DELHI PUBLIC SCHOOL

SAIL TOWNSHIP, RANCHI

ANNUAL EXAMINATION (2017-18)

Class:- XI **Subject:- Chemistry**
Time- 3 Hrs. **F. M:- 70**

General Instructions:-

- ***All questions are compulsory.***
- ***Question no. 1 to 5 are very short answer questions and carry 1 mark each.***
- ***Question no. 6-10 are short answer questions and carry 2 marks each.***
- ***Question no. 11 to 22 are also short answer questions and carry 3 marks each.***
- ***Question no.- 23 is a value based question and carry 4 marks.***
- ***Question no. 24 to 26 are long answer questions and carry 5 marks each.***
- ***Use Log table if necessary.***

Q.1 **Why is the law of Gay Lussac's not obeyed if any reactant or product is not a gas?** **[1]**

Q.2 **How many moles of iron can be made from Fe_2O_3 by the use of 16 moles of carbon monoxide in the following reaction?**

$$Fe_2O_3 + 3\,CO \longrightarrow 2\,Fe + 3CO_2$$ **[1]**

Q.3 **What are the oxidation number of each iodine in KI_3?** **[1]**

Q.4 **Find the value of n in**

$$MnO_4^- + 8\,H^+ + ne^- \longrightarrow Mn^2 + 4\,H_20$$ **[1]**

Q.5 **Write IUPAC name of**

$CH_3 - CH_2 - CH = CH - CH_2COOH$ **[1]**

Q.6 **(i) In the combustion of methane why is methane regarded as limiting reagent?** **[2]**
(ii) When is the law of definite proportion is not obeyed? **[2]**

Q.7 **(i) How many electrons can be filled in all the orbitals with n+l = 5?**
(ii) What is the angular momentum of electron in 5^{th} orbit according to Bohr's theory? **[2]**

OR

(i) Why did Heisenberg replace the concept of definite orbits by the concept of probability?
(ii) Out of the electron and proton which will have a higher velocity to produce matter waves of same wavelength? Explain it. **[2]**

Q.8 **(a) Arrange the following in order of increasing reducing property.**

NaH , MgH_2 and H_2O

(b) Complete the following reaction.

$$MnO_4^-\,(aq) + H_2O_2\,(aq) \longrightarrow$$

Q.9 An alkene 'A' on ozonolysis gives a mixture of ethanal and pentan -3-one. Write the structure and IUPAC name of 'A'. [2]

Q.10 (i) pK_a value of acids A,B,C,D are 1.5 , 3.5 , 2.0 and 5.0. Which of them is strongest acid?

(ii) Glycine is an α –amino acid exist in the form of Zwitter ion as $^{+}NH_3CH_2COO^{-}$, write the formula of its (a) conjugate acid and (b) conjugate base. [2]

Q.11 The electronic energy in H-atom is given by En = $(-2.18 \times 10^{-18})/n^2$ J atom^{-1}. Calculate the energy required to remove an electron completely from n=2 orbit. What is the longest wavelength of light that can be used to cause this transition? [3]

Q.12 (a) Why is fluorine more reactive than chlorine?

(b) How would you explain the fact that first ionization enthalpy of sodium is lower than that of magnesium but its second ionisation enthalpy is higher than that of magnesium? [3]

Q.13 State and explain Dalton's law of partial pressure. Mention the application of this law.

OR

What is ideal gas equation? How it can be derived? Also express it in term of density of gas. [3]

Q.14 Calculate the total pressure in a 10 litre cylinder which contains 0.4 gm of helium 1.6 gm of Dioxygen and 1.4 gm of dinitrogen at 27^0 C. Also calculate the partial pressure of helium gas in the cylinder. Assume ideal behaviour of gases. [R = 0.082 lit atm K^{-1} mol^{-1}] [3]

Q.15 (a) Explain why alkali metals can not be obtained by chemical reduction method?

(b) Potassium carbonate can not be obtained by Solvay's process, why?

(c) Compare the alkali metals and alkaline earth metals with respect to solubility of hydroxide. [3]

Q.16 Define Free Energy and derive Gibb's Helmholtz equation. [3]

Q.17 At 300K the standard enthalpies of formation of C_6H_5COOH (s) , CO_2 (g) and H_2O (l) are – 408 , - 393 and – 286 KJ /mol respectively. Calculate the heat of combustion of benzoic acid (C_6H_5COOH) at (i) constant pressure and at (ii) constant volume.
(R = 8.314 J/K/mol)

Q.18 (a) Why is boric acid considered a weak acid?

