

II. Fill in the blanks by choosing the appropriate word from those given in the brackets: 1 x 5 = 5[Benzene, 2-methyl butane, sp^2 , zero, 1.6×10^{-4}]

16. 0.00016 can be expressed in scientific notation as _____
17. _____ is the type of hybridization of boron in BCl_3 .
18. Standard enthalpy of formation of an element is _____.
19. The IUPAC name of isopentane is _____.
20. The product formed when acetylene gas is passed through red hot iron is _____.

PART B**III. Answer any four of the following. Each question carries two marks. 2 x 4 = 8**

21. What amount of oxygen is liberated when 120 g of potassium chlorate undergoes thermal decomposition?
22. Write the relation between K_c and K_p . Give an example where $K_c = K_p$.
23. Write the molecular orbital configuration of O_2 .
24. Illustrate Hess's law with an example.
25. Write the electronic configuration of iron and copper.
26. Explain Friedel Craft's acylation of benzene.
27. Using suitable example explain hydrogenation of alkyne.
28. Calculate the oxidation number of Manganese in potassium permanganate.

PART C**IV. Answer any four of the following. Each question carries three marks 3 x 4 = 12**

29. a) Write the general outer electronic configuration of d-block elements
b) How does atomic radius vary across the period and down the group? (1+2)
30. a) Write the Lewis dot structure of carbonate ion and sulphuric acid.
b) Give an example of a molecule which exhibits intramolecular hydrogen bonding. (2+1)
31. Explain the formation of methane molecule based on hybridization. (2+1)
32. Explain the formation of H_2O molecule based on VSEPR theory. (3)
33. Balance the redox reaction by half reaction method in basic medium
 $I^- (aq) + MnO_4^- (aq) \rightarrow MnO_2 (s) + I_2$ (3)
34. a) Calculate the wave number and frequency of a light wave with wave length 5800A
b) Define threshold frequency. (2+1)
35. Mention any three postulates of Dalton's atomic theory. (3)
36. Give any three differences between BMO and ABMO (3)

PART-D**V. Answer any four of the following. Each question carries five marks. 5 x 4 = 20**

37. a) Calculate the molecular formula of a compound containing 4.07% hydrogen, 24.47% carbon and rest is chlorine, if molar mass of a compound is 98.96 g/mol.
b) Convert $27^\circ C$ to degree Fahrenheit. (3+2)
38. a) Explain emission spectrum of hydrogen and write the equation to calculate the wave number of spectral lines formed.
b) State Aufbau's principle. (4+1)
39. a) Explain the formation of Nitrogen molecule based on MOT.
b) Write all possible values of l and m if $n = 2$. (3+2)

40. a) Derive Ostwald dilution law for a weak acid .
b) What are buffer solutions? Give an example of basic buffer. (3+2)
41. a) How do you determine internal energy change by Bomb calorimeter?
b) Mention two criterias for a process to be spontaneous. (3+2)
42. a) Calculate the standard Enthalpy of formation of benzene. Given that enthalpy of combustion of carbon and hydrogen are -393.5kJmol^{-1} and -285.83kJmol^{-1} respectively.
b) State first law of thermodynamics and give its mathematical form. (3+2)
43. a) What are homogeneous and heterogeneous equilibria? Give an example.
b) For a reaction $2\text{NOCl} \leftrightarrow 2\text{NO} + \text{Cl}_2$, K_c is 3.75×10^{-6} at 1069K. Calculate K_p for the reaction (3+2)
44. a) Explain the effect of temperature and pressure on equilibrium for the formation of ammonia in Haber's process.
b) Calculate the pH of 0.001M KOH solution assuming it to undergo complete ionization at 25 C. (3+2)

VI. Answer any two of the following. Each question carries five marks**5 x 2= 10**

45. a) Write the principle and calculation involved in the estimation of nitrogen present in organic compound by Kjeldahl's method.
b) What is position isomerism? Give an example (3+2)
46. a) Explain the mechanism of chlorination of methane.
b) Give any two differences between inductive and mesomeric effect. (3+2)
47. a) Explain the formation of ethane by Kolbe's electrolysis method.
b) Give equation for the following conversions:
i) propene to 2-bromopropane
ii) benzene to chlorobenzene (3+2)
