O.P.JINDAL SCHOOL,SAVITRINAGAR

HALF YEARLY EXAMINATION-(2026-27)

CLASS-XI **M.M-50**

SUBJECT-CHEMISTRY **TIME-2HOURS**

General Instruction:-

(i)All questions are compulsory .There are 24 questions in all.
(ii)SECTION –A: Question numbers 1 to 12 are MCQs carrying one mark each.
(iii) SECTION –B:Question numbers 13 to 16 are short answer type-I questions , carrying 2 marks each.
(iv) SECTION –C: Question numbers 17 to 20 are short answer type-II questions , carrying 3 marks each.
(v) SECTION –D:Question numbers 21 and 22 are case-based questions carrying 4 marks each.
(v) SECTION –E:Question numbers 23 and 24 are al long answer type questions and carrying 5 marks each.
(vi)There is no overall choice. However,an internal choice has been provided in some questions.
(vii)Use of calculator is not permitted. However, you may use log tables, if necessary.

SECTION-A

1.A solution is prepared by adding 2 g of a substance A to 18g of water.The mass percentage of solute is:

(a)90% (b)10%
(c)20% (d)50%

2.The recently discovered element with Z= 119 belongs to:

(a)s-block (b)p-block
(c)d-block (d)f-block

3. The electronic configuration of Cu is

(a)[Ar] $4s^2 3d^9$ (b) [Ar] $4s^1 3d^5$
(c) [Ar] $4s^2 3d^5$ (d) [Ar] $4s^1 3d^{10}$

4.The symbol of the element with atomic number 123 is:

(a)Unb (b) Ubt
(c)Ubt (d) Ubn

5. In BrF_5 ,the hybridization of of Br atom is

(a)sp^3d^3 (b)sp^3d^2
(c)sp^3d (d)sp^3

6. The maximum number of elements in 5^{th} period of Modern Periodic Table is :

(a)2 (b)8
(c)18 (d)32

7. 2 g of oxygen contain the number of atoms equal to that contained by :

(a)0.5g hydrogen (b)4g sulphur
(c)7g nitrogen (d)2.3 g sodium

8.The bond order of He^{2+} is:

(a)1 (b)1/2
(c)0 (d)3/2

Questions 9-12 are Assertion and Reason questions:

In these questions(15-18) a statement of assertion followed by a statement of reason is given.
Choose the correct answer out of the following choices:
(a)Assertion and reason both are correct statements and reason is the correct explanation for assertion.
(b) Assertion and reason both are correct statements and reason is not the correct explanation for assertion.

(c) Assertion is correct statement but reason is wrong statement .

(d) Assertion is wrong statement but reason is correct statement .

9.Assertion: IF_7 has sp^3d^3 hybridisation.

Reason: It has octahedral structure.

10. Assertion: The molarity of a solution is defined as the number of moles of solute per litre of solution.

Reason: Molarity can change with temperature because it depends on volume of the solution,which can expand or contract as temperature changes.

11. Assertion: The magnetic quantum number determines the shape of an orbital.

Reason: It describes the orientation of orbitals within a given subshell.

12. Assertion: Noble gases are highly reactive.

Reason: Noble gases have stable closed shell electronic configuration.

SECTION-B

13. Calculate the mass of sugar and water required to make 250 ml of 15% solution of sugar . (The density of the solution is 1g/ml)

OR

In a reaction, $A + B_2 \longrightarrow AB_2$ .Identify the limiting reagent , if any the following reaction mixture:

(i)300 atoms of A + 200 molecules of B

(ii)2 moles of A + 3 moles of B

14. How would you explain the fact that the first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium ?

15.XeF_2 molecule is a linear molecule but it is a sp^3d hybridized .Why?

16.(i) Chromium has configuration $3d^54s^1$ and not $3d^44s^2$ Why?

(ii)Write the e.c.e. of Fe^{3+} ion.

SECTION-C

17. Calculate the formal charges on the atoms in Nitrite ion .

18. A 200 watt bulb emits electromagnetic light of wave length 600 nm.Calculate the number of photons emitted per second by the bulb.

19. 1.41 g of glucose(molar mass=180) is dissolved in 60 g of water.Calculate mole fraction of glucose and water in the mixture.

OR

The molecular mass of an organic compound is 78 and its percentage composition is 92.4% C and 7.6% H . Determine the molecular formula of the compound .

20. The density of 3M solution of NaCl is 1.25 g ml^{-1} .Calculate the molality of the solution.

SECTION-D

21. Read the passage given below and answer the following questions:

Stoichiometry involves calculation based on chemical equations and mole concept. Mole is a counting unit ,equal to $6.022X10^{23}$ particles . One mole is also equal to molar mass expressed in grams.In chemical reactions,the reactant which get used up completely is called limiting reactant and decides the amount of product formed.The properties of elements depend upon their electronic configuration and valence electrons.

(i)Calculate the number of atoms in 52g of He.

(ii)In three moles of ethane(C_2H_6),calculate the number of moles of carbon atoms ?

(iii)Calculate the total number of oxygen atoms present in 20 g of calcium carbonate.

OR

(iii)Calculate the amount of water in gram produced by the combustion of 16 g of methane.

22. Read the passage given below and answer the following questions:

Orbitals are regions or space where there is maximum probability of finding electrons. Orbitals are filled with electrons in increasing order of energy.Each degenerate orbitals is first singly filled,then pairing of electrons takes place.Quantum number 'n' determines energy of electron, 'l' determines shape of orbital and angular momentum,'m_l' determines magnetic orientation and 'm_s' determines spin of electrons.Magnetic moment depends upon number of unpaired electrons.

(i)What is the angular momentum of 2s orbital?

(ii)What represents (a)n=2,l=1 (b)n=4,l=0

(iii)(a)Why is 4s orbital is filled before 3d orbtal?

(b)What are the values of n,l, m_l , m_s for valence electron of Cu(29).

OR

(iii)Explain, giving reasons,which of the following sets of quantum numbers are not possible.

(a)n=0 ,l=0 ,m_l=0 , m_s = +1/2 (b) n=1 ,l=0 ,m_l=0 , m_s = -1/2

(c) n=1 ,l=1 ,m_l=0 , m_s = +1/2 (d) n=2 ,l=1 ,m_l=0 , m_s = -1/2

SECTION-E

23.(i) Yellow light emitted from a sodium lamp has a wave length 700 nm.Calculate the frequency and wave number of this light .

(ii) If the energy of an electron in the second Bohr's orbit of H-atom is –E ,What is the energy of the electron in Bohr's first orbit?

OR

(i)In the Rydberg equation,a spectral line corresponds to n_1=3 and n_2 = 5. Calculate the wave length and frequency of this spectral line.

(ii)How many orbitals(of all kinds) are possible n=4 energy level?

24. On the basis of VSEPR Theory explain the structures of the following:

(i) NH_3 (ii) SF_4 (iii) ClF_3 (iv)XeF_4 (v)H_2O

OR

On the basis of M.O.T. ,calculate the bond order of following species : O_2 ,O_2^+ ,O_2^- and O_2^{2-} .

Arrange the above species in the increasing order of stability and indicate their magnetic properties.
