HOLIDAYS' HOMEWORK 2024-25
XII CHEMISTRY

Write the answer of the following questions:

Q1. What is the basic structural difference between starch and cellulose?

Q2. Write the products obtained after hydrolysis of DNA.

Q3. Give reasons:

(a) Cooking is faster in a pressure cooker than cooking in the pan.

(b) Red Blood Cells (RBC) shrink when placed in saline water but swell in distilled water.

Q4. If benzoic acid (mol. mass = 122 g mol^{-1}) is associated into a dimer when dissolved in benzene and the osmotic pressure of a solution of 6.1 g of benzoic acid in 100 mL benzene is 6.5 atm at 27°C, then what is the percentage association of benzoic acid? (Given: R = 0.0821Latm $K^{-1}mol^{-1}$)

Q5. (a) What is the product of hydrolysis of maltose?

(b) What type of bonding provides stability to the α-helix structure of a protein?

(c) Name the vitamin whose deficiency causes pernicious anaemia.

Q6. Define the following terms:

(a) Invert sugar

(b) Native protein

(c) Nucleotide

Q7. When 1.5 g of a non-volatile solute was dissolved in 90 g of benzene, the boiling point of benzene raised from 353.23 K to 353.93 K. Calculate the molar mass of the solute. (K_b for benzene = 2.52 K kg mol^{-1})

Q8. Explain the following:

(a) An increase in temperature is observed on mixing chloroform and acetone.

(b) Aquatic animals are more comfortable in cold water than in warm water.

Q9. Calculate the freezing point of a solution containing 60 g of glucose in 250 g of water. (Molar mass = 180 g mol^{-1})
(K_f of water = 1.86 K kg mol^{-1})

Q10. Give reasons for the following:

(a) Measurement of osmotic pressure method is preferred for the determination of molar masses of macromolecules such as proteins and polymers.

(b) Elevation of the boiling point of 1M KCl solution is nearly double than that of 1M sugar solution.

Q.11

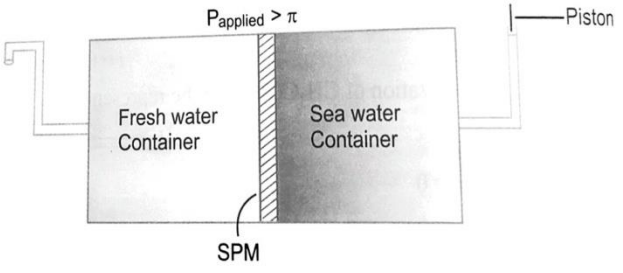
Q. 11. Given alongside is the sketch of a plant for carrying out a process.

(*i*) Name the process occurring in the given plant.

(*ii*) To which container does the net flow of solvent take place?

(*iii*) Name one SPM which can be used in this plant.

(*iv*) Give one practical use of the plant.



Q12. (a) Write the product when D-glucose reacts with conc. HNO_3.

(b) Amino acids show amphoteric behaviour. Why?

(c) Write one difference between α-helix and β-pleated structures of proteins.

Q13. (i) Why is the value of Van't Hoff factor for ethanoic acid in benzene close to 0.5?

(ii) Determine the osmotic pressure of a solution prepared by dissolving 2.32×10^{-2}g of K_2SO_4 in 2L of solution at 25°C assuming that K_2SO_4 is completely dissociated.

(R = 0.082 L atm $K^{-1}mol^{-1}$, Molar mass K_2SO_4= 174gmol^{-1})

(iii) When 25.6g of Sulphur was dissolved in 1000g of benzene, the freezing point lowered by 0.512 K. Calculate the formula of Sulphur (S_x)

(K_f for benzene = 5.12 K kgmol^{-1} Atomic mass of Sulphur = 32g mol^{-1})

Q14. (a) Draw the graph between vapour pressure and temperature and explain the elevation in boiling point of a solvent in solution.

(b) Determine the osmotic pressure of a solution prepared by dissolving 25 mg of K_2SO_4 in 2 litres of water at 25°C assuming it to be completely dissociated.

(Atomic masses K = 39 u , S = 32 u, O = 16u)**.**

Q15. (a) A 10% solution (by mass) of sucrose in water has a freezing point of 269.15 K. Calculate the freezing point of 10% glucose in water if the freezing point of pure water is 273.15 K.

Given:

The molar mass of sucrose = 342g mol^{-1}

The molar mass of glucose = 180 g mol^{-1}

(b) Define the following terms:

(i) Molality (m)

(ii) Abnormal molar mass

Q16. (a) 30 g of urea (M = 60g mol-1) is dissolved in 846 g of water. Calculate the vapour pressure of water for this solution if vapour pressure of pure water at 298 K is 23.8 mm Hg.

(b) Write two differences between ideal solutions and non-ideal solutions.

Note: Learn the chapters Solutions and Biomolecules.

Q17. (i) Explain why on addition of 1 mol glucose to 1 litre water the boiling point of water increases.

(ii) Henry's law constant for CO_2 in water is 1.67×10^8 Pa at 298 K. Calculate the number of moles of CO_2 in 500 mL of soda water when packed under 2.53×10^5 Pa at the same temperature.

Q.18

Following data are obtained for the reaction:

$$N_2O_5 \longrightarrow 2NO_2 + \frac{1}{2}O_2$$

t/s	0	300	600
$[N_2O_5]$/mol L^{-1}	1.6×10^{-2}	0.8×10^{-2}	0.4×10^{-2}

(*i*) **Show that it follows first order reaction.**

(*ii*) **Calculate the half-life.**

(Given log 2 = 0.3010, log 4 = 0.6021)

Q.19

The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at a constant volume:

$$SO_2Cl_2(g) \longrightarrow SO_2(g) + Cl_2(g)$$

Experiment	Time/second^{-1}	Total pressure/atm
1	0	0.4
2	100	0.7

Calculate the rate constant.

[Given: log 4 = 0.6021, log 2 = 0.3010] **[*HOTS*]**

Q20. (i) The conversion of molecule A into B followed second order kinetics. If concentration of A increased to three times, how will it affect the rate of formation of B?

(ii) Define Pseudo first order reaction with an example.

Q21. The rate constant for the first order decomposition of N_2O_5 is given by the following equation:

$\log k = 23.6 - (2 \times 10^4 K)/T$.

Calculate E_a for this reaction. ($R = 8.314 JK^{-1} mol^{-1}$]

Q22. For the reaction

$2N_2O_5$ (g) -------> $4NO_2$(g) + O_2 (g) at 318K

Calculate rate of reaction if rate of disappearance of N_2O_5 (g) is 1.4×10^{-3} ms^{-1}

(b) For a first order reaction derive the relationship:

$t_{99\%} = 2t_{90\%}$

Note: Also Learn Solution and Chemical Kinetics Chapters.

Practical Work

- To analyse the given salt (Ammonium Sulphate) for cation and anion.
- To analyse the given salt (Lead Nitrate) for cation and anion.
- To analyse the given salt (Ammonium Chloride) for cation and anion.
- To analyse the given salt (Aluminium Sulphate) for cation and anion.
- To analyse the given salt (Ferric Chloride) for cation and anion.

INVESTIGATORY PROJECT

Prepare a Project on any one of the following topics:

- Study of the presence of oxalate ions in guava fruit at different stages of ripening.
- Study the quantity of casein present in different samples of milk.
- Study of common food adulterants in fat, oil, butter, sugar, turmeric powder, chilli powder and pepper.
- Corrosion and its prevention.
- Colligative properties.
- Vitamins and their deficiency disease.
- Osmosis.
- Chemical Kinetics (Factors affecting rate of chemical reaction)
- Biomolecules