SAMPLE PAPER - I (Unsolved)

CHEMISTRY – XI

**Time allowed : 3 hrs.**   **M. M. : 70**

General Instructions :

(i)   All questions are compulsory.

(ii) Marks for each question are indicated against it.

(iii) Question number 1 to 8 are very short answer questions carrying one mark each. Answer these in one word or about one sentence.

(iv) Question number 9 to 18 are short answer questions carrying 2 marks each. Answer these in about 30 words.

(v)   Question number 19 to 27 are also short answer questions carrying 3 marks each. Answer them in about 40 words.

(vi) Question number 28 to 30 are long answer questions carrying 5 marks each. Answer them in about 70 words.

(vii) Use log tables, if necessary. Use of calculator is not allowed.

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1.   Write the electronic configuration of Cu^+ (Z = 29).   1

2.   State modern periodic law.   1

3.   Give one example of intensive property.   1

4.   What would you observe when HCl gas is passed into the saturated solution of NaCl ?   1

5.   Calculate oxidation state of Mn in K_2MnO_4.   1

6.   Draw the structure of $C_2H_5^+$.   1

7.   Which reactive intermediate is formed when the covalent bond in CH_3–Li under-goes hetrolytic cleavage ?   1

8. Predict the alkene as a major product obtained by the dehydrohalogenation of : 1

$$CH_3-CH_2-\underset{\underset{CH_3}{|}}{\overset{\overset{Br}{|}}{C}}-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$$
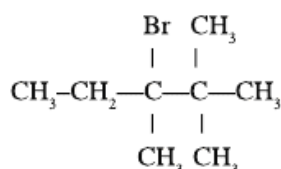
9. A sample of NaOH weighing 0.38 g is dissolved in water and solution is made 50.0 mL in a volumetric flask. Calculate the molarity of the resulting solution. (Molar mass of NaOH = 40 g mol^{-1}) 2

10. Electromagnetic radiation of wavelength of 242 nm is just sufficient to ionise sodium atom. Calculate the ionization enthalpy of sodium in kJ/mol. 2

11. Draw the energy level diagram of molecular orbitals in N_2 molecule. 2

12. On the basis of kinetic theory of gases explain why 2

    (a) gases exert pressure.

    (b) the volume of fixed amount of gas at constant pressure increases with the rise in temperature.

13. A student forgot to add the reaction mixture to a flask at 27° C and placed on the flame and heated it to 477° C. What fraction of air has been expelled out ? 2

14. State Le Chatelier principle. Predict the direction of the reaction :

$$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g) \qquad 2$$

    when noble gas is added to the reaction mixture at constant pressure.

15. Balance the following chemical equation in alkaline medium : 2

$$I^- + MnO_4^- \rightarrow IO_3^- + MnO_2$$

16. Contrast the action of heat on the following and explain your answer : 2

    (a) Na_2CO_3 and $CaCO_3$

    (b) $Ca(NO_3)_2$ and $NaNO_3$

17. Write the chemical equations for the following reactions :

    (a) Markownikov's rule   (b) Friedel-Crafts reaction   2
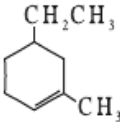
OR

Explain the following technique of separation of organic compounds with suitable examples : 2

    (a) Chromatography   (b) Differential extraction

18. (a) Why is fusion of organic compound with sodium metal is essential before performing tests for detection of extra elements in the organic compounds ?

    (b) Write the chemistry involved in the test used for detection of nitrogen.   2

19. State Gay-Lussac's law combing volume of gas and Avogadro's   3 law. Standard molar volume of any ideal gas is 22.7 L. Give the values of standard temperature and pressure.

20. (a) State Pauli's exclusion principle.

    (b) Which rule will be disobeyed by the following   3 electronic configurations :

      (i) $2s^3$ (ii) $2s^2\, 2p_x^{\,2}\, 2p_y^{\,1}\, 2p_z^{\,0}$

21. Account for the following :   3

    (a) Ionization enthalpy of nitrogen (Z = 7) is more than that of oxygen (Z = 8).

    (b) Electron gain enthalpy of chlorine (Z = 17) is more negative than that of fluorine (Z = 9).

