CHEMISTRY - I YEAR

LAQ's: (8 Marks)

1. Write the postulates of Bohr's theory of hydrogen atom? Discuss the importance of this model to explain various series of line spectra in hydrogen atom. (Ch.No.1, Q.No.55)
2. How are the quantum numbers n,l and m_l arrived and explain the significance of quantum number? (Ch.No.1, Q.No.61)
3. Write an essay on s,p,d and f block elements. (Ch.No.2, Q.No.85)
4. What is a periodic property? How the following properties vary in a group and in a period? Explain a) Atomic radius b) Electron gain enthalpy c) IE d) EN (Ch.No.2, Q.No.87,88)
5. Define IE_1 and IE_2. Why is $IE_2 > IE_1$? Disscuss the factors which effect IE? (Ch .no 2, Qno. 90)
6. Give an account of VSEPR Theory and its applications. (Ch.No.3, Q.No.44)
7. What do you understand by Hybridization? Explain different types of hybridization invoving s and p orbitals. (Ch.No.3, Q.No.46)
8. Give the molecular orbital energy diagram of a) N_2 and b) O_2. Caluculate the respective bond order. Write the magnetic nature of N_2 and O_2 molecules. (Ch.No.3, Q.No.48)

SAQ's: (4 Marks)

1. Define Dipole moment. Write its applications? (Ch.No.3, Q.No.20)
2. Explain the hybridization involved in PCl_5 and SF_6 molecule. (Ch.No.3, Q.No.28)
3. Explain the formation of coordinate covalent bond with one example. (Ch.No.3, Q.No.30)
4. State and explain Dalton's law of partial pressures (Ch.No.4, Q.No.50)
5. State and explain Graham's law of diffusion. (Ch.No.4, Q.No.49)
6. Derive an expression for kinetic energy of gas molecules. (Ch.No.4, Q.No.53)
7. Deduce gas laws from kinetic gas equation. (Ch.No.4, Q.No.64)
8. Find RMS speed, average speed and most probable speed of CO_2 gas at 27^0C. (Ch.No.4,Sp.Q.No. 7)
9. Calculate kinetic energy of 5 moles of Nitrogen at 27^0C. (Ch.No.4,Sp.Q.No. 8)
10. Write the postulates of Kinetic molecular theory of gases. (Ch.No.4, Q.No.62)
11. Chemical analysis of a carbon compound gave the following percentage composition by weight of the elements present. Carbon = 10.06%, hydrogen = 0.84%; chlorine = 89.10% calculate Empirical formula. (Ch.No.5, Q.No.5)
12. A carbon compound contains 12.8% carbon, 2.1% hydrogen, 85.1% bromine. The molecular weight of the compound is 187.9 calculate molecular formula. (Ch.No.5, Q.No.16)
13. Balance the folowing redox reactions by ion electron method? (Ch.No.5, Q.No.61)
    a) $MnO_4^-(aq) + I^- \rightarrow (aq)\ MnO_2(s) + I_2(s)$ (in basic medium)
    b) $MnO_4^- + SO_2 \rightarrow Mn^{+2} + HSO_4^-$ (in acidic medium)
    c) $Cr_2O_7^{2-} + SO_2 \rightarrow Cr^{3+} + SO_4^{2-}$ (acidic medium)
14. What are disproportionation and comproportionation reactions ? Give examples? (Ch.No.5, Q.No.29,30)
15. Calculate the volume of $0.1N H_2SO_4$ required to neutralise 200 ml of 0.2N NaOH Solution.? (Ch.No.5, Q.No.41)
16. Calulate the volume of 0.1m KMnO4 required to react with 100ml of 0.1m $H_2C_2O_4.2H_2O$ solution in presence of H_2SO_4.? (Ch.No.5, Q.No.43)
17. Show that $\Delta H = \Delta U + \Delta n RT$ (Ch.No.6, Q.No.49)
18. Define heat capacity. What are C_p and C_V ? Show that $C_p - C_V = R$ (Ch.No.6, Q.No.53)
19. Explain extensive and intensive properties ? (Ch.No.6, Q.No.51)
20. Explain spontaneity of a process in terms of Gibbs energy? (Ch.No.6, Q.No.81)
21. State and explain Hess's law of constant heat summation. Give example. (Ch.No.6, Q.No.101)
22. Derive the relation between K_p and K_c for the equilibrium reaction $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(G)}$ (Ch.No.7, Q.No.40)
23. What is a conjugate acid - base pair ? Illustrate with examples. (Ch.No.7, Q.No.58)
24. Explain briefly about Bronsted - Lowry theory with example.
25. Define ionic product of water. What is its value at room temperature? (Ch.No.7, Q.No.69)
26. Aqueous soluation of CH_3COONa is basic explain . (Ch.No.7, Q.No.79)
27. Discuss the application of Lechaterlier's principle for the industrial synthesis of Ammonia and sulphur trioxide. (Ch.No.7, Q.No.89)
28. Write notes on i) Common ion effect ii) The relation between K_{SP} and solubility (S) of a spaningly soluble salt $BaSo_4$ (Ch.No.7, Q.No.99)
29. What is meant by dynamic equilibrium? Explain with suitable examples? (Ch.No.7, Q.No.85)
30. Give the General characteristics of equilibria involving physical processes ? (Ch.No.7, Q.No.86)

