

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