



MID TERM EXAMINATION - 2015-16

SUBJECT - CHEMISTRY

CLASS - XI

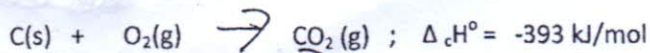
TIME 3 HOURS

M.M 60

Important instructions:

1. All questions are compulsory.
2. Q.No. 1 to 8 are very short answer type questions and carry 1 mark each.
3. Q. No. 9 to 14 are short answer type questions carrying 2 marks each.
4. Q.No. 15 to 24 are short answer type questions carrying 3 marks each.
5. Q.No. 25 and 26 are long answer type questions carrying 5 marks each.

1. Predict the change in internal energy for an isolated system at constant volume.
2. Under what condition of temperature and pressure do real gases tend to show ideal gas behavior ?
3. Name two intermolecular forces that exist between HF molecules in liquid state.
4. How many atoms of fluorine are present in  $1.9 \times 10^{-6}$  g of fluorine ? ( atomic mass of fluorine = 19 u )
5. Two flasks of equal volumes contain  $N_2$  and  $O_2$  gases at same temperature and pressure. Which will have greater number of molecules ? Justify
6. From the following nuclei, choose the isotopes and isobars :  
(i)  $8p+8n$  (ii)  $8p+9n$  (iii)  $18p+22n$  (iv)  $20p+20n$
7. Which combination will lead to  $\pi$  molecular orbitals ( bonding and nonbonding both)  
(i)  $2p_x-2p_y$  (ii)  $2p_z+2p_z$  (iii)  $2s+2p_z$  (iv)  $2p_y+2p_y$
8. If the number of moles of a gas are doubled by keeping the temperature and pressure constant , what will happen to the volume ?
9. Find the total number of electrons in a molecule of phosphoric acid ,  $H_3PO_4$
10. A gas absorbs 120 J of heat and expands against external pressure of 1.1 atm from volume of 0.5 L to 2.0 L. What is the change in the internal energy ?
11. Explain by giving reasons : (i) Be has higher ionisation enthalpies than boron.  
(ii) Oxygen has lower ionisation enthalpies than nitrogen and Fluorine
12. What should be the ratio of velocities of  $CH_4$  and  $O_2$  molecules so that they are associated with de Broglie waves of equal wavelengths ?
13. 0.7 g of zinc dust containing Zn and ZnO when dissolved in dil.  $H_2SO_4$  evolved 224 ml of  $H_2$  at N.T.P. Calculate the percentage of zinc in the zinc dust. ( Atomic mass of Zn = 65)
14. At 300 K the standard enthalpies of formation of  $C_6H_5COOH$  (s) ,  $CO_2$ (g) ,  $H_2O$  (l) are -408 , - 393 and - 286 kJ mol<sup>-1</sup> . Calculate the heat of combustion of benzoic acid at (i) constant pressure and (ii) constant volume
15. Calculate the standard enthalpy of formation of  $CH_3OH$  (l) from the following data :  
 $CH_3OH$  (l) +  $3/2O_2$  (g)  $\rightarrow$   $CO_2$  (g) +  $2H_2O$  (l) ;  $\Delta_r H^\circ = -726$  kJ/mol



16. A flask was heated from 27 °C to 227 °C at constant pressure. Calculate the volume of the flask if 0.1 dm<sup>3</sup> of air measured at 227 °C was expelled from the flask
17. Discuss the shape of PCl<sub>5</sub> on the basis of hybridisation
18. The atomic mass of a metal is 56. Calculate the empirical formula of its oxide containing 70% metal.
19. Calculate the molecular mass of the following: (i) (COOH)<sub>2</sub>·2H<sub>2</sub>O (ii) Na<sub>2</sub>SO<sub>4</sub> (iii) CaSO<sub>4</sub>  
(C= 12 , H = 1 , Na = 23 , S = 32 , O =16 , Ca = 40)
20. Write the main features of Planck's Quantum theory. What is the wavelength of a radiowave with frequency of 1200 kHz
21. (a) Define Pauli's exclusion principle.  
(b) Write the electronic configuration and the number of unpaired electrons in Fe<sup>2+</sup> ion
22. Write three important postulates of kinetic theory of gases. What are the two postulates of the theory are defective .Explain.

