23. Given

$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ $\Delta H = -92.4$ KJ/mol

Define Standard Enthalpy of formation. Calculate the standard enthalpy of formation of NH_3 in the above reaction.

OR

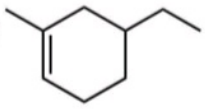
Define the following terms:

(a) Adiabatic process (b) second law of thermodynamics

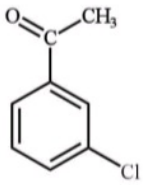
24. Write the IUPAC name of the following (any two)

i) **CH_3-CH=CH-CH_2-OH**

ii)



iii)



25. Explain the following term with examples.

(a) positional isomerism (b) functional group isomerism

OR

Explain the following terms:

(i) Extensive properties (ii) Intensive Properties (iii) Path function (iv)State function.

Section - C

26. (a) Compare the relative stabilities of O_2, O_2^+, O_2^- on the basis of Molecular Orbital Theory

(b) Define Bond order

OR

Calculate the standard enthalpy of formation of CH_3OH from the following data.

CH_3OH (l) + 2 O_2 (g) → CO_2 (g) + 2 H_2O (l) ($\Delta H = -726$ kJmpl^{-1})

C (graphite) + O_2 (g) → CO_2 (g) ($\Delta H = -393$ kJmol^{-1})

H_2 (g) + 2 O_2 (g) → H_2O (l) ($\Delta H = -286$ kJmol^{-1})

27. Define acidic buffer with an example and also explains buffer action with help of an acidic buffer.

Or

Calculate the concentration of H^+ ion in a mixture of 0.02 M Acetic acid (CH3COOH) and 0.1M sodium acetate (CH3COONa). Ka for CH_3OOH is 10^{-5}.

28. Balance the following redox reaction by half reaction method.

(b) Explain the following terms with examples (i) Chiral Centre.
(ii) Enantiomers.
(iii) Diastereomers.

OR

a) Explain the following term
(1) Work done in isothermal process (2) Hess's Law

(a) Explain born haber cycle with considering example of formation of $MgCl_2$ as given in the chemical reaction

$Mg\ (s) + Cl_2 \rightarrow MgCl_2\ (s)$

34. (1) Write the expression for the equilibrium constant, K_c for each of the following reactions:

(i) $2NOCl\ (g) \dashrightarrow 2NO\ (g) + Cl_2\ (g)$

(ii) $2Cu(NO3)_2(s) \dashrightarrow 2CuO\ (s) + 4NO_2\ (g) + O_2\ (g)$

34. Describe the effect of following on the equilibrium of the reaction:

$2H_2\ (g) + CO\ (g) \rightarrow CH_3OH\ (g)$

(a) addition of H_2
(b) addition of CH_3OH
(c) removal of CO
(d) addition of an inert material
(e) increase in temperature

OR

An organic substance containing carbon, hydrogen and oxygen gave following percentages:- C = 40.68%, H = 5.05%, O = 54.2%. The vapour density of the compound is 59. Calculate the molecular formula of the compound.

35. For the reaction $2A(g) + B(g) \rightarrow 2D(g)$

if standard change in internal energy for this reaction is -10.5 KJ and standard change in entropy is -44.1JK^{-1}. Calculate standard change in Gibbs free energy and predict whether reaction may occur spontaneously or not.

OR

$SO_2(g) + NO_2(g) \longleftrightarrow SO_3\ (g) + NO\ (g)$

The equilibrium constant for this reaction is 16. If one mole of each of four gases is enclosed in a vessel of volume 1L. Find the Equilibrium concentration of NO.

$Fe^{2+} + CrO7^{2-}$ ----------→ $Fe^{3+} + Cr^{3+}$

29. Write a short note on the following-

(a) Law of Reciprocal proportion.

(b) Tautomerism and Metamerism.

(c) Heisenberg's Uncertainty Principle and De Broglie concept.

