

DEEP PUBLIC SCHOOL  
CLASS XI (Chemistry)  
FIRST TERM EXAM

Time: 2.30 Hours

Max Marks: 70

General Instructions: All Questions are compulsory. Marks are given against each Question.

Q1.

- a) What is degenerate orbital's give example?  
 b) State and explain Hund's Rule  
 c) Define the bond length.  
 d) Define octet rule. Write its significance and limitations.  
 e) What is the relationship between  $n$ ,  $l$ , and  $m$ ?  
 f) What is meant by Node? How many nodes are there for  $3s$  orbital?  
 g) what sub shell would be found in the shell with  $n=4$

(7)

Q2.

- (a) Write the Configurations of  $Cu^{2+}$ ,  $Cd^{2+}$ ,  $Mn^{2+}$ ,  $Fe^{2+}$   
 (b) How does an orbital differ from an orbit? Which scientific principle originates d the Idea of orbital's?

(4)

(2)

Q3.

- a) What is the relationship between wavelength and momentum of a particle? (2)  
 b) Explain why cations are smaller and anions larger in radii than their parent atoms? (1)  
 c) Write the general outer electronic configuration of  $s$ -,  $p$ -, and  $d$ -- block elements (3)  
 d) Define electro negativity, electro positivity, ionization Enthalpy, and Electron gain Enthalpy (2)  
 e) indicate the number of unpaired electrons in: (a) P, (b) Si, (c) Cr, (d) Fe and (X) Kr. (2)

Q4. How does atomic radius vary in a period and in a group? How do you explain the variations? among the species  $N^{3-}$ ,  $O^{2-}$ ,  $F^-$ ,  $Na^+$ ,  $Mg^{2+}$  and  $Al^{3+}$

(1.5)

- (a) What is common in them? (1)  
 (b) Arrange them in the order of increasing ionic radii (1)

Q5 a) What is the significance of the terms - 'isolated gaseous atom' and 'ground state' while defining the ionization enthalpy and electron gain enthalpy?

(1)

b) 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? (1.5)

Q6 a) What are the various factors due to which the ionization enthalpy of the main Group elements tends to decrease down a group?

(1.5)

- b) Which of the following pairs of elements would have a more negative electron enthalpy?  
 (i) O or F (ii) F or Cl (1)  
 (c) Would you expect the second electron gain enthalpy of O as positive, more negative or less negative than the first? Justify your answer. (1)

Q7. Write the favorable factors for the formation of ionic bond.

- a) Although geometries of  $NH_3$  and  $H_2O$  molecules are distorted tetrahedral, bond angle in water is less than that of ammonia. Discuss (3)

- b) Write the resonance structures for  $\text{SO}_3$ ,  $\text{NO}_2$  and  $\text{NO}_3^-$  (3)  
 c) Write the significance/applications of dipole moment (1.5)

Q 8. (a) What is meant by hybridization of atomic orbitals? (1)  
 (b) Describe the shapes of  $sp$ ,  $sp^2$ ,  $sp^3$ ,  $sp^3d$  and  $sp^3d^2$  hybrid orbitals with suitable examples. (3)

Q 9. (a) What do you understand by bond pairs and lone pairs of electrons? Illustrate by giving one example of each type. (2)  
 (b) Distinguish between a sigma and a pi bond. (2)

Q 10. (a) Describe the hybridization in case of  $\text{PCl}_5$ . Why are the axial bonds longer as compared to equatorial bonds? (2)  
 (b) Define hydrogen bond. What are the conditions necessary for the formation of it (2)

Q 11. (a) State and explain the Quantum Numbers? (3)  
 (b) In a process, 701 J of heat is absorbed by a system and 394 J of work is done by the system. (2)

Q 12. (a) Why the  $\text{Be}_2$  molecule does not exist. Use molecular orbital theory to explain. (1.5)  
 (b) Compare the relative stability of the following species and indicate their magnetic Properties:



Q 12. (a) What is meant by the term bond order? Calculate the bond order of  $\text{N}_2$  molecules (1.5)  
 (b) Draw the M.O diagram of  $\text{N}_2$  molecule (1.5)

Q 12. A student forgot to add the reaction mixture to the round bottomed flask at  $27^\circ\text{C}$  but instead he/she placed the flask on the flame. After a lapse of time, he realized his mistake, and using a pyrometer he found the temperature of the flask was  $477^\circ\text{C}$ . What fraction of air would have been expelled out? (1.5)

Q 12. (b) What will be the minimum pressure required to compress  $500\text{ dm}^3$  of air at 1 bar to  $200\text{ dm}^3$  at  $30^\circ\text{C}$ ? (1.5)  
 (b) Define compressibility factor. Derive ideal gas equation. (1.5)  
 (c) Why gases deviate from their ideal behavior (1)

Q 13. Use the periodic table to answer the following questions  
 (a) Identify an element with five electrons in the outer sub shell.  
 (b) Identify an element that would tend to lose two electrons.  
 (c) Identify an element that would tend to gain two electrons.  
 (d) Identify the group having metal, non-metal, liquid as well as gas at the room temperature (2)