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AU–16

B.Sc. (Part-I) Semester-I Examination

1S : CHEMISTRY

Time : Three Hours] [Maximum Marks : 80

Note :— (1) Question No. **1** is compulsory.

(2) Solve **ONE** question from each unit.

(3) Draw diagrams and write equations wherever necessary.

(4) Use of calculator is allowed.

1. (A) Fill in the blanks :

(i) $-NH_2$ group is _____ directing group.

(ii) The size of anion is always _____ than parent atom.

(iii) Ideal gas equation for 'n' moles of gas is _____.

(iv) The molecular formula of chlorobenzene is _____. 2

(B) Choose the correct option from the given alternatives :

(i) Which of the following molecule has banana bond ?

(a) C_2H_6 (b) CH_4

(c) B_2H_6 (d) $-NH_3$

(ii) In E_1 mechanism, _____ reactants involved in rate determining step.

(a) 1 (b) 2

(c) 3 (d) 4

(iii) Entropy is measure of :

(a) Order (b) Disorder

(c) Temperature (d) Pressure

(iv) Which of the following group is deactivating group ?

(a) $-NH_2$ (b) $-OH$

(c) $-CH_3$ (d) $-NO_2$ 2

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(C) Answer the following in one sentences :

(i) Define : Ionization energy.

(ii) Give statement of Markownikoff's Rule.

(iii) What is mean Free Path ?

(iv) Write the structural formula of benzene sulphonic acid. 4

UNIT—I

2. (A) What is lattice energy ? Give Born-Lande equation for calculation of lattice energy giving meaning of each term. 4

(B) Explain the Periodic variation of ionization potential along a period and a group of periodic table. 4

(C) Discuss the advantage of long term of periodic table. 4

OR

3. (P) Explain the effect of electronegativity on the properties of elements. 4

(Q) Calculate the effective nuclear charge felt by the 3P electron of silicon. 4

(R) Explain solvation of ions and solvation energy. 4

UNIT—II

4. (A) What is the action of following on diborane ?

(i) Alkali

(ii) Oxygen. 4

(B) Write the electronic configuration of first (I^{st}) group elements. 4

(C) What is inert pair effect ? Why does the tendency to form +5 oxidation state decrease from As to Bi in group 15^{th} (Nitrogen Family). 4

OR

5. (P) Explain trend of ionization energy in 13^{th} group elements (Boron Family). 4

(Q) Explain formation of Hydrogen bridges in diborane on the basis of molecular orbital theory. 4

(R) What are carbides ? How are they classified ? 4

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UNIT—III

6. (A) Discuss the applications of inductive effect. 4

(B) Define the following terms with suitable examples :

(i) Eletromeric effect

(ii) Mesomeric effect. 4

(C) How will you prepare the following :

(i) Acetylene from ethylene dibromide

(ii) 1-Propene from 1-Propanol. 4

OR

7. (P) Explain the E_2 mechanism and state Saytzeff rule. 4

(Q) How will you prepare the following :

(i) Propane from ethylbromide

(ii) Butane from ethylchloride. 4

(R) How will you convert :

(i) n-hexane into benzene

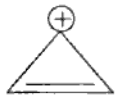
(ii) Cyclohexene into 1, 3-butadiene. 4

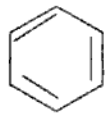
UNIT—IV

8. (A) Discuss Kekule's structure of benzene. 4

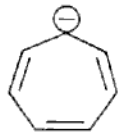
(B) Explain Friedel Craft Acylation reaction. 4

(C) Classify the following as aromatic and antiaromatic :

(i) 

(ii) 

(iii) 

(iv)  4

OR

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9. (P) Discuss Birch reduction of benzene with mechanism. 4

(Q) Classify the following groups into ortho-paradirecting and meta directing group.

(i) $-OCH_3$ (ii) $-C \equiv N$

(iii) $-COOH$ (iv) $-CH_2Cl$ 4

(R) How will you convert :

(i) Benzene into Nitro-benzene

(ii) Toluene into benzyl chloride. 4

UNIT—V

10. (A) Explain entropy change for sublimation and allotropic transition processes. 4

(B) Explain the need of 2^{nd} law of thermodynamics. 4

(C) Derive the expression for workdone in adiabatic reversible expansion of an ideal gas. 4

OR

11. (P) A heat engine working between 30°C and 200°C absorbs 950 J from the source at higher temperature. Calculate (i) workdone, (ii) heat rejected, (iii) efficiency of heat engine. 4

(Q) Explain entropy changes in reversible and irreversible processes. 4

(R) Give any two statements of 2^{nd} Law of thermodynamics. 4

UNIT—VI

12. (A) Define the following terms :

(i) Triple Point

(ii) Root mean square velocity. 4

(B) Explain the law of corresponding states. 4

(C) Discuss the terms involved in the phase rule. 4

OR

13. (P) Give the derivation of kinetic gas equation. 6

(Q) The density of hydrogen at 0°C and 1 atmospheric pressure is 9×10^{-5} gcm^{-3}. What is root mean square velocity of hydrogen molecule ? 4

(R) Define : Critical Temperature with example. 2

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