Q.P. Code : 51462

[3 Hours] **[Marks: 100]**

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory.
2. Answers to the sub-questions must be written together.
3. Figures to the right indicate marks.
4. The use of log table/non programmable calculator is allowed.

1. (A) Select the correct option and complete the following sentences : **12**

i) The gas will show heating effect _____.
- **a)** at inversion temperature
- **b)** below inversion temperature
- **c)** above inversion temperature

ii) When a real gas is allowed to expand adiabatically then its temperature _____.
- **a)** decreases
- **b)** increases
- **c)** remain constant

iii) According to Le-chatlier principle, the ideal condition for the reaction $2SO_{2(g)} + O_{2(g)} \leftrightharpoons 2SO_{3(g)}$, $\Delta H = -$ ve, is _____.
- **a)** high pressure & low temperature
- **b)** high pressure & high temperature
- **c)** low pressure & high temperature

iv) On dissolving KCl in water there is _____.
- **a)** increase in free energy
- **b)** decrease in entropy
- **c)** increase in entropy

v) For the precipitation of sulphides of Ni^{2+}, C_O^{2+}, Zn^{2+} _____ group reagents are used.
- **a)** $NH_4Cl + NH_4OH + H_2S$
- **b)** $NH_4Cl + H_2S$
- **c)** $NH_4OH + H_2S$

vi) In a chemical test heating solid substances alone or with other substances then the tests are called _____.
- **a)** wet test
- **b)** dry test
- **c)** charcoal cavity test

vii) Acidic & basic character in non-aqueous solvent is not explained by _____.
- **a)** Arrhenius concept
- **b)** Lowry-Bronsted concept
- **c)** Lewis-concept

viii)_____ among the following is Lewis base.

a) $AlCl_3$

b) NH_3

c) BF_3

ix) Coupling of alkylhalide with _____ metal in dry ether to form corresponding hydrocation is called as Wurtz reactions.

a) Mg

b) Na

c) Li

x) If two atoms or groups are eliminated from adjacent carbon atoms then it is called _____ elimination.

a) α

b) β

c) γ

xi) The C-X & C-H bonds may breaks simultaneously then such mechanism is considered as _____.

a) E_1

b) E_2

c) E_1cB

xii) The product of Hofmann elimination reaction is _____ olefin.

a) least alkylated

b) most alkylated

c) least hydrogenated.

1. (B) State whether the following statements are True or False : **03**

i) Non ideal gases behave ideally at high pressure & low temperature.

ii) Lux-flood concept explains acid-base behaviour in terms of 'Oxide ion".

iii) Wilkinson catalyst is the common name for chloro tris (triphenylphosphine) sodium (I)

1. (C) Match the following columns : **05**

Column P	Column Q
i) Average velocity	m) Pop sound
ii) Active mass of solid	n) $(8RT/\pi m)^{½}$
iii) $C1O_4^-$	o) Benzylic Bromination
iv) H_2 gas	p) Catalyst
v) NBS	q) Bronsted base
	r) propyl bromide
	s) unity

2. (A) i) Discuss the Van der Waals modification of the ideal gas equation PV = nRT by replacing the pressure with corrected pressure. **05**

ii) Distinguish between real and ideal gases. **03**

OR

2. (A) i) Explain compressibility factor. Calculate the volume occupied by 8 moles of a gas at $1{\cdot}013 \times 10^7$ N/m^2 pressure and 275K, if its compressibility factor is 0·783 ($R = 8{\cdot}314$ Nmk^{-1} mol^{-1}) **05**

ii) State and explain Charles law. **03**

2. (B) i) What are reversible and irreversible reactions? Explain with suitable examples. **05**

ii) Equillibrium constant for the reaction A ⇌ B at 298K is 2×10^2. Calculate the standard free energy change for the reaction. ($R = 8{\cdot}314$ J/k/mol) **03**

OR

2. (B) i) Define entropy. Give the physical significance of entropy. **05**

ii) The equilibrium constant of a reaction is 2×10^{-3} at 25ºC and 2×10^{-2} at 50ºC. What is the nature of the reaction, exothermic or endothermic? Give reasons. **03**

2. (C) State any four assumptions of kinetic theory of gases. **04**

OR

2. (C) State any four characteristics of equilibrium constant of a reaction. **04**

3. (A) i) Explain the solubility product principle used in qualitative analysis with example. **05**

ii) Calculate the solubility of silver chromate if concentration of silver ion is $2{\cdot}6\times10^{-4}$ mol/dm^3 & chromate ion is $1{\cdot}3 \times 10^{-4}$ mol/dm^3. **03**

OR

3. (A) i) What are the apparatus used to detect the gases in qualitative analysis. **05**

ii) Give the classification of gases. **03**

3. (B) i) Explain Pearson's Principle of acids and bases. Comment on stability of complex $[AgI_2]^-$ and occurrence of mineral of $MgCO_3$ and $CaCO_3$. **05**

ii) Give limitations of Arrhenius acid-base concept. **03**

OR

3. (B) i) What is Lewis concept of acids and bases? Give its advantages. **05**

ii) Define equivalence point. **03**
Calculate the pH of solution.
When 7·0 cm^3 of 0·1M KOH is added to 10·0 cm^3 of 0·1M HCl.

3. (C) Write a brief note on hydrogen sulphide gas. **04**

OR

3. (C) Explain the solvent solute system (Autoionization) concept with suitable examples. **04**

4. (A) i) How is sodium acetylide prepared? How is it converted into following: **04**
a) Ethene b) propyne c) Butyne

ii) Explain oxidation of 2-Butene with OsO_4 with chemical equation. Why it is called a syn-addition? Explain its stereospecificity. **04**

OR

4. (A) i) Explain Diels Alder Reaction with one example. Name diene and dienophile. Give its mechanism. **04**

ii) What are different types of catalysis? Explain with examples. Explain why catalytic hydrogenation of olefin is predominantly cis-addition. **04**

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4. (B) i) Explain Allylic and Benzylic bromination with suitable examples. **04**

ii) State and explain Markownikoff's and Anti Markownikoff's rules with examples. **04**

OR

4. (B) i) What is ozonolysis? Give the products of ozonolysis of ethene and 2-Methyl-2-Butene. **04**

ii) Write a note on E_1 mechanism with rate and order of reaction. **04**

4. (C) State and explain with suitable examples **04**

i) Saytzeff rule

ii) Hoffmann Rule

OR

4. (C) Define vicinal dihalide. How is it converted into following alkynes: **04**

i) Acetylene

ii) Propyne

iii) Butyne

5. Answer any four of the following :

A) Explain the causes of deviation of gases from the ideal behaviour. **05**

B) For the reaction $CO_{(g)} + 2H_{2(g)} \rightleftharpoons CH_3OH_{(g)}$. Calculate the value of K_c & Kp at 300ºC. The equilibrium concentration of $H_{2(g)}$, $CO_{(g)}$ & $CH_3OH_{(g)}$ are 0·09 mole dm^{-3}, 0·03 mol dm^{-3}, 0·03 mol dm^{-3} respectively. **05**

C) Explain the effect of complexation in separation of ions. (Any two examples). **05**

D) Differentiate between Bronsted & Lewis concept of acids & bases with suitable example. **05**

E) Explain oxymercuration & demercuration reaction and give its mechanism and one application. **05**

F) What are the different products obtained when 1, 3 butadiene is treated with Br_2 & HCl. **05**

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