Sample Paper- 2015
Subject : Chemistry
Class XI

**MM**: 70   **Time**:3.00 Hr.

General Instructions :
1. All questions are compulsory.
2. Questions no. 1 to 8 are very short answer questions and carry 1 mark each.
3. Questions no. 9 to 18 are short answer questions and carry 2 marks each.
4. Questions no. 19 to 27 are also short answer questions and carry 3 marks each.
5. Questions no. 28 to 30 are long answer questions and carry 5 marks each.
6. Use log tables if necessary, use of calculators is not allowed.

1. State the relationship between :   1
   (i) Empirical and molecular formula.
   (ii) Molecular wt. and vapour density.
2. Write IUPAC name for;   1
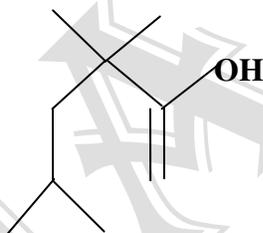
3. Which one of the following atomic orbitals is not possible ? Why ?   1
   (i) n = 3, l = 1, m = –2   **(ii)** n = 4, l = 0, m = 0
4. What is the significance of van der Waal's constant 'b' ?   1
5. What is inductive effect ?.   1
6. State why heat changes in chemical processes are indicated as enthalpy changes and not internal energy changes ?   1
7. What is the condition required for the precipitation to occur ?   1
8. Give an example of a β–elimination reaction.   1

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9.   A compound contains 4.07 % hydrogen, 24.27 % carbon and 71.65 % chlorine. It's molar mass is 98.96 g
        . Deduce the empirical and molecular formulae.   2
        [At. masses : H = 1 ; O = 16 ; Cl = 35.5]
10.   How would you separate a mixture of ethylene, acetylene and ethane ?   2
11.   Explain the significance of the terms 'isolated gaseous atom' and 'ground state' while   defining
ionization enthalpy and electron gain enthalpy.   2
12.   State why :   2
        (a) In any period, the alkali metal has lowest ionization energy.
        (b) van der Waals' radii are always larger than covalent radii.
13.   **(a)** Write an expression to calculate angular momentum of an electron ?
        (b) State the significance of minus sign in Bohr's equation.   2
                                        OR
        (a) Which quantum number does not follow from the solution of Schrodinger wave
            equation ?
        (b) An electron has s = + ½ and m = -1, it cannot be present in which of the orbitals and   why
?
14.   Differentiate between primary and secondary pollutants.   2
15.   The following system is in equilibrium ;   2

$$SO_2Cl_2 + Heat \rightleftharpoons SO_2 + Cl_2$$

        What will happen to the temperature of the system if some Cl_2 into it at constant volume ?   Give
reason.
16.   Write the conformations of ethane and compare their stability.   2
17.   Account for the following :   2
        (a) Alkali metals are used in photoelectric cells.
        (b) There is a very large difference between first and second ionization energies of alkali
            metals.
18.   Explain why :   2
        (i) B—X bond length in BX_3 is shorter than theoretically expected values.
        (ii) BCl_3 has a higher stability than $TlCl_3$.
19.   Write down chemical equations (only) corresponding to the following :   3
        (i) Friedel-Craft's reaction
        (ii) Wurtz reaction
        (iii) Baeyer's test
20.   Why is benzene extra ordinarily stable although it contains three double bonds ? 3
21.   What are electrophiles and nucleophiles ? How are the produced during bond
        fission ?   3
22.   **(a)** Define wave number.   3

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(b) Calculate the uncertainty in the velocity of a wagon of mass 3000 kg whose position is known to an accuracy of $\pm$ 10 pm **[Planck's constant = 6.63×10^{-34} Js]**   **23. (i)** State one application of Dalton's law.   3

(ii) A gaseous mixture contains 56 g of N_2, 44 g of CO_2 and 16 g of CH_4. The total pressure of the mixture is 720 mm Hg. What is the partial pressure of CH_4 ?

24.   **(i)** Derive the relationship : $Kp \neq Kc\,(RT)^{\Delta n}$. Symbols having usual sense.   3

(ii) Name the conjugate acids of the following species :

   (a) CO_3^{2-} **(b)** OH^-

25.   (a) In terms of oxidation number, What is an oxidizing agent ?   3

   (b) Balance the following equation in acidic medium by half equation method :

   $$Sn(s) + NO_3^-(aq) + H^+(aq) \ \rightarrow \ Sn^{2+}(aq) + NH_4^+(aq) + H_2O(l)$$
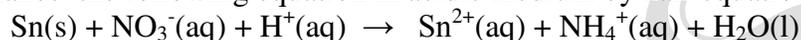
26.   State what are :   3

   (a) Isotope effect.   (b) Anion Exchange resins.

   (c) Hydride gap.

27.   **(a)** What is diagonal relationship?   3

   (b) Alkali and alkaline earth metals cannot be obtained by chemical reduction method. Comment.

   (c) Write chemical equation showing the conversion of gypsum to P.O.P.

OR

   (a) Li shows similarities to which element of periodic table ? What this phenomenon is called ?

   (b) Write the chemical equation corresponding to the slaking of lime.   **(c)** Why an aqueous solution of Na_2CO_3 is alkaline ?

28.   **(a)** Account for the following :   5

   (i) Bond length follows the order : C—C > C=C > C≡C for di carbon species .

   (ii) pi-bond is always formed in association with sigma-bond.

   (b) Use MOT to explain why N_2^+ is less stable than N_2 and O_2^+ is more stable than O_2.

OR

   (a) Account for the following :

   (i) Free rotation around a π-bond is not possible.

   (ii) Predict the type of hybridization and shape of IF_7 molecule.

   (b) In terms of MOT, taking a suitable example explain why noble gases do not exist as diatomic species.

29.   **(a)** Derive $q_p = q_v + \Delta n_g RT$, symbols having usual sense.   5

   (b) Calculate the enthalpy change accompanying the transformation of C (graphite) to   C (diamond). Given that the enthalpies of combustion of graphite and diamond are

   393.5 and 395.4 KJ mol^{-1} respectively.

   (c) Define Gibb's free energy.

OR

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(a) Derive the expression Cp - Cv = R. Symbols having usual meaning.
(b) Calculate ΔH_f of ethene (C_2H_4) from the following data :
(i) $C(s) + O_2(g) \rightarrow CO_2(g)$; $\Delta H = -396$ KJ
    (ii) $H_2(g) + \frac{1}{2} O_2(g) \rightarrow H_2O(l)$; $\Delta H = -287$ KJ
    (iii) $C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(l)$; $\Delta H = -1400$ KJ
(c) State Hess's Law.
30.   **(a)** With the help of relevant chemical equations, state what is borax bead test ? What   type
of cations are tested by this test ?   **(b)** Comment :
                                         5   **(i)**) $PbCl_2$ is ionic but $PbCl_4$ is covalent.
    (ii) No form of elemental silicon is comparable to graphite ?

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OR

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(a) State what are :
    (i) Inorganic benzene
    (ii) Fullerenes
(b) Account for the following :
    (i) CCl_4 is not hydrolyzed by water but $SiCl_4$ is easily hydrolyzed.
    (ii) $SnCl_2$ is ionic whereas $SnCl_4$ is covalent.
    (iii) BF_3 is less acidic than BCl_3 although flourine is more electronegative than
        chlorine?

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