# DELHI PUBLIC SCHOOL, RUBY PARK

Class– XII
Subject - Chemistry

1. Ionic solids conduct electricity in molten state but not in solid state. Explain.

2. Write the mathematical expression of Nernst equation for : $Zn(s) /Zn^{+2}(aq) // Cu^{+2}(aq)/Cu(s)$.

3. How is the physically adsorbed mass of a gas on a unit mass of adsorbent related to the pressure of the gas?

4. Give the IUPAC name of $(NH_4)_3[Co(ONO)_6]$.

5. Write the IUPAC name of the following compound: $CH_3CH(Br)CH_2CH(Cl)CH_3$.

6. What is a semiconductor? Describe the two main types of semiconductors with respect to their conduction mechanisms.

7. Why is it that the elevation in boiling point of solution is not the same in the following solutions: 0.1M molar NaCl solution and 0.1 molar glucose solution? Give reasons to justify your answer.

8. (i) On the basis of the standard electrode potential values stated in acid solution, predict whether Ti^{+4} species may be used to oxidize Fe(II) to Fe(III)or not. $E^o Ti^{+4}/Ti^{+3}= +0.01V$ and $E^o Fe^{+3}/Fe^{+2}= +0.77V$

    (ii) How does the concentration of sulphuric acid change in a lead storage battery when current is drawn from it?

9. Account for the following:

    (i)Ferric hydroxide sol gets coagulated on addition of small amount of sodium chloride solution.

    (ii) Activated charcoal is used in gas masks used by coal miners.

10. Outline the principles of refining of metals by the following methods:

    (i)   Zone refining

    (ii)   Vapour phase refining

    (iii)   Froth floatation method

    (iv)   Autoreduction of copper oxide in a Bessemer convertor.

11. Silver forms fcc lattice. X- ray studies of its crystals show that the edge length of its unit cell is 410 pm. Calculate the density of silver (Atomic mass = 107.9 u)

12. Ethylene glycol (molar mass = 62 g/mol) is a common automobile antifreeze. Calculate the freezing point of a solution containing 12.4g of this substance in 100 g of water. Would it be advisable to keep this substance in the car radiator during summer? Given : K_f for water = 1.86K kg/mol, K_b for water = 0.512K kg/mol

13. (i) An aqueous solution freezes at 272.07 K while pure water freezes at 273 K. Determine the molality and the boiling point of the solution. Given $K_f= 1.86$ K/m; $K_b =0.512$ K/m.

    (ii) What is the value of Van't Hoff's factor for Na_2SO_4 assuming it undergoes complete dissociation.

14. Calculate the (i) Emf and (ii) ΔG° for the following cell at 298K.

Mg(s)/Mg^{+2} (10^{-3}M) // Cu^{+2} (10^{-4} M)/Cu(s).
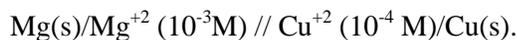
Given E° Mg^{+2}/Mg =-2.36V and E° Cu^{+2}/Cu =+0.34V.1F=96500 Cmol^{-1}

15. (a)The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at a constant volume.

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

t(sec)	0	100
Total pressure(atm)	0.5	0.6

Calculate the following:

(i)   Rate constant of the reaction
(ii)   Rate of the reaction when the total pressure is 0.65 atm.

(b)A solution of H_2O_2 when titrated against $KMnO_4$ solution at different intervals of time gave the

   following   results:

Time(mins)	0	10	20
Volume of KMnO$_4$(mL)	23.8	14.7	9.1

(i)   Show that the decomposition of H_2O_2 is first order reaction.
(ii)   Rate constant of the reaction

16. (i) Differentiate between lyophilic and lyophobic colloidal sols.

(ii) Describe Freundlich adsorption isotherm. Explain it with relevant graphs.
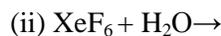
17. Explain the following:

(i) Aqueous solution of sodium chloride cannot be used for the isolation of sodium by electrolytic reduction method.

 (ii) Graphite rods in the extraction of aluminium from molten Al_2O_3 have to be replaced from time to time.

(iii)Hydrometallurgy can be used to extract silver but not zinc.

18. Write the balanced equations for the following reactions: (i) $C_{12}H_{22}O_{11} + H_2SO_4$(conc.) $\rightarrow$

(ii) $XeF_6 + H_2O \rightarrow$

(iii) $F_2 + H_2O \rightarrow$

19. (a) Give the structure of the following compounds:

(i) $HClO_4$ (ii) XeF_2

(b) What prompted N.Bartlett to prepare the first compound using noble gases?

20. (i)Using Valence bond theory explain how the two complexes of nickel, $[Ni(CN)_4]^{-2}$ and $[Ni(CO)_4]$, have

different structures but do not differ in their magnetic behaviour (Ni =28).

(ii) Draw the structure of all isomers of $[Cr(en)_3]Cl_3$

21.   Draw a figure to show splitting of degenerate d-orbitals in an octahedral crystal field. Explain how does the magnitude of CFSE($\Delta°$) decide the actual configuration of d-orbitals in a complex entity.

22.   (i)In some reactions,it is found that a large number of colliding molecules have energy greater than threshold value , yet the reaction is slow. Why?
    (ii) Derive the integrated rate equation for first order reaction.
    (iii) In a reaction between A and B, the initial rate of reaction (r_0) was measured for different initialconcentrations of A and B as given below:

A/ mol L^{-1}	0.20	0.20	0.40
B/ mol L^{-1}	0.30	0.100	.05
r^0/mol $L^{-1}s^{-1}$	5.07×10^{-5}	5.07×10^{-5}	7.16×10^{-5}

What is the order of the reaction with respect to A and B?

23.   (i) Differentiate between average rate and instantaneous rate of a reaction.

(ii)Derive the general form of the expression for the half life of a first order reaction.

(ii) Illustrate graphically the effect of catalyst on activation energy.

24.   (a) Give reasons for the following observations:

(i) Sulphur hexafluoride is used as a gaseous electrical insulator.

(ii) PCl_5 is known while NCl_5 is not known.

(iii) H_2SO_4 acts only as an oxidizing agent while SO_2 can act both as a reducing agent and also oxidizing agent.

(b) Give two uses of noble gases.

25.   (a) How will you convert (i)Chlorobenzene to phenol   (ii)aniline to chlorobenzene   (iii) ethane to butane

(iv) 2 bromopropane to 1-bromopropane.   (v) aniline to phenyl isocyanide.

(b) Explain why: (i) Alkyl halides undergo hydrolysis more easily as compared to aryl halides.

(ii) Haloalkanes undergo nucleophilic substitutions whereas haloarenes undergo electrophilic substitutions.

(iii) Alkyl halides are insoluble in water though they contain polar C-X bond.

(iv) Alkyl fluorides are not prepared directly.

(v)Although chlorine is an electron withdrawing group, yet it is *ortho-para-* directing in electrophilic aromatic substitution reactions.

(vi)the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride

(c) Write the mechanism of the following reaction:

(i)$CH_3I + AgNO_2 \rightarrow CH_3NO_2 + Ag\ I$.

(ii) n-BuBr+ KCN $\rightarrow$n-BuCN + KBr
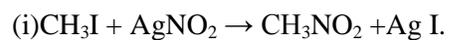
(d)Write short note on (i) Wurtz reaction (ii)_Friedel Craft's alkylation

(e)In the following pair of halogen compounds, which compound undergoes faster SN1

reaction and why?
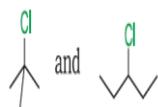
(f) Give a chemical test to distinguish between (i)chlorobenzene and benzyl chloride
(ii) bromoethane and chloro ethane.