0.0529 nm</math>)</p> <p>(b) Calculate the mass of a photon with wavelength <math>3.6 \text{ \AA}</math>.</p>	<b>5</b>
32.	<p>(a) In which C-C bond of the following, the inductive effect is expected to be the least? Explain.</p> <p style="text-align: center;"><b>CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>Br</b></p> <p>(b) Write resonance structures of the following and show the movement of electrons by curved arrows.</p> <p style="text-align: center;"><b>Carbonate Ion</b></p> <div style="text-align: center;">  </div> <p style="text-align: center;"><b>OR</b></p> <p>(a) Arrange the following in increasing order of stability:</p> <div style="text-align: center;">  </div> <p>(b) Show the fission of the bond &amp; draw the free radical produced of the following molecule:</p> <div style="text-align: center;">  </div>	<b>5</b>
33.	<p>Name any five:</p> <p>(a) An alkali metal in period 3 and halogen in period 2</p> <p>(b) The noble gas with 3 shells.</p> <p>(c) The non-metals present in period 2 and metals in period 3.</p> <p>(d) The element of period 3 with valency 4.</p> <p>(e) The element in period 3 which does not form an oxide.</p> <p>(f) The element of lower nuclear charge out of Be and Mg.</p> <p>(g) The element which has higher E.A. Fluorine or Neon.</p>	<b>5</b>