OR

What are the different types of molecular speed ? Explain them by giving mathematical expression.

23. (a) Define Charle's law .  
(b) A certain amount of gas occupies a volume of 400 ml at 17°C. To what temperature should it be heated so that the volume is reduced to half.

OR

- (a) What is ideal gas ? Write equation of state for the ideal gas.  
(b) Calculate the mass of 0.120 dm<sup>3</sup> of N<sub>2</sub> at 150°C and 0.987 bar pressure .

24. Define ionisation enthalpy. Explain the factors which influence its value
25. (a) Which of the following represent ground state configurations and which are excited state configurations: (i) 1s<sup>2</sup>2s<sup>2</sup>2p<sup>4</sup> (ii) 1s<sup>2</sup>2s<sup>2</sup>2p<sup>6</sup>3s<sup>1</sup>3p<sup>1</sup> (iii) 1s<sup>2</sup>2s<sup>2</sup>2p<sup>6</sup>3s<sup>2</sup>3p<sup>4</sup>  
(b) How many unpaired electrons are present in Mn<sup>2+</sup>  
(c) Find the total number of electrons in a molecule of phosphoric acid  
( atomic numbers of H = 1 , P = 15 , O = 16 )  
(d) How many protons are present in 5.6 L of oxygen at NTP, using O-16 isotope only

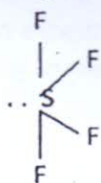
OR

- (a) The reaction  $2\text{C} + \text{O}_2 \rightarrow 2\text{CO}$  is carried out by taking 24 g of C and 96 g of O<sub>2</sub>. Find out  
(i) which reactant is left in excess  
(ii) how much of it is left  
(iii) how many grams of the other reactant should be taken so that nothing is left at the end of the reaction?  
(b) 1.0 g of Mg is burnt in a closed vessel which contains 0.5 g of O<sub>2</sub>. Which is the limiting reactant ? What is the amount of MgO formed in the reaction?

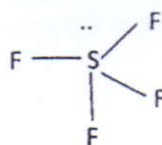
26. (i) Which of the following orbitals are degenerate ?  $3d_{xy}$ ,  $4d_{xy}$ ,  $3d_{z^2}$ ,  $3d_{yz}$ ,  $4d_{yz}$ ,  $4d_{z^2}$
- (ii) wavelength of different radiations are given below :  $\lambda_{(A)} = 300 \text{ nm}$ ,  $\lambda_{(B)} = 300 \mu\text{m}$ ,  $\lambda_{(C)} = 3 \text{ nm}$ ,  $\lambda_{(D)} = 30 \text{ \AA}$ . Arrange these radiations in the increasing order of their energies.
- (iii) The electronic configurations of valence shell of Cu is  $3d^{10} 4s^1$  and not  $3d^9 4s^2$ . How is this configuration explained ?
- (iv) Out of electron and proton which one will have a higher velocity to produce matter waves of the same wavelength ? Explain.
- (v) Chlorophyll present in green leaves of plants absorbs light at  $4.62 \times 10^{14} \text{ Hz}$ . Calculate the wavelength of radiation.

OR

- (i) Give a non polar molecule which have polar covalent bonds.
- (ii) Sigma bond is stronger than pi bond. Explain.
- (iii) Why is that in the  $\text{SF}_4$  molecule, the lone pair of electrons occupies an equatorial position in the overall trigonal bipyramidal arrangement in preference to an axial position.



Equatorial position of  
Lone pair



axial position of  
lone pair

- (iv) The dipole moment of hydrogen halides decreases from HF to HI. Explain  
 $\text{H}-\text{F} (1.78 \text{ D})$ ,  $\text{H}-\text{Cl} (1.07 \text{ D})$ ,  $\text{H}-\text{Br} (0.79 \text{ D})$ ,  $\text{H}-\text{I} (0.38 \text{ D})$   
 $(1 + 1 + 1^{1/2} + 1^{1/2})$