St. Xavier's Sr. Sec. School
Delhi-54

Pre Board Examination 2016
Std. 12
18-01-2016

Set 1

CHEMISTRY

Max. Marks : 70
Time : 3 hrs.

General instructions : -
i) All questions are compulsory.
ii) Question numbers 1 to 5 carry one mark each.
iii) Question numbers 6 to 10 carry two marks each.
iv) Question numbers 11 to 22 carry three marks each.
v) Question number 23 is a value based question carrying four marks.
vi) Question numbers 24 to 26 carry five marks each.

1. Substitute a suitable term for the following:-
   a) A small amount of impurity is introduced in the crystal lattice of a solid.
   b) The materials which are repelled by magnetic field. 1

2. Differentiate between Schottky defect and Frenkel defect (Two points only). 1

3. The measured resistance of a conductance cell containing potassium chloride solution is 1005 ohms. Calculate the specific conductance. Given that the cell constant is 1.25cm $^{-1}$. 1

4. Name the following:-
   a) Method used for refining Nickel.
   b) Chief ore of copper metal. 1

5. Explain the mechanism involved in the hydration reaction of ethene in acidic medium to form ethanol. 1

6. Aluminium crystallises in fcc packed structure. Its metallic radius is 125 x 10^{-10}cm.
   i) What is the length of the side of unit cell?
   ii) What is the number of unit cells in aluminium crystal? 1,1

   (OR)

   Lithium crystallises in body centred structure. Its density is 0.53g/cm^3 and its atomic mass is 6.94g/mol.Calculate the volume of a unit cell of lithium metal.
   Given that Avogadro's no. = 6.023 x 10^{23}. 2

7. a) Define i) Raoult's Law ii) Osmotic Pressure.
   b) Henry's law constant for molality of methane in benzene at 298K is 4.27 x 10^5 mm of Hg. Calculate the solubility of methane in benzene under 760 mm of Hg . 1,1

8. a) $4\ H_3PO_3 \rightarrow PH_3 + 3\ H_3PO_4$ is called a disproportionation reaction. Justify.
   b) Arrange the following as indicated :-
   $HClO_4$, $HClO_3$, $HClO_2$, HClO (increasing order of acidic strength)
   HCl, HF, H Br, HI (increasing bond dissociation energy) 1,1

9. a) What are macromolecular colloids? Give an example.
   b) Explain mathematically the effect of pressure on the extent of adsorption at constant temperature. 1,1

10. a) For the following complex:-
   K_4 [Fe Cl Br $(CN)_4$]
   i) Assign IUPAC name to the complex.
   ii) Identify the type of isomerism possible in this complex.
   iii) What is the coordination number of iron?
   b) In the complex $[Cu(NH_3)_4](OH)_2$, determine the primary valency of copper metal.

(½x4=2)

11. a) Why is boiling point of water increased on addition of a non volatile solute to it?
   b) Determine the osmotic pressure of a solution by dissolving 0.025g of potassium sulphate in 2 L of water at 25°C ,assuming that it is completely dissociated.
   Given that molecular mass of potassium sulphate = 174, R = 0.0821 L atm./K/mol.

1,2

12. Explain the following with the help of reactions only:-
   a) Extraction of silver metal from silver sulphide.
   b) Concentration of alumina by Bayer's process.
   c) Extraction of iron in blast furnace from Haematite. 1,1,1

13. a) Draw the structure of the following:-
   i) XeF_2 ii) H_3PO_4
   b) Complete the following reactions and balance if required:-
   i) HNO_3(conc.) + Cu →
   ii) NH_4Cl + $Ca(OH)_2$ → 1,2

14. a) Explain the following terms related to proteins :-
   i) Peptide bond. ii) Denaturation.
   b) What happens when Glucose–D is treated with HI in presence of red phosphorous? (write the reaction involved).
   c) i) Which disease is caused due to the deficiency of vitamin D?
   ii) Write one difference between DNA and RNA. 1,1,1

15. a) Define Kohlrausch's law of independent migration.
   b) A cell in which the following reaction takes place: -
   $2Fe^{3+}(aq.) + 2\ I^{-}(aq.) \rightarrow 2\ 2Fe^{2+}(aq.) + I_2(s)$
   has E^0_{cell} = 0.236 V. Calculate the standard Gibb's energy. F = 96500 C 1,2

16. Give reason for the following :-
    a) $R_3P = O$ exists but $R_3N = O$ is not known where R is an alkyl group.
    b) Elements show their highest oxidation state in the form of their oxides and fluorides.
    c) H_2S is less acidic than H_2Te in group 16. 1,1,1

(OR)

Answer the following questions:-
    a) As we move down the members of group 15 stability of +3 oxidation state increases and that of +5 state decreases. Why?
    b) Nitrogen shows the property of catenation less than that of phosphorous. Explain.
    c) H_2S can act as the reducing agent, give reason. 1,1,1

17. a) Draw and label the d orbital splitting diagram for an octahedral complex.
    b) Explain the hybridisation in $[Ni(CN)_4]^{2-}$ on the basis of valence bond theory. Predict the shape and magnetic character of this complex. Given that atomic number of Ni = 28. 1,2

18. a) Give an example of:-
        i) A semi synthetic polymer ii) Thermosetting polymer
    b) Differentiate between a homo - polymer and co- polymer.
    c) Write the reaction involved in the preparation of tefflon. 1,1,1

19. a) How can ferric hydroxide sol be prepared?
    b) Define the following terms:-
        i) Catalyst poison ii) Selectivity of a catalyst
    c) i) Name a method which can be used to purify colloids.
        ii) What is observed when an electrolyte aluminium chloride is added to ferric hydroxide sol? 1,1,1

