Roll No. 17

LBS.

Half Yearly Examination 2016

Subject - Chemistry

Class - XI

Set - A

Time : 3 Hrs. M.M. 70

General Instructions:

1. All questions are compulsory.
2. Questions 1 to 5 carry 1 mark each.
3. Questions 6 to 10 carry 2 marks each.
4. Questions 11 to 22 carry 3 marks each.
5. Question 23 carry 4 marks .
6. Questions 24 to 26 carry 5 marks each.

Q.1 How many significant figures are present in 208. (1)

Q. 2 Write the IUPAC name of the element having atomic number(Z) 110. (1)

Q.3 Draw the Lewis structure of $SiCl_4$. (1)

Q.4 Calculate the molecular mass of HNO_3 . (1)
(Atomic Mass of N = 14 u , O = 16 u)

Q.5 What do you mean by the term isotones explain with examples. (1)

Q.6 (i) Calculate the number of atoms in 0.25 mole of carbon atoms. (1x2)

(ii) Sodium is an essential constituent of our body. Calculate the percentage of sodium in the breakfast cereal which has been advertised to contain 40mg of sodium per 50g of the cereal.

Q.7 Define molarity. Calculate the molarity of a solution containing 3.15g of hydrated oxalic acid [$\begin{matrix}COOH \\ COOH\end{matrix} \cdot 2H_2O$] dissolved in 250 mL of the solution. (2)

Q.8 Explain why cations are smaller and anions are larger in radii than their parent atoms ? (2)

OR

Define octet rule. Write its significance and limitations .

Q.9 Consider the following species

N^{3-} , O^{2-} , F^- , Na^+ , Mg^{2+} and Al^{3+}

(a) What is common in them?

(b) Arrange them in the order of increasing ionic radii. (1x2)

Q.10 Show by a chemical reaction with water that Na_2O is a basic oxide and Cl_2O_7 is an acidic oxide. (2)

Q.11 Define mole fraction. A solution has been prepared by dissolving 60g of methyl alcohol in 120g of water. What is the mole fraction of methyl - - alcohol (CH_3OH) and water? (3)

Q.12 (i) An atomic orbital has n = 3. What are the possible values of l and m_l?

(ii) List the quantum numbers (m_l and l) of electrons for 3d orbital.

(iii) Which of the following orbitals are possible?

1p , 2s , 2p and 3f (1x3)

Q.13(i) Use Lewis symbols to show electron transfer between Al and N.

(ii) Count the total number of sigma and pi bonds in C_2H_2 molecule.

(iii) Explain, why bond angle in water is less than that of ammonia although geometries of NH_3 and H_2O molecules are distorted tetrahedral. (1x3)

Q.14 State Heisenberg Uncertainty Principle. A microscope using suitable photons is employed to locate an electron in an atom within a distance of 0.1A. What is the uncertainty involved in the measurement of its velocity? (3)

Q.15 Write down the electronic configuration of the following elements having atomic number

[1] 15 [2] 29 [3] 35 (1x3)

16 Assign the position of an element having outer electronic configuration- $ns^2 np^4$, where n = 3

Also mention two properties of the block to which this element belongs.(3)

Q.17 Give reasons for :- [any three]

(i) Ionisation enthalpy of Be is higher than B.

(ii) Halogens have most negative electron gain enthalpy.

(iii) Reactivity of group 1 elements increases down the group.

(iv) Elements of a group have similar physical and chemical properties. (1x3)

Q.18 (i) What do you understand by dual nature of matter? (1)

(ii) If the velocity of electron in Bohr's first orbit is $2.19 \times 10^{8} ms^{-1}$. Calculate de-Broglie wavelength associated with it. [$h=6.626 \times 10^{-34} kgm^{2}s^{-1}$, $m_e = 9.11 \times 10^{-31} kg$]. (2)

Q.19 Define hybridisation of atomic orbitals. Describe the hybridisation in case of C_2H_6 or BCl_3. (3)

Q.20 Arrange the following elements according to the property indicated-

(i) B , K , Mg , Al increasing metallic character.

(ii) B , F , N , Si , C increasing non metallic charecter.

(iii) Cl , Br , F , I increasing reactivity. (1x3)

Q.21 Account for the following :-

(a) Electron gain enthalpy differs from electronegativity.

(b) C=C bond is shorter than C-C .

(c) Dipole moment in NH_3 is more than NF_3. (1x3)

Q.22 (i) 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? (2)

(ii) What are various factors due to which the ionization enthalpy of the main group elements tends to decrease down a group? (1)

Q.23 In ionic solids, the oppositely charged Ions are closely packed in space and have strong electrostatic forces of attraction. These compounds have high melting and boiling points and are also poor conductors of electricity in the solid state.

(i) Why are ionic solids poor conductors of electricity ? (1)

(ii) What happens to electrical conductivity when these are dissolved in water? (1)

(iii) The electronegativity of cesium is 0.7 and that of fluorine is 4.0. Which type of bond is formed between cesium and fluorine ? (2)

Q.24 A welding fuel gas contains carbon and hydrogen only. Burning a small sample of it in oxygen gives 3.38 g carbon dioxide, 0.690 g of water and no other products. A volume of 10.0 L of this welding gas is found to weigh 11.6 g .Calculate (i) empirical formula, (ii) molecular mass of the gas, and (iii) molecular formula. (5)

or

A organic compound on analysis gave the following percentage composition ; C = 57.8% , H = 3.6% and the rest is oxygen. The vapour density of the compound was found to be 83. Find the molecular formula of the compound. (5)

Q.25 (i) The unpaired electrons in Al and Si are present in 3p orbital. Which electrons will experience more effective nuclear charge from the nucleus? (1)

(ii) How many sub-shells are associated with n=4 ? (1)

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

Q.26 (i) Explain the shape of following molecules using the VSEPR model-

(a) PCl_5 (b) H_2O (1x2)

(ii) Define bond order. Calculate the bond order of :- (1x2)

(a) N_2 (b) F_2

(iii) Use molecular orbital theory to explain why the Be_2 molecule does not exist. (1)