



DELHI PUBLIC SCHOOL

SAIL TOWNSHIP, RANCHI ANNUAL EXAMINATION (2016-17)

Class:-XI
Time- 3 hrs.

Subject:- Chemistry
M.M-70

General Instructions:-

1. All questions are compulsory.
2. Questions number 1 to 5 are very short answer questions and carry 1 mark each.
3. Questions number 6 to 10 are short answer questions and carry 2 marks each.
4. Question number 11 to 22 are also short answer questions and carry 3 marks each.
5. Question number 23 is a value based questions and carry 4 marks.
6. Questions number 24 to 26 are long answer questions and carry 5 marks each.
7. Use log tables if necessary. Use of calculator is NOT allowed.

1. Define molality. What is the effect of temperature on it. [1]
2. Write the expression for work done for an isothermal reversible change. [1]
3. Define Boyle Point. [1]
4. Giving justification categories the following as nucleophile or electrophile.
 BF_3 , $(CH_3)_3 N$: [1]
5. The equilibrium constant expression for a gaseous reaction is $K_c = \frac{[NH_3]^4 [O_2]^5}{[NO]^4 [H_2O]^6}$
Write balanced equation corresponding to this expression. [1]
6. Write down the electronic configuration of Fe²⁺ ion. How many unpaired electrons are present in it? [Fe, Z= 26] [2]
7. (a) Define disproportionation reaction.
(b) Explain disproportionation reaction by giving one suitable example. [2]

OR

- (i) Define the term Oxidation Number.
- (ii) Which of the following species do not show disproportionation reaction and why?



8. (a) Define entropy and write its unit.
(b) For the reaction:

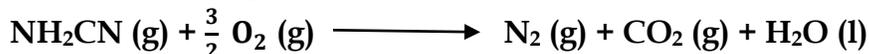


What are signs of ΔH and ΔS ? [2]

9. Complete the following chemical reaction.
- (a) $\text{NaH} + \text{H}_2\text{O} \longrightarrow$
- (b) $\text{PbS} + \text{H}_2\text{O}_2 \longrightarrow$ [2]
10. Draw the Lewis dot structure of carbonate ion and calculate the formal charge on carbon atom giving the appropriate formula. [2]
11. Balance the following redox reactions by ion-electron method. [3]
- (a) $\text{Cr}_2\text{O}_7^{2-} + \text{SO}_3^{2-}(\text{aq}) \longrightarrow \text{Cr}^{3+}(\text{aq}) + \text{SO}_4^{2-}$ (in acidic solution)
- (b) $\text{Cl}_2\text{O}_7(\text{g}) + \text{H}_2\text{O} \longrightarrow \text{ClO}_2^-(\text{aq}) + \text{O}_2(\text{g}) + \text{H}^+$ (basic medium)
12. Calculate the wave number for the longest wavelength transition in the Balmer Series of atomic hydrogen. [3]
13. State Avogadro's Law. Explain how he made a distinction between atom and molecules. [3]
14. (a) Explain why alkyl groups act as electron donors when attached to a π system.
 (b) How are the terms inductive and electromeric effect different. Explain. [1+2=3]
15. (a) State Markovnikov Rule.
 (b) Addition of HBr to propene yields 2-bromopropane, while in the presence of benzoyl peroxide the same reaction yields 1-bromopropane. Explain and give mechanism. [1+2=3]
16. (a) Find the oxidation state of Boron in NaBH_4 .
 (b) Identify the substance oxidized, reduced, oxidizing and reducing agent in the following given reaction.
- $$\text{HCHO} + 2[\text{Ag}(\text{NH}_3)_2]^+ + 3\text{OH}^- \longrightarrow 2\text{Ag}(\text{s}) + \text{HCOO}^- + 4\text{NH}_3 + 2\text{H}_2\text{O} \quad [3]$$
17. (a) Describe the change in hybridization (if any) of the Al atom in the following reaction:
- $$\text{AlCl}_3 + \text{Cl}^- \longrightarrow \text{AlCl}_4^-$$
- (b) PCl_5 molecule is quite reactive. Why?
 (c) Covalent compounds like sugar, Urea are soluble in water. Why? [3]
18. (a) Write the general electronic configuration of f-block elements
 (b) Write four characteristic properties of d block elements. [3]
19. Define Enthalpy of formation of a compound and calculate the enthalpy of formation of ethanol using the following data:
- (i) $\text{C}_2\text{H}_5\text{OH}(\text{l}) + 3\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 3\text{H}_2\text{O}(\text{l}) \quad \Delta H^\circ = -1380.7 \text{ KJ mol}^{-1}$
- (ii) $\text{C}(\text{s}) + \text{O}_2 \longrightarrow \text{CO}_2(\text{g}) \quad \Delta H^\circ = -394.5 \text{ KJ mol}^{-1}$
- (iii) $\text{H}_2(\text{g}) + \frac{1}{2}\text{O}_2 \longrightarrow \text{H}_2\text{O}(\text{l}) \quad \Delta H^\circ = -286.6 \text{ KJ mol}^{-1}$ [3]