(b) Write the balanced equation for

$Al + NaOH + H_2O \longrightarrow$

(c) Why CCl_4 is resistant to hydrolysis but $SiCl_4$ is easily hydrolysed? [3]

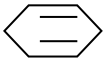
Q.19 (i) Draw resonance structure of

$CH_3CH = CH - CHO$

(ii) Explain Homolytic and heterolytic bond fission with example. [3]

Q.20 (i) What effect does branching of an alkane chain has on its boiling point?

(ii) Why do the C-C bonds rather than C-H bonds break during cracking of alkane?

(iii)  = CH_2 is not aromatic explain. [3]

Q21. Balance the following redox reaction by ion electron method.

(a) N_2H_4 (l) + ClO_3^- (aq) $\longrightarrow$ NO + Cl^- (Basic radium)

(b) $MnO_2 + C_2O_4^{2-} \longrightarrow Mn^{2+} + CO_2$ (alid medium)

Q.22 **(i) Define Oxidation and Reduction process in terms of oxidations No.** **[3]**

(ii) The Mn^{3+} ion is unstable in solution and undergoes disproportionation reaction to give Mn^{2+} , MnO_2 and H^+ ion. Write balanced ionic equation for this reaction. **[3]**

Q.23 **The major cause of environmental pollution is the rapid industrilisation particularly the development of those industries which either produce or use toxic chemicals. One way to protect our environment from chmemical effluents and wastes is to use 'Green Chemistry.'**

Answer the following on the basis of above paragraphs.

(i) What do you mean by Green Chemistry?

(ii) Give the basic aim of Green Chemistry.

(iii) How can you apply Green Chemistry

(a) to avoid use of halogenated solvents in dry cleaning and that of chlorine in bleaching.

(b) to reduce consumption of petrol and diesel. **[4]**

Q.24 **(a) State Le-chatelier's principle. Using this principle predict the effect of decreasing temperature and increasing the pressure in the following equilibrium.**

$N_2(g) + O_2(g) \rightleftharpoons 2NO(g) + Heat$

(b) At 700 K, equilibrium constant for the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ is 54.8 . If 0.5 mol/L of HI (g) is present at equilibrium at 700 K. What are the concentration of H_2 (g) and I_2 (g) assuming that we initially started with HI (g) and allowed to reach equilibrium at 700 K? **[5]**

OR

(a) What is common ion effect? How does common ion affect the solubility of electrolyte?

(b) The solubility of $Sr(OH)_2$ at 298 K is 19.23 gm/L of solution. Calculate the concentration of strontium and hydroxyl ion and the pH of the solution (Atomic mass of Sr = 87.6)

Q.25 **(i) What type of hybridization and shape involved in BrF_5 ?**

(ii) Arrange the following in decreasing order of bond angle.

NO_2 , NO_2^+ , NO_2^-

(iii) Write the molecular orbital configuration of a diatomic molecule having bond order equal to three .

(iv) Draw the resonating structure of CO_2 .

(v) Why PCl_5 dissociates to give PCl_3 and Cl_2 ? **[5]**

OR

(i) Why NF_3 is pyramidal but BF_3 is triangular planar?

(ii) Predict which out of the following have higher dipole moment and why?

OCS and CS_2

(iii) Out of O_2^+ and O_2^- which one is more stable on the basis of bond order calculation?

(iv) Why H_2O is liquid while H_2S is gas?

(v) Draw the resonance structure of Nitrate ion.

Q.26 (i) Explain the following with example

(a) Friedel craft acylation.

(b) Wurtz reaction.

(ii) How will you convert the following :

(a) Benzene to p-nitrobromo benzene

(b) Benzoic acid to Benzene

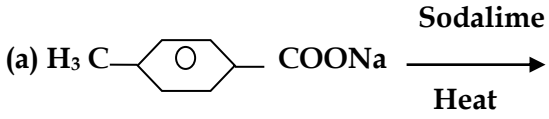
(c) 1-Bromopropane to 2 - Bromopropane

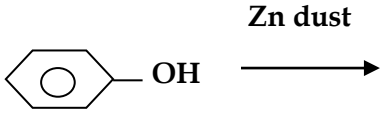
OR

(i) Arrange Benzene , n-hexane and Ethyne in decreasing order of acidic behavior with reason.

(ii) Suggest a route for the preparation of nitrobenzene starting from acetylene.

(iii) Complete the following reaction.

(a) 

(b) 

(c) $CH_3 - C \equiv CH \xrightarrow[H^+]{Hg^{2+}}$