(Inorganic Chemistry-B)

Time Allowed : 3 Hours] **[Maximum Marks : 22**

Note : (*i*) Attempt **five** questions in all, selecting **one** question from each Unit.

(*ii*) UNIT–V is compulsory.

(*iii*) Be brief and precise in your answers.

UNIT–I

1. (*a*) How many tetrahedral and octahedral voids and associated with each constituent particle in a closed packed structure? 1

(*b*) Show how by changing the size of cation or anion, co-ordination number also changes. 2

(c) Give an example of compound which shows both Schottky a Frankel defects.

2. (a) What are the consequences of Schottky and Frankel defects?

(b) Show that there are four formula units of NaCl in the unit cell sodium chloride.

UNIT–II

3. (a) Draw Born-Haber cycle to calculate Proton-Affinity for Ammonia(c linearly) in the formation of $NH_4Cl(s)$.

(b) Can Ionic compound have covalent character? Explain Polarizati and Polarizability.

4. (a) Which have high B.P. and why :

(i) o-Nitrophenol and

(ii) p-Nitrophenol.

(b) Which have high M.P. and why :

$HgCl_2$ and $CaCl_2$.

(c) Why covalent or ionic bond is not possible in metals?

(d) Which had high B.P. and why-Kr or Ar?

UNIT–III

5. (a) Why Aluminium has slightly more radius as that of Gallium? (Al = 143 pm. Ga = 135 pm)

(b) $H_3BO_3 \xrightarrow{100°C} ? \xrightarrow{160°C} ? \xrightarrow{\text{red hot}} ?$

Complete the reaction.

(c) Draw structure of B_2H_6 showing important parameters.

(d) Draw structure of Borazine. Why it is called inorganic benzene?

6. (a) Why carbon does not show any tendency for complex formatio whereas other elements like Si, Ge, Sn shows?

(b) How CaC_2 and Al_4C_3 differs?

(c) Write a brief note on FULLERENES.

UNIT–IV

7. (a) Give an example of oxide of Nitrogen which have:

(i) N is +2 oxidation state

(ii) Lavghing gas

(iii) Paramagnetic

(iv) Blue solid.

(b) What structure PCl_5 adopts in solid and vapour state? 1

(c) SF_6 have zero dipole moment wheras SF_4 do not? 1

8. (a) Why Interhalogens compounds are more reactive than parent halogens? 1

(b) I_3^- is known whereas F_3^- is known. Why? 1

(c) Give structure of S_4N_4. 1

(d) Complete the r × n :

(i) $P_4O_6 + H_2O \xrightarrow{\Delta}$

(ii) $P_2O_5 + H_2O(\text{cold}) \rightarrow$ 1

UNIT–V

9. (a) How many particules are there in bcc unit cell?

(b) Give basic difference between n-type and p-type semi conductors.

(c) Boric acid is not a protonic acid, explain.

(d) How many pentagonal faces and hexagonal faces are there in C_{60} fullerene?

(e) Arrange in order of increasing acidic strength :

HClO, HClO

$HClO_2$, $HClO_4$

(f) What is basic structural unit of silicates? $6 \times 1 = 6$

CHEMISTRY Paper-VI

(Organic Chemistry–B)

Time Allowed : 3 Hours] **[Maximum Marks : 22**

Note : Attempt **five** questions in all, selecting **one** question from each Section. Question No. 9 is compulsory. All questions carry equal marks.

SECTION–I

1. (a) Describe Sache-Mohr theory of strainless rings How does it account for the stability of cycloalkanes containing six or more carbon atoms?

(b) Discuss the mechanism of chlorination of methane. Give two evidences in support of this mechanism. 2,2

2. (a) Halogenation of alkanes in presence of tetraethyl lead proceeds at a lower temperature than when it is done in its absence, explain.

(b) Cyclopropane and cyclobutane undergo addition reactions while higher cycloalkanes do not. Why?

(c) What are isomers of pentane? Give their IUPAC names. Which isome has highest b.p. and why? 1,1

SECTION–II

3. (a) How does ozonolysis help in locating the position of a double bon in alkenes? Explain with two examples.

(b) Discus the mechan.sm of Anti Markownikov's rule of addition HBr to unsymmetrical alkenes. 2

4. (a) Compelte the reactions :

(i) Cyclohexene + Perbenzoic acid → .....

(ii) Cyclopentene + Br_2/CCl_4 → .....

(b) Discuss the S_N^1 mechanism of dehydration of alcohols to alkenes

(c) Explain why addition of chlorine to propene at ordinary temperatu gives 1,2-dichloropane but at 773 K, it gives 3-chloropane. 1,2

SECTION–III

5. (a) Explain the orbital structure and resonance structure of 1,3-Butadien

(b) Write the major product and sugges. suitable mechanism for th following reactions :

$$CH_2=CH-CH=CH_2 + HBr \xrightarrow[313\ K]{1\cdot3\ K} \begin{matrix} ? \\ ? \end{matrix}$$ 2

6. (a) Give chemical equations for the following reactions :

(i) Reduction of But-2-yne with H_2 Pd/$BaSO_4$

(ii) Reduction of But-2-yne with Na/liq NH_3

(b) How will you explain that alkynes undergo nucleophilic additio reaction but alkenes do not?

(c) How will you prepare a higher alkyne from a lower alkyne? 1,1

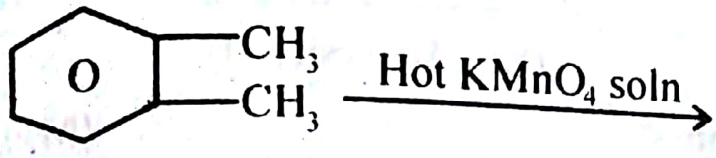
SECTION–IV

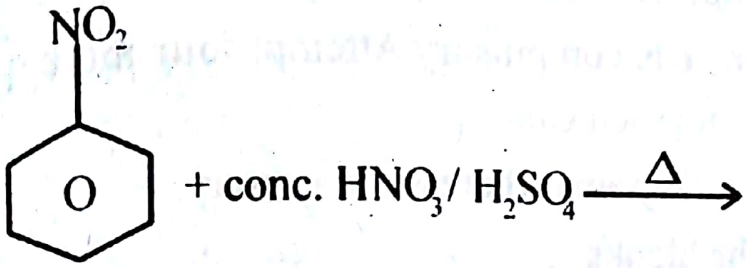
7. (a) Discuss the kekule structure of benzene and also give aobjection to these structures. 2

(b) Give the mechanism of Friedel Craft's acylation reaction.

8. (a) Nitration of benzene takes place readily than that of nitrobenzen Explain.

(b) Predict the major product of the following reactions :

(i) 

(ii) 

1,1,2

(c) Give one method of formation of Phenyl acetylene and one method of formation of biphenyl. 1,1,2

SECTION–V

(Compulsory)

(a) Free radial chlorination of alkanes is not a good method for the preparation of alkyl halides yet neopentyl chloride is generally prepared by free radical chlorination of neopentane.

(b) Out of cis 2-butene and trans 2-butene, which has more m.p. and why?

(c) Penta 1,3-diene is more stable than penta 1,4-diene. Why?

(d) Though benzene is an unsaturated hydrocarbon, yet it fails to give Baeyer's Test. Why?

(e) What are terminal alkynes and non-terminal alkynes? Give examples.

(f) Why in case of ortho and para disubstitution, the para isomer generally dominates? 6×1=6