

BANKIM SARDAR COLLEGE
B.Sc (Hons), Sem- II, Paper CC-2-4
Subject - Chemistry

Group –A

Marks: (1x10 = 10)

1. Select the correct answers:

i) The limiting radius ratio 0.414 – 0.732 is for a cation having co-ordination number

- a) 2 b) 3 c) 4 d) 6

ii) Schottky defects arise in a crystal when the number of cations and anions missing from the lattice sites are

- a) Different b) same c) equal to 2 and 4 respectively d) none of these.

iii) The value of Madelung constant 'A' in NaCl crystal structure is

- a) 1.52 b) 1.64 c) 1.7475 d) None of these

iv) In PF_5 axial bond length is

- a) Greater than equatorial bond length b) Less than equatorial bond length c) Equal to the equatorial bond length d) None of these

v) The structure of SF_4 molecule is

- a) Octahedral b) Tetrahedral c) Trigonal bipyramid d) None of these.

vi) In case of NF_3 the formal charge on N atom is

- a) 3 b) 2 c) 0 d) None of these.

vii) Which isotope of Co is used in radiotherapy for the treatment of cancer

- a) Co-60 b) Co- 59 c) Co-61 d) None of these

viii) The nuclear reactions that occur in the Sun and the Stars involve

- i) Fusion ii) Fission iii) Spallation iv) None of these

ix) Among the following numbers the 'Magic number' is

- i) 28 ii) 30 iii) 37 iv) None of these.

x) ZnO when heated turns yellow and white when cold due to

- i) Schottky defect ii) Frenkel defect iii) Metal excess iv) None of these

Group - B

2.1

Marks - 30

a. Equivalent weight of $K_2Cr_2O_7$ is

1x5 =5

i) 49.03 ii) 60.02 iii) 59.01 iv) None of these

b. Sodium thiosulphate is available as

i) $Na_2S_4O_6, 5H_2O$ ii) $Na_2S_2O_3, 5H_2O$ iii) $Na_2S_2O_3, 4H_2O$ iv) None of these.

c. I_2 crystal dissolves in

i) H_2O ii) Cl_2 water iii) KI solution vi) None of these.

d. 1% starch solution means

i) 0.01 gm starch in 10 ml distilled water ii) 1 gm starch in 100 ml distilled water
ii) .01 gm starch in 100 ml distilled water iv) None of these

e. The formula of bleaching powder is

i) $CaCl_2$ ii) $Ca(OCl)Cl$ iii) $Ca C_2O_4$ iv) None of these

2.2 . What happens when I_2 solution is added to the vitamin C solution? Write the reaction 5

2.3. a) Write down the reactions involved in the standardisation of sodium thiosulphate against standard $K_2Cr_2O_7$ solution. 5

b) Why starch is added towards the end point of the above titration? 5

2.4. a) What is the amount of potassium dichromate required for the preparation of 250 ml 0.1 (N) of its solution? 5

b) What do you mean by 'available' chlorine in bleaching powder. Write down the theory of estimation of available chlorine in bleaching powder. 3+2

Group-C (F.M=50) (10x2+6x5)

Q.3 Answer any ten questions (each of 2 marks)

- i) What is the radius ratio value for tetrahedral crystal structure?
- ii) Write the expression of heat of formation of NaCl according to Born –Haber cycle.
- iii) What do you know about n type semiconductor?
- iv) NaCl is ionic but LiCl is covalent - why?
- v) Write the molecular orbital electronic configuration of O_2^{2-} ion.
- vi) How do you express the extent of polarity of a bond?
- vii) Define equivalent and non- equivalent orbitals.
- viii) Write down the expression by which you would determine the formal charge of an atom in a molecule.
- ix) H_2S is a gas but H_2O is liquid – Explain why?
- x) Complete the following
 - a) ${}^{30}_{15}P \longrightarrow {}^{30}_{14}Si + \dots\dots$
 - b) ${}^{27}_{13}Al + \dots\dots \longrightarrow {}^{30}_{15}P + {}^1_0n$
- xi) What is called artificial radioactivity?
- xii) Indicate the two important hazards of radiation.

(Answer any 6 questions from the following)(6x5 =30)

4. a) What is lattice energy? Mention the factors on which it depends. 3
 - b) Write down the Born- Lande equation of lattice energy 2
- 5) a) Mention two stoichiometric defects in a crystal and discuss one of them 3
 - b) Why are they called stoichiometric defects? 2
- 6) a) NH_3 and NF_3 both are sp^3 hybridised molecules but their bond angles differ--- why? 3
 - b) Predict the structure of ClF_3 according to the VSEPR theory 2
- 7) a) Draw the molecular orbital energy level diagram of F_2 molecule 3
 - b) Find out the bond order in F_2 2
- 8.a) The solubility of the following compounds in water is in the following order 3
 $MgSO_4 > CaSO_4 > Sr SO_4 > Ba SO_4$ ----- Explain.
 - b)What is the effect on melting point of a compound if its covalent character increases 2
- 9)a) Calculate the mass defect of the He nucleus having a mass of 4.0039 a.m.u, given that masses of proton and neutron are 1.00758 and 1.00893 a.m.u respectively. 3
 - b) Find out also the binding energy of the He nucleus . 2

- 10) a) Explain the Meson theory of stability of nucleus 3
b) What is radiocarbon dating? 2
- 11) a) Discuss the condition of linear combination of atomic orbitals 3
b) Give examples of intra molecular H bonding and intermolecular H bonding 2