20. Explain the following named reactions with the help of chemical reactions involved:-
    a) Kolbe's reaction b) Cannizaro's reaction
    c) Hydroboration oxidation reaction 1,1,1

21. a) Assign IUPAC name to the following organic compounds :-
        i) $CH_3CH = CHCH_2COOH$ ii) $C_6H_5CH_2CH_2OH$
    b) Suggest one suitable test to distinguish between the following organic compounds:-
        i) Primary and secondary amine.
        ii) Propanol and propanoic acid. 1,2

22. Give reason for the following:-
    a) o-nitro phenol is more acidic than o-methyl phenol.
    b) Although tri-methyl amine $[(CH_3)_3N]$ and n- propyl amine $[CH_3CH_2CH_2NH_2]$ have the same molecular mass but the former boils at a lower temperature (276K) than the latter (322K).

c) As we down the homologous series of alcohols the solubility decreases. 1,1,1

23. Vishal was very upset and worried. His class fellow Arjun asked him the reason. He replied that since morning he has a burning sensation, stomach is bloated and he feels like vomiting. He also told Arjun that he had taken Eno but no effect. Arjun told Eno has only a temporary effect and suggested him to consult a doctor. The doctor diagnosed properly and prescribed the medicines. Vishal was much better after two hours. After reading this passage answer the following questions:-

a) What values are expressed by Arjun?

b) Name the problem the doctor would have diagnosed? Name one medicine used in this problem.

c) What is Eno? Explain how does Eno work?

d) What is the general name of medicines prescribed for the problem Vishal is suffering from? 1,1,1,1

24. a) An organic compound has the molecular formula C_4H_8O. From each of the following observations draw suitable conclusion. (Rewrite the table and complete it.)

Observation	Conclusion
i) Compound produces a yellow precipitate with DNP reagent.	
ii) Compound does not show any change with Fehling's solution.	
iii) Compound answers iodoform test.	
iv) Name of the given compound is :-	

b) In the following reactions identify compounds A, B etc. :-

$CH_3COCl \xrightarrow{H_2/BaSO_4} A \xrightarrow{CH_3MgBr} B$

$C_6H_5NH_2 \xrightarrow{CH_3COCl} A \xrightarrow{Br_2 \text{ in } CS_2} B$

$C_6H_5N_2Cl \xrightarrow{Cu/HCl} A \xrightarrow{\text{Aq. NaOH, Heat}} B$ 2,3

(OR)

a) An organic compound A having a fruity smell has the molecular formula $C_8H_{16}O_2$. From each of the following observations draw suitable conclusion. (Rewrite the table and complete it)

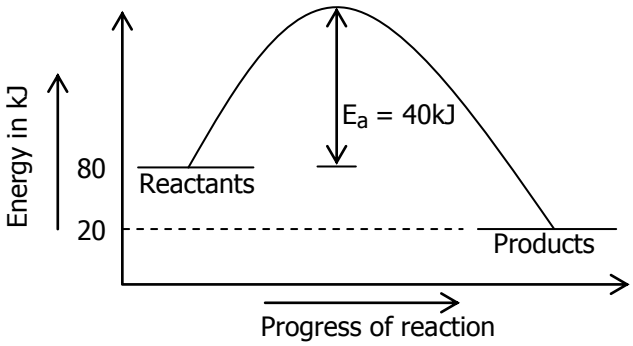
Observation	Conclusion
i) Compound A was hydrolysed with dil. Sulphuric acid to produce a carboxylic acid B and an alcohol C.	functional group present in compound A is _____
ii) Compound C on dehydration produces but-1- ene .	Structure of compound C _____
iii) Compound C on oxidation with chromic acid produced compound B	Structure of compound B _____
iv) Structure of compound A is	_____

b) How would you bring about the following conversions?
   i) Toluene to m-bromo benzoic acid.
   ii) Sodium phenoxide (C_6H_5ONa) to ethoxy benzene.
   iii) 2-Chloro butane to But-2-ene. 2,3

25. a) Differentiate between order and molecularity of a reaction. (Two points only)
   b) Conversion of reactant X to product Y follows second order kinetics. If the concentration of X is increased to three times ,how will it affect the rate of formation of Y?
   c) The rate of a reaction of a reaction quadruples when the temperature changes from 293K to 313 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature. R = 8.34 J/K/mol. 1,1,3

(OR)

   a) From the energy level diagram given below calculate:
      i) Threshold energy
      ii) ΔH



   b) In a pseudo first order hydrolysis of an ester in water, the following results were obtained :-

Time in sec.	0	30	60	90
Conc. of ester in mol/ L	0.55	0.31	0.17	0.085

Calculate the rate of reaction between the time interval 30 to 60 sec.

   c) For a first order reaction rate constant is 60 $sec.^{-1}$. Calculate the time required to reduce the initial concentration of the reactant to its $1/16^{th}$ value . 1,1,3

26. a) Write the balanced chemical reaction between acidic solution of potassium permanganate and ferrous sulphate solution.
   b) Define transition metals. What is their general configuration?
   c) What is 'Lanthanoid contraction'? Give its one consequence.
   d) Give reason for the following :-
      i) Transition metals form coloured compounds.
      ii) Transition metals are paramagnetic in nature. 1,1,1,2

(OR)

a) What is the effect of pH change on potassium dichromate?

b) Write the balanced chemical reaction involved in the preparation of potassium dichromate from chromite ore.

c) i) Discuss the paramagnetic character in 3d series of transition metals.

ii) Zn, Cd and Hg are not considered to be transition metals. Why? 1,2,2

-x-x-x-x-x-x-