30. Find the solubility and solubility product of $BaSO_4$ ($Ksp = 10^{-4}$) in

(a) water (b) 0.2 M $Ba(NO_3)_2$ solution.

Section - D

31. Hydronium ion concentration in molarity is more conveniently expressed on a logarithmic scale known as the pH scale. The pH of a solution is defined as the negative logarithm to base 10 of the activity (a_{H^+}) of hydrogen ion. In dilute solutions (< 0.01 M), activity of hydrogen ion (H^+) is equal in magnitude to molarity represented by $[H^+]$. It should be noted that activity has no units and is defined as:

$a_{H^+} = [H^+] / \text{mol } L^{-1}$

From the definition of pH, the following can be written,

$pH = -\log a_{H^+} = -\log \{[H^+] / \text{mol } L^{-1}\}$

a) Give an example of salt formed by reaction of a strong acid and weak base.

b) Give example of basic buffer solution.

c) Calculate the pH of a 0.001 M NaOH solution.

OR

Explain common ion effect with appropriate example.

32. We know that the complete address of electron is described by the set of four quantum no namely principal quantum no, Angular quantum no, magnetic quantum no and spin quantum no. these quantum numbers are also helpful to write the electronic configuration of the elements and also form the basis for classification of Elements in the periodic table.

Based on this case paragraph Answer the following question

(a) Name the quantum No which determine the shape of orbital

(b) Write the Electronic configuration of the Element Cr (Z=24)

(c) Explain the Extra stability of half filled and fully filled Electronic configurations of a subshell.

OR

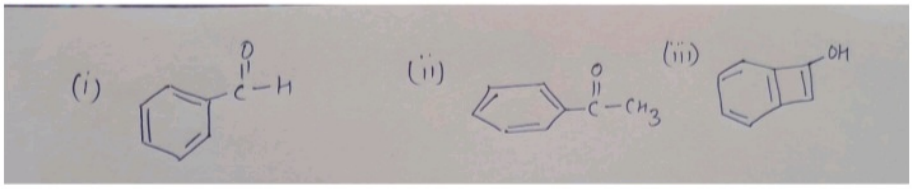
Calculate the number of electrons in Zn (Z=30) from the following data:

i) n=3, l=2, m_s= -1/2

ii) n=3, l=1, m_l=0

Section - E

33. (a) Out of the following compounds which shows tautomerism. If shown also explain the stability of the form formed.



Seven Star International School Bani
Class 11th
Subject: Chemistry

Max marks 70 **Time: 3 hours**

GENERAL INSTRUCTIONS:
Read the following instructions carefully.

(a) There are 35 questions in this question paper with internal choice.
(b) SECTION A consists of 18 multiple-choice questions carrying 1 mark each.
(c) SECTION B consists of 7 short answer questions carrying 2 marks each.
(d) SECTION C consists of 5 short answer questions carrying 3 marks each.
(e) SECTION D consists of 2 case - based questions carrying 4 marks each.
(f) SECTION E consists of 3 long answer questions carrying 5 marks each.
(g) All questions are compulsory.
(h) Use of log tables and calculators is not allowed.

SECTION - A

(MULTIPLE CHOICE QUESTIONS) **(One Marks only)**

1. What is the Mass percent of carbon in carbon-dioxide.
(a) 0.034 % (b) 27.27% (c) 3.4% (d) 28.7%

2. The set of quantum numbers not applicable for an electron in an atom is-
(a) n = 1, L = 1, m = 1, s = +1/2 (b) n = 1, L = 0, m = 0, s = +1/2
(c) n = 1, L = 0, m = 0, s = -1/2 (d) n = 2, L = 0, m = 0, s = +1/2

3. Law of Multiple proportion is illustrated by one of the following pairs-
(a) H_2S and SO_2 (b) NH_3 and NO_2.
(C) Na_2S and Na_2O (d) N_2O and NO.