31. Explain Lewis acid-base theory with suitable example. Classify the following species into Lewis acids and Lewis bases and show these act as Lewis acid / base. (Ch.No.7, Q.No.94)
    a) OH^- b) F^- c) $H^=$ d) BCl_3
32. Define pH. What is buffer solution? Derive Henderson - equation for Calculating the pH of an acid buffer solution. (Ch.No.7, Q.No.96)
33. Write the chemical reaction to justify that hydrogen peroxide can function as on oxidizing as well as reducing agent. (Ch.No.8, Q.No.30)
34. Write a few lines on the utility of hydrogen as a fuel. (Ch.No.8, Q.No.21)
35. Explain with suitable examples, the following: (Ch.No.8, Q.No.26)
    i) electron - deficient (ii) electron - precise and (iii) electron - rich hydrides
36. Explain the terms hard water and soft water: Write a note on the (Ch.No.8, Q.No.29)
    i) Ion - exchange method and (ii) Calgon method for the removal of hardness of water:
37. Explain the significance of sodium, potassium, magnesium and calcuim in biological fluids. Boilogical importances of Na amd K. (Ch.No.9, Q.No.59)
38. What do you know about castner - kellner process ? Write the principle involved in it? (Ch.No.9, Q.No.36)
39. Explain borax bead test with a suitable example. (Ch.No.10, Q.No.28)
40. How is diborane prepared ? Explain its structure. (Ch.No.10, Q.No.38)
41. Explain the following :
    a) SiO_2 is treated with HF b) Graphite is a lubricant c) Diamond is an abrasive. (Ch.No.11, Q.No.34)
42. Explain the structure of silica. How does it react with a. NaOH and b. HF? (Ch.No.11, Q.No.48)
43. Write a note on the allotropy of carbon. (Ch.No.11, Q.No.49)
44. Define the terms Sink, COD, BOD, and TLV. (Ch.No.12, Q.No.24)
45. What is green house effect? and how is it caused? (Ch.No.12, Q.No.26)
46. Explain the following in detail. a) Golbal Warming; b) Ozone depletion; c) Acid Rain; d) Eutrophication (Ch.No.12, Q.No.34)
47. Complete the following reaction and name the products A, B and C. (Ch.No.13, Q.No.11)

$$CaC_2 \xrightarrow{H_2o} A \xrightarrow{\text{hotmetaltube}} B \xrightarrow{AlCl_3+CH_3Cl} C$$

48. Name the productes A, B and C fromed in the following reactions. Give the equations for the reactions.

$$\text{Ethylene} \xrightarrow{Br_2/CCl_4} A \xrightarrow{\text{alc.KOH}} B \xrightarrow{Br_2} C$$ (Ch.No.13, Q.No.12)

49. Explain the mechanism of halogenations methane (Ch.No.13, Q.No.18)
50. Give two examples each for position and functional group isomerism. (Ch.No.13, Q.No.17)
51. Explain addition of HBr to Propene with the ionic mechanism. (Ch.No.13, Q.No.24)
52. Explain Inductive effect with a suitable example. (Ch.No.13, Q.No.49)
53. Describe two methods of preparation of ethane. Give any three reactions of ethance (Ch.No.13, Q.No.28)
54. Describe two methods of preparation of ethylene.Give equation for the reactions of ethylene with the following:
    a) Ozone d) Hypohalous acid c) Cold and dil.alk.$KMno_4$ d) Heated with O_2 at high pressure. (Ch.No.13, Q.No.32)
55. How does acetylene react with the following reagents? Give the corresponding equations and name of the products formed in the reactions. a) Acetic acid b) Water c) Hydrogen d) Halogens e) Hydrogen halide
    f) Ammonical $AgNO_3$ and $CuCl_2$ (Ch.No.13, Q.No.37)
56. How do we get benzene from acetylene? Give the corresponding equation. Explain the halogenations, alkylation, acylation, natration and sulphonation of benzene? (Ch.No.13, Q.No.39)
57. Discuss Markownikoff's rule and Kharash effect. (Ch.No.13, Q.No.57)

VSAQ's: (2 Marks)

