

CHEMISTRY

PAPER 1

(Three hours)

CLASS : XI

(Candidates are allowed additional 15 minutes for only reading the paper.

They must NOT start writing during this time)

All questions are compulsory

Question 1 is of twenty marks having four sub parts all of which are compulsory.

Question numbers 2 to 8 carry 2 marks with two questions having internal choice.

Question numbers 9 to 15 carry 3 marks with two questions having internal choice.

Question numbers 16 to 20 carry 5 marks each. The intended marks for questions or parts of questions are given in []

Balanced equations must be given wherever possible and diagrams where they are helpful. When solving numerical problems all essential working must be shown.

In working out the problems, use the following data:

Gas constant $R = 1.987 \text{ cal deg}^{-1} \text{ mol}^{-1} = 0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1} = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$
 $= 0.083$

$1 \text{ L atm} = 1 \text{ dm}^3 \text{ atm} = 101.3 \text{ J}$, Avogadro's number = 6.023×10^{23}

PART - 1

Answer all questions

Question 1

(a) Fill in the blanks:

[4]

(i) m-nitro benzoic acid is ----- acidic than benzoic acid due to ----- effect.

(ii) Ozonolysis of pent -2- ene will give ----- and -----.

(iii) The conjugate acid of HS^{-1} is ----- whereas the conjugate base of HS^{-1} is -----.

(iv) The vanderwaals equation reduces itself to ideal gas equation at ----- pressure and ----- temperature.

(b) Choose the correct alternative :

(i) The reaction $RX + OH^{-1}_{(aq)} \longrightarrow ROH + X^{-1}$ takes place by
 (a) S_N^1 mechanism (b) E_1 mechanism (c) E_2 mechanism (d) S_N^2 mechanism

(ii) Which of the following represents most electropositive element

(a) $[He] 2S^1$ (b) $[He] 2S^2$ (c) $[Xe] 6S^1$ (d) $[Xe] 6S^2$

(iii) 7.5 gm of a gas occupy 5.6 litres of volume at STP. The gas is

(a) NO (b) N_2O (c) CO (d) CO_2

(iv) The rate of diffusion of methane at a given temperature is twice that of X. The molecular weight of X is

(a) 64 (b) 32 (c) 40 (d) 80

(c) Match the following :

[4]

(i) Carius method	intensive property
(ii) Density	Nitrogen
(iii) Kjeldahls method	Extensive property
(iv) Mole	Phosphorus

(d) Answer the following:

[8]

(i) Give reason:

(a) Anhydrous magnesium chloride cannot be prepared by heating $MgCl_2 \cdot 6H_2O$

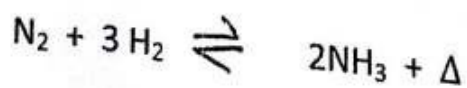
(b) Graphite is used in making pencil leads.

(ii) What are the conditions needed for

(a) geometrical isomerism (b) optical isomerism

(iii) State Lechatliers principle.

What happens to the equilibrium when



(a) inert gas is added at constant pressure

(b) temperature is decreased.

(iv) Balance the redox reaction in acidic medium



PART – 11

QUESTION -2

[2]

The value of K_c is 4.24 at 800 K for the reaction



Calculate the equilibrium concentration of CO, CO₂, H₂, H₂O at 800 K if 0.10 M each of CO and H₂O were present initially.

QUESTION – 3

[2]

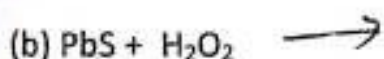
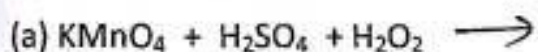
The heat of formation of CO₂ and water is – 395 KJ/mol and – 285 KJ/ mol respectively.

Calculate the heat of formation of glucose if the heat of combustion of glucose is – 2900 KJ/mol.

QUESTION -4

[2]

Complete and balance the following equation:



QUESTION -5

[2]

Define lewis acid and draw the lewis structure of phosphoric acid and chloric acid.

[OR]

Give reasons:

(a) AlCl₃ is more covalent in character than NaCl.

(b) Ammonia has higher boiling point than phosphine [PH₃]

QUESTION -6

[1]

0.3605 gm of a metal is deposited on the electrode by passing 1.2 ampere current for 15 minutes through its salt solution. If atomic weight of the metal is 96, what will be valency.

QUESTION -7**[2]**

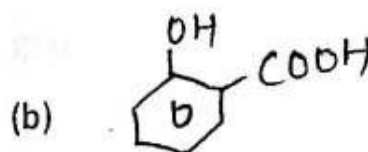
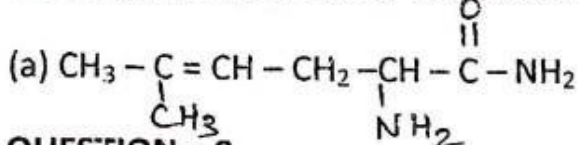
- (a) State any **two** uses of silicones.
- (b) Write the equation to show the preparation of silicon carbide.