4. Match the spectral lines in column I with its characteristics in column II

Column I	Column II
(A) Balmer series	**(p) Falls in infra region**
(B) Pfund series	**(q) involve jumps from higher orbits to to n=3**
(c) Brackett series	**(r) falls in visible region**
(d) Paschen Series	**(s) involve jumps from higher orbits to n=5**

(a) (A)-(r) , (B)- (p),(s), (C) -(p), (D)-(p),(q) (b) (A)-(r),(s), (B)- (s), (C)- (p),(q), (D)- (q)
(c) (A)-(s), (B)-(p), (C)-(r)(s), (D)-(s) (d) (A)- (r),(p) (B)- (q), (C)-(s) (D)- (r)

5. What is the order of electron affinity for following elements-
(a) O > Se > Te > S (b) S > Se > Te > O (c) O > Te > Se > S (d) Se > Te > S > O

6. Arrange the following elements in decreasing order of metallic characters. The correct order of the metallic character is
(a) Na > Be > Mg > P > Si (b) Na > Mg > Be> P > Si
(c) Na > Be > P > Mg > Si (d) Na > Mg > Be > Si > P

7. The shape of the XeF_2 is
(a) Tetrahedral (b) linear (c) octahedral (4) none of these

8. Which of the following molecule is polar and have zero dipole moment?

(i) CO_3^{2-} **(ii) XeF_2** **(iii) SO_2**

(a) (i) and (ii) (b) (ii) and (iii) (c) (i) and (iii) (d) (i), (ii) and (iii)

9. What is the oxidation state of Cr in CrO_5

(a) -6 (b) +12 (C) +6 (d) +4

10. The number of sigma and pi bond in $C_2(CN)_4$ are -

(a) 9 sigma & 9 pi (b) 9 sigma & 8 pi (c) 8 sigma & 8 pi (d) 8 sigma & 7 pi

11. The enthalpy of all the elements in their standard state are

(a) unity (b) zero (c) < zero (d) > zero

12. The conjugate base of H_2SO_4 is

(a) HSO_4^{-1} (b) HSO_4^{2-} (c) SO_4^{-2} (d) none of these

13. The pH of 0.0001 M HCl solution is

(a) 3 (b) 1 (c) 4 (d) 7

14. How many geometrical isomer are shown by CH3-CH=CH-CH=CH-CH=CH-CH3

(a) 8 (b) 4 (c) 6 (D) 2

The following questions form Q.15 to 18 given below consist of Assertion(A) and Reason (R) use the following key to select correct answer

(a) if both assertion and reason are correct and reason is the correct explanation of assertion .

(b) if both assertion and reason are correct and reason is not the correct explanation of assertion.

(c) if assertion is correct but a reason is incorrect.

(d) if assertion is false and reason is correct.

15. **Assertion :** In NH_3, N is sp^3 hybridised, but angle is found to be 107°.
Reason : The decrease in bond angle is due to repulsion between the lone pair.

16. Assertion: Kp can be less than, greater than or equal to Kc.
Reason: Relation between Kp and Kc depends on change in number of moles of gaseous reactants and products (delta ng)

17. Assertion: PCl_5 molecule has trigonal bipyramidal structure
Reason: The Hybridization of PCL_5 is sp^3d.

18. Assertion : Combustion of 16g of methane gives 18g of water.
Reason : In the Combustion of methane, water is one of product.

Section – B

19. (a) Why the 1st ionization energy of Na is less than 1st ionisation energy of Mg while 2nd I.E of Na is greater than 2nd I.E of Mg.

20. Yellow light emitted from a sodium lamp has a wavelength of 580nm. Calculate the frequency and wave number of the yellow light.

21. Explain the geometry of SF_6 Using concept of Hybridization.

22. Using Le-Chatelier's principle predict the effect of

a) decreasing the temperature

b) increasing the pressure on following Equilibrium

$N_2(g) + O_2(g) \longrightarrow 2NO(g) + \text{heat}$.