

Please check whether you have got the right question paper.

- N.B:
1. All questions are compulsory.
 2. Answer to the same question must be written together.
 3. Figures to the right indicates full marks.
 4. The use of log-table/Non-programmable calculator is allowed.

Q.1 (A) Select the correct option (MCQ) and complete the following sentences.

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- For one mole of an ideal gas, the ideal gas equation is _____.
(a) $PV = RT$ (b) $PV = 1/2 RT$ (c) $P = VRT$
- The average kinetic energy of the gas molecule is _____.
(a) inversely proportional to it's absolute temperature
(b) equal to square of it's absolute temperature
(c) directly proportional to it's absolute temperature.
- The entropy of the system increases in the order _____.
(a) Solid<liquid<gas (b) Gas<liquid<solid (c) Gas<solid<liquid
- Equilibrium constant for a reaction can be altered by _____.
(a) change in concentration of reactant
(b) addition of catalyst
(c) change in temperature
- When iron is heated with dil sulphuric acid it evolves _____ gas.
(a) H_2 (b) O_2 (c) N_2
- The amount of sample required for semi micro qualitative analysis is about _____.
(a) 0.5 g to 1.0 g (b) 0.05 g to 0.1 g (c) 0.01 g to 0.05 g
- _____ among the following, when dissolved in water behaves as a base.
(a) HCl (b) H_2O_2 (c) NH_3
- The most suitable indicator for the titration between a strong acid and a strong base is _____.
(a) starch (b) eriochrome black T (c) phenolphthalein
- Among the following alkanes _____ can not be prepared by reduction of alkyne.
(a) methane (b) ethane (c) butane
- Terminal alkynes are weakly _____ in nature.
(a) acidic (b) basic (c) neutral
- Reaction intermediate of $E1$ reaction is _____.
(a) carbocation (b) carbanion (c) carbene
- Dehydrating agent for alcohol is _____.
(a) H_2O (b) Conc. H_2SO_4 (c) KCl

B) State whether the following statements are true or false.

- Entropy is path function
- The conjugate base of H_3O^+ is OH^-
- Primary alkyl halides follow E1 mechanism.

C) Match the following columns.

	Column P		Column Q
i	Avogadro's law	m	Mg^{2+}
ii	Helmholtz free energy	n	Ni^{2+}
iii	Oxine paper	o	$V \propto n$ (at constant T & P)
iv	DMG paper	p	One step reaction
v	E2	q	$A=E-TS$
		r	Two step reaction
		s	$G=H-TS$

- Q.2 (A) (i) State the Boyle's law and explain the type of deviation from Boyle's law produced by real gases. 05
 (ii) Define: the most probable velocity, the average velocity and root mean square velocity. 03

OR

- (A) (i) Derive Van der Waal's equation for pressure correction. 05
 (ii) Explain the term compressibility factor. 03

- (B) (i) What are K_p and K_c ? Obtain a relationship between relationship between them. 05
 (ii) For the reaction $\frac{1}{2} \text{H}_{2(g)} + \frac{1}{2} \text{Cl}_{2(g)} \rightleftharpoons \text{HCl}_{(g)}$ the standard free energy at 298 K is - 95.27 kJ. Calculate the equilibrium constant for the reaction at the same temperature. 03
 (Given $R=8.314 \text{ JK}^{-1} \text{ mol}^{-1}$)

OR

- (B) (i) Define entropy and discuss its physical significance. 05
 (ii) For the reaction $\text{CO}_{(g)} + 2\text{H}_{2(g)} \rightleftharpoons \text{CH}_3\text{OH}_{(g)}$ The value of K_c is 254.8 at 600 K Calculate K_p at 600 K. 03
 (Given $R=8.314 \text{ JK}^{-1} \text{ Mol}^{-1}$)

- (C) Calculate by using Van der Waal's equation the pressure exerted by 1.8 mol of NH_3 occupying a volume of 1.8 dm³ at 300 K. 04
 (Given $a=0.4226 \text{ Nm}^4 \text{ mol}^{-2}$; $b=3.71 \times 10^{-5} \text{ m}^3 \text{ mol}^{-1}$, $R=8.314 \text{ Nm K}^{-1} \text{ mol}^{-1}$)

OR

- (C) (i) Explain irreversible reaction with a suitable example. 02
 (ii) Define: 02
 a) Dynamic equilibrium
 b) Heterogeneous reaction

- Q.3 (A) (i) Explain uncommon ion effect. 05
 (ii) The solubility product of BaSO_4 is 1×10^{-10} at 25°C. Calculate its solubility in pure water. 03

OR

- (A) (i) Explain the types of qualitative analysis. 05
 (ii) What is the importance of solubility product? 03

- (B) (i) Explain Bronsted-Lowry concept of acids and bases with suitable examples. What are the limitations of this theory? 05
 (ii) Write a note on applications of 'HSAB' concept in finding the relative stability of complexes. 03

OR

05

- (B) (i) Explain 'Solvent system' concept by taking examples of acetic acid and liquid SO_2 solvents. What are the advantages of this concept? 03
 (ii) Write a brief note on 'Class b' metals. 04

- (C) (i) How is complexation phenomenon used for the separation of Fe^{3+} ions from Al^{3+} and Zn^{2+} ions? 04

OR

- (C) (ii) Explain Lewis concept of acids and bases with any two suitable examples. 04
 Q.4 (A) (i) Give the mechanism involved in hydroboration-oxidation of propene. 05
 (ii) How does acetylene react with the following reagents? 03
 a) H_2/Pd
 b) HCN
 c) HBr

OR

- (A) (i) Explain ozonolysis of alkenes with suitable examples. 05
 (ii) Give the preparation of propyne from propene. 03

- (B) (i) Write the mechanism of addition of HBr to propene in presence of peroxide. 05
 (ii) How will you synthesize ethane from methane? 03

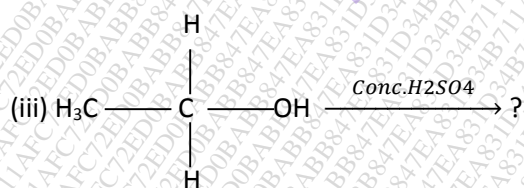
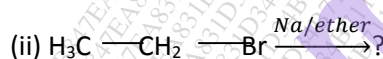
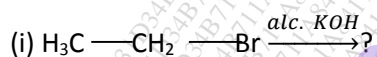
OR

- (B) (i) What happens when propene is treated with? 05
 a) Br_2/CCl_4
 b) H_2SO_4
 c) O_3 and $\text{Zn}/\text{H}_2\text{O}$
 d) H_2/Ni
 (ii) State and explain saytzeff rule with a suitable example. 03

- (C) Explain Diels-Alder reaction with suitable example. 04

OR

- (C) Complete the following reactions:- 04



Q.5 Attempt any four of the following:-

- (A) State and explain Joule-Thomson's effect. 05
 (B) Explain Gibb's free energy and discuss its variation with temperature and pressure. 05
 (C) Give the importance of reagent papers in qualitative analysis and explain the preparation and use of Potassium dichromate paper. 05

- (D) (i) Name the different types of titrations on the basis of the nature of the reactions. 05
(ii) What is 'Friedel Crafts alkylation reaction'? Write the chemical equation.
- (E) Give the mechanism of chlorination of propane. 05
- (F) Explain the allylic and benzylic bromination using NBS. 05