    (c) Noble gases have high positive values of electron gain enthalpy.

22. (a) How many sigma (σ) and pi (π) bonds are there in $CH_2{=}CH{-}C{\equiv}CH$?

    (b) Using VSEPR model predict the geometrical shapes of the following species :

      (i) ClF_3 (ii) XeF_2 3

23. (a) If water molecules were linear instead of angular, would water (H_2O) be a good solvent as it is ? Why or why not ?

    (b) How is H_2O_2 prepared by hydrated barium peroxide ? Show by   3 chemical reactions that H_2O_2 acts both as oxidising and reducing agent.

24. Comment on each of the following observations :

    (a) The mobilities of the alkali metal ions in aqueous solution are $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$.

    (b) Lithium is only alkali metal to form a nitride directly.

   (c) Alkaline earth metals are harder than alkali metals.   3

OR

What happens when : 3

(a) Sodium metal is dropped in water.

(b) Sodium metal is heated in free supply of air.

(c) Sodium peroxide dissolves in water.

25. Write the IUPAC name of the following organic compounds : 3

(a) $CH_3CH = CH - \underset{\underset{CH_3}{|}}{CH} - CH_3$

(b)

(c) $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{OH}{|}}{CH}} - CH - CH_3$ 3

26. K_a for an acid (HA) is 5×10^{-6}. What is the pH of 0.2M solution of HA. Find also the molar concentration of A^-. 3

27. Write the use of green chemistry in the following day to day life processes for decrease in pollution : 3

(a) Dry cleaning of clothes

(b) Bleaching of paper

(c) Synthesis of chemicals

28. (a) Calculate $\Delta_r G^\theta$ for conversion of oxygen to ozone :

$$3/2\ O_2\ (g) \to O_3 \text{ at } 298\ K$$

K_p for this conversion is 2.47×10^{-29}.

(b) State the second law of thermodynamics. How is Gibbs energy change related with spontaneity of a process ? 5

OR

(a) Define Gibbs energy.

(b) Predict the direction in which a reversible reaction will move when $\Delta G = +ve$.

(c) Using the data given below, calculate the value of $\Delta_r G^{\varnothing}$ and K_p for the following reaction at 298 K :
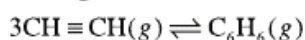
$$3CH \equiv CH(g) \rightleftharpoons C_6H_6(g)$$

$\Delta_f G^{\theta}$ [CH≡CH (g)] = 2.09×10^5 J mol^{-1},   5

$\Delta_f G^{\theta}$ [C$_6$H$_6$ (g)] = 1.24×10^5 J mol^{-1} and R = 8.314 J K^{-1} mol^{-1}.

29. (a) Draw the structure of diborane.

(b) Define the term inert pair effect. Explain your answer with the help of lead chlorides.

(c) (i) Which is more ionic SnCl$_2$ or SnCl$_4$ and why ?

(ii) PbO$_2$ is a strong oxidising agent. Assign a reason for this.   5

OR

(a) Account for the following :

(i) AlCl$_3$ is a Lewis acid.

(ii) CO$_2$ is a gas while silicon dioxide is a solid.

(iii) Carbon shows catenation property but Pb does not.

(b) Write the balanced chemical equations for the following reactions :

(i) NaH + B$_2$H$_6$ →

(ii) BF$_3$ + LiH →

30. (a) Make the following conversions :

(i) Propene to propanal

(ii) 2-Bromopropane from propene

(b) A hydrocarbon 'A' adds one mole of hydrogen in presence of Pt   5
catalyst to form n-hexane. When 'A' is oxidised with hot alkaline KMnO$_4$ solution (alkaline), a single carboxylic acid containing three carbon atoms is isolated. Give the structure of 'A' and write chemical equation of reactions involved.

OR

(a) Give one chemical test to distinguish the following pairs :

(i) Ethene and Ethyne   (ii) Ethane and Ethene

(b) An alkene C$_8$ H$_{16}$ on ozonolysis form ozonide which on hydrolysis   5
with Zn dust form an aldehyde and pentan-2-one as products. Draw the structures of alkene and write the chemical reaction involved.