1. What are Isotherms. (Ch.No.4, Q.No.4)
2. Which of the gases diffuses faster among N_2, O_2 and CH_4 ? Why ? (Ch.No.4, Q.No.18)
3. How many times methane diffuses faster than sulphur dioxide? (Ch.No.4, Q.No.19)
4. What is Boltzman's constant ? Give its value. (Ch.No.4, Q.No.26)
5. Give the ratio of RMS, average and most probable speed of gas molecules. (Ch.No.4, Q.No.32)
6. What is Laminar flow of liquid. (Ch.No.4, Q.No.44)
7. What is compressibility factor. (Ch.No.4, Q.No.34)
8. How many number of moles of glucose are present in 540gm of glucose. (Ch.No.5, Q.No.1)
9. How many molecules of Glucose are present in 5.23 gm of Glucose? (Ch.No.5, Q.No.3)
10. Calculate the volume of O_2 at S.T.P required to completely burn 100ml of acetylene. (Ch.No.5, Q.No.8)
11. The emperical formula of a compound is CH_2O It's molecular weigh is 90. Caluate molecular formula of compound. (Ch.No.5, Q.No.5)
12. How many significant figures are present in the following: (Ch.No.5, Q.No.34)

    i) 0.0025 ii) 10.4107 iii) 0.04597 iv) 2808 v) 500.0

13. Assign oxidation numbers to yhe undrlined i) $NaH_2\underline{P}O_4$ II) $H_4\underline{P}_2O_7$ III) $K_2\underline{Mn}O_4$ IV) $H_2\underline{S}_2O_7$ (Ch.No.5, Q.No.82)

14. Explain the relationship between Gibbs energy change and equilibrium constant. (Ch.No.6, Q.No.32)

15. State the third law of thermodynamics. (Ch.No.6, Q.No.38)

16. What is homogeneous and heterogeneous equilibrium reaction ? Give examples (Ch.No.7, Q.No.4,5)
17. All Bronsted bases are Lewis bases. Explain. (Ch.No.7, Q.No.30)
18. What is the pH of 10^{-8} M HCl? (Ch.No 7, Q.No.29)

19 Calculate the pH of the following solutions: (Ch.No. 7, Q.No.13)
a) $[H^+] = 0.05$ M b) $[OH]^- = 2 \times 10^{-4}$ M
20. Calculate of pH for (Ch.No. 7, Q.No.23)
a) 0.001 M NaOH b) 0.0008 M $Ba(OH)_2$
21. Water behaves as an amphoteric substance in the Bronsted sense. How do you explain? (Ch.No.8, Q.No.10)
22. Explain the tem "SYNGS". (Ch.No.8, Q.No.4)
23. What do you mean by autoprotolysis ? Give the equation to represent the autoprotolysis of water. (Ch.No.8, Q.No.9)
24. What is meant by coal gasification? Explain with relevant, balanced equation. (Ch.No.8, Q.No.5)

25. Lithium salts are mostly hydrated. Why? (Ch.No.9, Q.No.3)
26. What happens when magnesium metal is burnt in air ? (Ch.No.9, Q.No.11)
27. Write the average composition of portland cement (Ch.No.9, Q.No.18)
28. Why is gypsum added to cement ? (Ch.No.9, Q.No.19)
29. Describe the important uses of caustic soda? (Ch.No.9, Q.No.22)
30. Explain inert pair effect. (Ch.No10, Q.No.8)
31. Give the formula of borazine. What is its common name ? (Ch.No10, Q.No.13)
32. Give the formulae of (a) Borax (b) Colemanite (Ch.No10, Q.No.14)
33. What is allotropy? Give the crystalline allotropes of carbon. (Ch.No 11, Q.No.
34. Name any two man - made silicates. (Ch.No. 11, Q.No. 8)
35. What are silicones? (Ch.No. 11, Q.No. 18)
36. Write the use of ZSM - 5. (Ch.No. 11, Q.No. 23)
37. Which oxides cause acid rain? and what is its pH value? (Ch.No. 12, Q.No. 10)
38. Whatis classical smog? and what is its chemical character (Oxidizing or reducing) (Ch.No 12, Q.No.13)
39. Write IUPAC name of the following compounds
i) $(CH_3)_3CCH_2C(CH_3)_3$ ii) $(CH_3)_2\ C(C_2H_5)_2$ iii) Tetra-tert.butyl methane (Ch. 13, SP.Q.No. 27)
40. Write IUPAC name of the following compounds
1) Trichlorethanoic acid 2) Neopentane 3) p-nitro benzaldehyde. (Ch. 13, SP.Q.No. 6)
41. Explain the following:
a) Crystallisation b) Distillation (Ch. 13, SP.Q.No. 10)

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