OR

- (i) State Hess's law of constant heat summation.
- (ii) The reaction of cyanamide NH_2CN (g) with dioxygen was carried out in a bomb Calorimeter, and ΔU was found to be $-742.7 \text{ KJ mol}^{-1}$ at 298 K. Calculate enthalpy change for the reaction at 298 K



20. Write the reaction involved in the following naming reactions.
- (a) Wurtz Reaction
- (b) Friedel Craft alkylation reaction
- (c) Kolbe's electrolytic method [3]
21. (a) What happens when (give chemical equation)
- (i) Borax is heated strongly.
- (ii) Diborane is heated with ammonia gas.
- (b) Suggest a reason as to why CO is poisonous. [3]
22. (a) Why does the solubility of alkaline earthmetal carbonate and sulphate in water decreases down the group?
- (b) When an alkalimetal dissolve in liquid ammonia the solution can acquire different colours. Explain the reason for this type of colour change. [1+2=3]
23. Heaps of garbage are seen at different place in our locality. With the passage of time it starts stinking thereby causing pollution in the atmosphere. For this nobody else but we ourselves are responsible. If we dispose off our garbage in proper way we can keep our environment clean. We talk a lot but we do nothing. Even smoking affects the health of the smoker, pollutes the air around him and affects the health of others. Disposal of Industrial waste into river and lakes causes pollution of water which affects the aquatic Life.
- Now answer the following question:
- (a) What values are expressed in the above paragraph.
- (b) What should be done to manage both household waste and industrial waste.
- (c) How the word smog is derived? [4]
24. (i) State Le-Chatelier's Principle.
- (ii) 0.561 gm of KOH is dissolved in water to give 200 ml of solution at 298 K. What is the p^{H} of the solution? (K= 39, O= 16, H=1)
- (iii) 1 Mole of H_2 , 2 moles of I_2 and 3 moles of HI were taken in a 1L flask. If the value of K_c for the reaction: $\text{H}_2 + \text{I}_2 \rightleftharpoons 2\text{HI}$ is 45.9 at 440°C , What will be the concentration of each species at equilibrium. [1+2+2=5]

OR

- (i) Derive relation between K_p and K_c .
- (ii) The ionization constant of HF is 3.2×10^{-4} . Calculate degree of dissociation of HF in its 0.02 M solution.

Calculate concentration of H_3O^+ ion in the solution and find the p^H

25. (a) An alkene 'A' on ozonolysis gives a mixture of propanal and hexan-3-one. Write structure and IUPAC name of A.

(b) Bring out the following conversions [2+3=5]

- (i) Sodium benzoate to benzene
- (ii) Propyne to acetone
- (iii) 1,2 dibromoethane to Ethyne.

OR

(1) (a) Write IUPAC name of the product obtained by the ozonolysis of the following compounds

- (i) 2-Ethyl but-1-ene
- (ii) 1-phenyl but-1-ene

(b) Explain the directive influence of a functional group in monosubstituted benzene. (giving at least two examples)

26. (i) State. Dalton's law of partial pressure.
- (ii) Give the relationship to show how partial pressure of a gas, mole fraction and total pressure are inter related.
- (iii) Calculate the total pressure in a mixture of 8g of dioxygen and 4 g of dihydrogen confined in a vessel of 10 dm^3 at 27° C . (Oxygen =16 g Hydrogen =1g) [1+1+3=5]

OR

- (i) Write the assumptions or postulate of the kinetic molecular theory of gases. (at least four).
- (ii) Pay load is defined as the differences between mass of displaced air and the mass of the balloon. Calculate the pay load when a balloon of radius 10m, mass 100 kg is filled with helium at 1.66 bar at 27° C .
(Density of air = 1.2 kg m^{-3} , $R = 0.083 \text{ bar L K}^{-1} \text{ mol}^{-1}$)