UG — Chem (GE / Gen – 151)

2022

Time : 3 hours

Full Marks : 60

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer from both the Groups as directed.

Group – A

(Compulsory)

1. [A] Select the correct answer of the following : 1×6 = 6

(a) Bohr Model Postulate is :

(i) $mvr = \frac{mn}{2\pi}$

(ii) $mvr = \frac{hm}{2\pi}$

(iii) $mvr = \frac{nh}{2\pi}$

(iv) None of these

(b) The compound which contains both ionic and covalent bond is :

(i) CH_4

(ii) H_2

(iii) KCN

(iv) KCl

(c) Homolytic fission of c-c bond leads to the formation of :

(i) Free radicals

(ii) Carbonium ion

(iii) Carbanion

(iv) None of these

(d) Which of the following is not a nucleophile ?

(i) CN^-

(ii) BF_3

(iii) CH_3O^-

(iv) NH_3

(e) How many optical isomer are possible for lactic acid ?

(i) 2

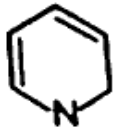
(ii) 4

(iii) 6

(iv) 8

(f) Which of the following compound is aromatic ?

(i) 

(ii) 

(iii) 

(iv) 

[B] Answer the following questions : 3×2 = 6

(a) What is (n + ℓ) rule ? Explain with example.

(b) What are the main postulates of VSEPR theory ?

Group – B

Answer any **four** questions of the following :

2. (a) Derive de-Broglie equation.

(b) Write postulates of Bohr's model.

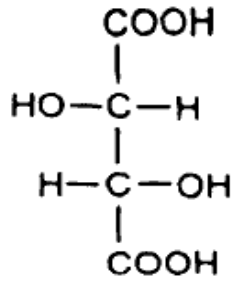
(c) Write electronic configuration of Sc, Cr, Cu and Zn 12

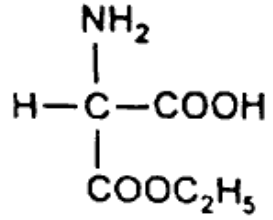
3. (a) Write postulates of Molecular orbital theory.

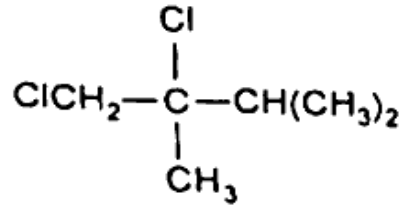
(b) Draw MO diagram of He_2^+, O_2, N_2 and CO.

(c) What is Born-Haber cycle ? Why melting point of NaCl is higher than that of $AlCl_3$? 12

4. (a) Assign R and S configuration to the following :

(i) 

(ii) 

(iii) 

(b) What do you understand by ϵ and Z not obtain for representing geometrical isomers ?

12

5. (a) What do you understand by Nucleophile and electrophile ?

(b) What is Huckel's rule ? How can you prove that Benzene is an aromatic compound ?

(c) Explain why ethyl carbocation ($CH_3\overset{+}{C}H_2$) is more stable than n-propyl carbocation ($CH_3CH_2-\overset{+}{C}H_2$) ? 4+4+4 = 12

6. (a) What happen when :

(i) Sodium acetate is heated with soda lime

(ii) Ethyl magnesium bromide is Hydrolysed

(iii) Aluminium Carbide is hydrolysed

(iv) But-2-ene is treated with hydrogen (H_2) in presence of Nickel

(b) Write notes on Wurtz's reaction with mechanism. 6+6 = 12

7. (a) What is ozonolysis of alkene ?

(b) Complete the following reactions :

(i) $CH_3 - CH = CH - CH_3 + O_3 \longrightarrow ?$

$\xrightarrow{Zn\,/\,H_2O}$?

(ii) $CH_3 - CH = C(CH_3)_2 + O_3 \longrightarrow ?$

$\xrightarrow{H_2/Pt}$?

(c) Write notes on oxymercuration – demercuration. 3+4+5 = 12

8. What is Carbene ? Explain about singlet and triplet carbenes. How can you prepare carbene ? 2+5+5 = 12

9. Write short notes on any **three** of the following : 4+4+4 = 12

(a) Quantum number

(b) Carbonium ion

(c) Markovnikov's

(d) Saytzeff's rule