No.of Printed Pages/Questions:6/33

O.P.JINDAL SCHOOL,SAVITRINAGAR
HALF YEARLY EXAMINATION-(2025-26)

CLASS-XI **MAX.MARKS-70**

SUBJECT-CHEMISTRY **MAX.TIME-3HOURS**

General Instruction:-

(i)All questions are compulsory .There are 33 questions in all.
(ii)SECTION –A: Question numbers 1 to 16 are MCQs carrying one mark each.
(iii) SECTION –B:Question numbers 17 to 21 are short answer type-I questions and carrying 2 marks each.
(iv) SECTION –C: Question numbers 22 to 28 are short answer type-II questions and carrying 3 marks each.
(v) SECTION –D:Question numbers 29 and 30 are case-based questions carrying 4 marks each.
(v) SECTION –E:Question numbers 31 to 33 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. 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] $4s^1 3d^{10}$

2. The symbol of the element with atomic number 123 is

(a)Unb (b) Ubt

(c)Ubs (d) Ubn

3. The number of moles in 11g of CO_2 is

(a)2.5 (b)0.25

(c)1.5 (d)2.0

4. Which one of the following is largest in size ?

(a) N^{3-} (b) O^{2-}

(c) F^- (d) Na^+

5. What will be the molality of the solution made by dissolving 10 g of NaOH in 100g of water ?

(a) 5 m (b)2.5 m

(c)10 m (d)1.25 m

6. The hybrid state of C in ethane, ethene and ethyne is respectively:

(a)sp^3, sp^2, sp (b)sp,sp^2,sp^3

(c) sp^2, sp, sp^3 (d) sp^3, sp,sp^2

7. The structure of BrF_5 is

(a)Square pyramidal (b)Trigonal bipyramidal

(c)Octahedral (d)Pentagonal bipyramidal

8 . The molarity of pure water is:

(a)18 (b)5.56

(c)55.6 (d)100

9. Consider two elements P and Q . If P has 2 and Q has 6 electrons in their outermost shell, then the formula of the compound is :

(a)PQ (b)PQ_2

(c)P_2Q (d)P_2Q_3

10. An electron is moving in Bohr's fourth orbit.Its de-Broglie wavelength is .Caslculate the circumference of the fourth orbit.

(a)2 λ (b)4 λ

(c)4/ λ (d)2/ λ

11. Number of atoms of oxygen present in 10.6 g Na_2CO_3 will be :

(a)6.02×10^{23} (b) 12.04×10^{23}

(c)1.806×10^{23} (d) 31.80×1

12.In which of the following substances will hydrogen bond be strongest?

(a)HCl (b)H_2O

(c)HI (d)H_2S

Questions 13-16 are Assertion and Reason questions:

In these questions(13-16) 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

13 .**Assertion**: Molality of a solution does not change with temperature.

Reason: Mass is affected by temperature.

14. **Assertion**:Energy of radiation is large if its wave length is large.

Reason: Energy (E) =hν (Where ν = frequency)

15. Assertion :Isoelectronic species have same radii.
Reason:They contain same number of electrons.

16. Assertion:.In NH_3 , N is sp^3 hybridised.
Reason:.The decrease in bond angle is due to the repulsion between the lone pair on nitrogen and bond pair between and H.

SECTION-B

17. Calculate the wave number for the longest wavelength transition in the balmer series of atomic hydrogen.

OR

What will be the wave length of a ball of mass 0.1kg moving with a velocity of 100 ms^{-1} .

18. What is the total number of sigma and pi bonds in the following : (i)C_2H_2 (ii)C_3H_6

19. Using s,p,d,f notations,describe the orbital with the following quantum numbers.
(i)n=1,l=0 (ii)n=3,l=1
(ii)n=4,l=2 (iv)n=4,l=3

20. Out of o-nitrophenol and p-nitrophenol which has higher boiling point and why?

OR

Explain the Lewis structure of carbon monoxide molecule..

21. Out of O and S , which has higher negative electron gain enthalpy and why?

SECTION-C

22. Explain the structure of ethyne on the basis of hybridization .

23. 11.28 g of glucose (molar mass=180) are dissolved in 60 g of water. Calculate the mole fraction of glucose and water.

OR

An organic compound on analysis gave the following data : C = 80% and H= 20% .If the molecular mass is 30 ,then calculate its molecular formula.

