

(4301)

2008-2009  
B.Sc. (HONS.) (PART-I) EXAMINATION  
(CHEMISTRY)  
INORGANIC CHEMISTRY  
(CH-111)

Duration: Two Hours

Maximum marks: 20

**NOTE:** Answer all questions.

Answer any FOUR of the following :

(2+2+2+2)

(a) What designations are given to orbitals having -

(i)  $n = 3, l = 1$

(ii)  $n = 2, l = 0$

(iii)  $n = 4, l = 0$

(iv) An electron is in 4f orbital

Give the possible values for its quantum numbers.

(b) In building up of the atoms the filling of 4s orbitals takes place before the 3d orbital. Why?

(c) Calculate the wave lengths of an electron moving with a velocity  $10^8$  cm per sec. and of a 100 kg drum rolling at a speed of 30 km per hour, mass of an electron =  $9.1 \times 10^{-31}$  kg.

(d) State Hund's rule of Maximum Multiplicity.

(e) Write the electronic configuration of elements having atomic numbers 24, 26, 47, 92.

(f) Draw the various shapes of p and d orbitals.

2. Answer any THREE of the following :

(2+2+2)

(a) Arrange the following according to the instructions given against each.

(i) F, N, O, S (Increasing order of electro-negativity).

(ii) Fe,  $\text{Fe}^{3+}$ ,  $\text{Fe}^{2+}$  (Increasing size)

(iii) C, F, Li, Cs (Increasing order of  $\text{IE}_1$ )

(iv) F, Cl, Br, I (Increasing order of electron affinity)

(b) Explain why?

(i) Electron affinity of noble gases is zero and that of nitrogen is very low.

(ii) The radius of an anion is greater than the radius of an atom.

(c) Define electro-negativity. Discuss the trend in electro-negativity in various groups and periods.

(d) Explain why the second ionization energy of sodium is very high as compared to its first ionization energy.

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Answer any TWO of the following :

- (a) How does Band Model explain the bonding in Sodium metal ?
- (b) Why the bond angles of  $\text{NH}_3$  and  $\text{H}_2\text{O}$  molecules are different than the normal bond angles of  $\text{Sp}^3$  hybridization ?
- (c) What is radius ratio rule ? Show how it helps in assigning geometry of ionic solids
- (d) Explain the consequences of hydrogen bonding. Why do  $\text{H}_2\text{O}$  and  $\text{HF}$  have abnormally high boiling points.

Answer any THREE of the following :

(2+2+2)

- (a) Draw the structures of hypophosphorous and orthophosphoric acid and pyrophosphoric acid. Why  $\text{H}_3\text{PO}_3$  is diprotic acid ?
- (b) On the basis of hybridization, discuss the geometry of  $\text{ClF}_3$  and  $\text{IF}_7$ .
- (c) What is diagonal relationship ? In what respect does Beryllium resemble Aluminium ?
- (d) Why  $\text{B}_2\text{H}_6$  is said to be a electron deficient compound ? Explain three centre bond in Diborane.
- (e) What is inert pair effect ? Why heavier p-block elements form more stable compounds in lower oxidation states ?