[OR]

What happens when silver nitrate solution is added to hypo solution? Give equations.

QUESTION -8**[2]**

Write the IUPAC name of the following :

**QUESTION -9****[3]**

- (a) What are the faulty postulates of kinetic theory of gases.
- (b) Explain why fourth group cat ions like zinc don't precipitate in second group

[OR]

- (a) 340.5 ml of phosphorus vapour weigh 0.0625 gm at 546°C and 0.1 bar pressure.

What is the molar mass of phosphorus.

- (b) Define RMS velocity.

QUESTION -10**[3]**

Explain why

- (a) First ionisation enthalpy of sodium is lower than that of magnesium but its second ionisation energy is greater than that of magnesium.
- (b) Al^{3+} is smaller than O^{2-} although both has same electronic configuration
- (c) Sulphur has greater electron affinity than oxygen.

QUESTION - 11**[3]**

Write balanced equation for the following conversions:

- (a) Propene to 1-bromo propane (b) Benzene to toluene (c) Methyl chloride to ethane

QUESTION – 12**[3]**

Give reasons:

- (a) Pb (II) compounds are more abundant than Pb (IV) compounds.
- (b) CCl_4 cannot be hydrolysed while SiCl_4 can.
- (c) Boron shows anomalous behaviour.

QUESTION – 13**[3]**

Draw a pair of possible isomers and mention the type of isomerism for each of the following:

- (a) $\text{C}_2\text{H}_4\text{O}$
- (ii) C_4H_6
- (iii) $\text{C}_2\text{H}_6\text{O}$

[OR]

Write the type of attacking reagent and type of reaction for the following:

- (a) Ethyl bromide with alcoholic KOH
- (b) Chlorination of methane in presence of sunlight.
- (c) Benzene treated with conc. HNO_3 in presence of conc. H_2SO_4

QUESTION – 14**[3]**An aqueous solution of dibasic acid (MM 118) containing 35.4 gm of the acid per litre of the solution has density 1.007 g/cm^3 . Express the concentration in terms of molality, molarity and normality.**QUESTION – 15****[3]**

(a) Predict the hybridisation and geometry of

- (i) XeF_4
- (b) NH_4^+

(b) Sigma bond is stronger than pi bond why?

QUESTION -16**[5]**(a) Calculate the PH of a buffer which has equal volume of 0.2 M NH_4OH and 0.02 M NH_4Cl The PK_b of the base is 5(b) The solubility product of AgCl is 4×10^{-10} at 298 K. Calculate the solubility of AgCl in

- (i) water
- (ii) 0.04 M CaCl_2 solution. Comment on your results.

QUESTION -17

[5]

- (a) How is boric acid prepared from borax?
- (b) Write two uses of alum.
- (c) What is the cause of hardness of water? How can you remove the hardness of water?
- (d) Draw the structure of H_2O_2

[OR]

- (a) Explain:
 - (i) Carbon shows maximum catenation.
 - (ii) Diamond is used for cutting.
 - (iii) Inhaling CO is poisonous.
 - (iv) CO_2 is a gas while SiO_2 is a solid.
- (b) How is sodium carbonate prepared by solvays process.

QUESTION -18

[5]

- (a) Give a chemical test to distinguish between
 - (i) Propene and propane
 - (ii) 1- butyne and 2- butyne
- (b) Write balanced equation for
 - (i) Friedel's – craft alkylation
 - (ii) Corey- House reaction
 - (iii) Kolb's electrolytic method for preparation of ethane

[OR]

- (a) Convert
 - (i) ethyl bromide to ethene
 - (ii) Benzene to chlorobenzene
- (b) Draw the resonating structures of phenol and explain its directive influence.

QUESTION – 19

[5]

State

(i) Markownikoffs rule

(ii) Peroxide effect

(iii) Saytzeffs rule

(iv) Hucke's rule

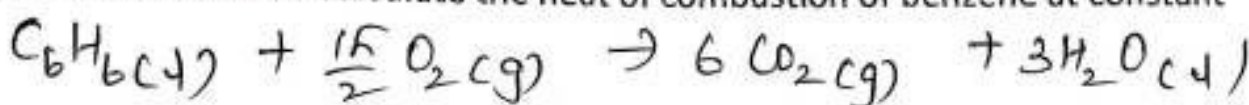
(v) Chirality

QUESTION- 20

[5]

(a) State the second law of thermodynamics.

(b) The heat of combustion of benzene in a bomb calorimetre at constant volume was found to be 3263.9 KJ/mol at 25°C. Calculate the heat of combustion of benzene at constant pressure.



(c) Calculate W, q, ΔE when 0.75 mol of an ideal gas expands isothermally and reversibly at 27°C from a volume of 15 L to 25 L.