24. What is the hybrid state of each carbon in the following molecules?
(i)$CH_2 = C = CH_2$ **(ii)**$CH_3 - CH = CH_2$ **(iii)** $CH_3 - CHO$

25.(i) How many orbitals are associated with n=4?

(ii) How many electrons will be present in the subshell having m_s value of -1/2 for n=4?

26.(i) Which is largest in size : Cu^+ ,Cu^{2+} or Cu and why?

(ii) Which element in the periodic table has highest ionization energy?

(iii) Which element is more metallic ;Mg or Al and why?

27.(i) Explain the formation of sodium oxide by the transfer of electrons in the two elements by using electron dot structure.

(ii) Explain the electrical conductivity of ionic compounds.

28.(i) Why does formic acid exist as dimer ?what is its one consequence?

(ii) What is the magnetic characterestics of N^{2-} ?

SECTION-D

29. In the modern periodic table,the 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 in to four blocks :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,seven periods have 2,8,8,18,18,32 and 32 elements respectively.

(i) Write the electronic configuration of Fe^{2+} .

(ii) What is the general electronic configuration of d-block elements.

(iii) Predict the periods and blocks to which each of the following elements belong?

(a)Si (b)Zn

OR

(iii) In terms of period and group where would you locate the elements with :

(a)Z=120 (b)Z=36

30. Dipole moment is the measure of degree of polarity and is defined as the product of the magnitude of charge and the distance between the centres of the positive and negative charge. It is represented by a Greek letter .

Mathematically,it is expressed as:

Dipolemoment (μ) = Charge (Q) X Distance separation(d)

It is usually expressed in Debye units(D).

$1D=1X10^{-18}$ esu

Here esu =electrostatic unit.

Dipole moment is a vector quantity and is represented by crossed arrow($\overset{+}{\longrightarrow}$)pointing towards the more electronegative atom.

(i) What is the relation between resultant dipole moment of NH_3 and NF_3 ?

(ii) In water molecule, two O-H bonds are oriented at an angle of 104.5^0.In BF_3,the three B-F bonds are oriented at an angle of 120^0.In BeF_2,the two B-F bonds are oriented at an angle of 180^0 .Which will have the highest dipole moment?

(iii) In diatomic molecule the bond distance is $1X10^{-8}$ cm. Its dipole moment is 1.2 D.What is fraction of electronic charge on each atom?

OR

(iii) The percentage of ionic character in certain bond A—B is 54.76% and the bond length is given as $246A^0$.What is the dipole moment of AB molecule?

SECTION-E

31. **(i)**Compare the relative stability of the following species and indicate their magnetic properties; O_2 , O_2^+ , O_2^- , O_2^{2-}

(ii) XeF_2 molecule is a linear molecule but it is a sp^3d hybridized .Why?

OR

(i) Using VSEPR theory draw the molecular structures of the following.

(a) H_2O (b)XeF_4 (c) BF_3

(ii) Calculate the formal charges on the various atoms in ozone molecule.

32. **(i)**A100 watt bulbemits monochromatic light of wavelength 400 nm.Calculate the number of photons emitted per second by the bulb.

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

(a) $n=3$, $l=3$, $m_l = +3$, $m_s = +\frac{1}{2}$ (b) $n=4$, $l=3$, $m_l = -2$, $m_s = -\frac{1}{2}$

(c) $n=5$, $l= 4$, $m_l = +3$, $m_s = +1$ (d) $n=3$, $l=0$, $m_l = +1$, $m_s = -\frac{1}{2}$

OR

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

(ii) A golf ball has a mass of 40g and speed of 45 m/s.If the speed can be measured within the accuracy of 2%, ,calculate the uncertainty in position.

33. **(i)**Calculate the molarity of NaOH in the solution prepared by dissolving its 4g in water to form 250 mL of the solution.

(ii) A solution contains 25% water,25% ethanol and 50% acetic acid by mass.Calculate the mole fraction of each component.

OR

(i) The density of 3M NaCl solution is 1.25 g mL^{-1}.Calculate the molality of the solution.

(ii) An organic substance containing carbon ,hydrogen and oxygen gave the percentage composition as C=40.687%,H=5.085% .The vapour density of the compound is 59. Calculate the molecular formula of the compound.
