

I PUC MID-TERM EXAMINATION OCT./NOV.-2024

SUBJECT : CHEMISTRY (34)

Time : 3 Hours

Max Marks : 70

PART-A

I Select the correct option from the given choices.

15x1=15

- The SI unit of electric current is
a) mole b) ampere c) candela d) Kelvin
- The number of moles of solute present in one litre of a solution is called
a) Molality b) Mole fraction c) Molarity d) Mass percent
- Highest number of molecules are present in
a) 22g of CO_2 gas b) 16g of O_2 gas c) 2g of H_2 gas d) 14g of N_2 gas
- Isobars in the following pairs is
a) $^{35}_{17}\text{Cl}$ and $^{37}_{17}\text{Cl}$ b) $^{14}_6\text{C}$ and $^{14}_7\text{N}$ c) $^{12}_6\text{C}$ and $^{13}_6\text{C}$ d) ^1_1H and ^2_1H

5. Match the items of column I and Column-II

Column-I

Column-II

(Atomic orbital)

(Number of angular nodes)

A) 2S

i) 2

B) 3P

ii) 3

C) 3d

iii) 1

D) 4f

iv) 0

a) A-i, B-iii, C-ii, D-iv

b) A-iv, B-iii, C-i, D-ii

c) A-iii, B-i, C-ii, D-iv

d) A-iii, B-ii, C-iv, D-i

6. C_p and C_v are related as

- a) $C_p - C_v = R$ b) $C_v - C_p = R$ c) $\frac{C_p}{C_v} = R$ d) $\frac{C_v}{C_p} = R$

7. For a spontaneous process

- a) $\Delta G = 0$ b) $\Delta G < 0$ c) $\Delta G > 0$ d) All of these

8. Basic oxide among the following is

- a) Na_2O b) Cl_2O_7 c) CO d) NO

9. Statement I : Diagonal relationship exist between certain pairs of diagonally adjacent elements in second and third periods of the period table

Statement II : Lithium and Magnesium shows diagonal relationship

- a) Both Statement I and II are correct
b) Both Statement I and II are incorrect
c) Statement I is correct but statement II is incorrect
d) Statement I is incorrect but statement II is correct

10. The valence shell electronic configuration of noble gases is

- a) ns^2np^3 b) ns^2np^4 c) ns^2np^5 d) ns^2np^6

11. The dipole moment is zero for

- a) H_2O b) HF c) BeF_2 d) NF_3

12. Intramolecular hydrogen bond is present in

- a) O-nitrophenol b) p-nitrophenol c) m-nitrophenol d) phenol

(P.T.O.)

13. Which of the following bond angle corresponds to sp^2 hybridization
a) 120° b) 180° c) 109.5° d) 104.5°
14. The first organic compound synthesised in the laboratory is
a) Methane b) Benzene c) Urea d) Acetic acid
15. Crude oil is separated into different fractions by
a) Steam distillation b) Fractional distillation
c) Sublimation d) Distillation under reduced pressure

II Fill in the blanks by choosing the appropriate word from those given in the brackets

5x1=5

(Chadwick, Cisplatin, trigonal pyramidal, less, free radicals, more)

16. _____ is used in cancer therapy.
17. Neutron was discovered by _____.
18. The energy of resonance hybrid is _____ than the energy of any single canonical structure.
19. Ammonia molecule has _____ shape.
20. Homolytic cleavage of covalent bond leads to the formation of _____.

PART-B

III Answer any FIVE of the following. Each question carries TWO marks

5x2=10

21. How many significant figures are there in
i) 0.00415
ii) 8.2105
22. Define isolated system. Give an example.
23. State Modern periodic law.
24. State Heisenberg Uncertainty principle.
25. Give any two differences between sigma and pi-bond.
26. Write the resonance structures of Ozone.
27. Name any two elements which are detected by Lassaigne's test.

PART-C

IV Answer any THREE of the following. Each question carries THREE marks. 3x3=09

28. Define Electronegativity. How does it vary across the period and down the group ?
29. Explain sp hybridization by taking $BeCl_2$ as an example.
30. a) Among $LiCl$ and $NaCl$, which one shows covalent character and why ? **2**
b) Give an example for polar molecule. **1**
31. For H_2 molecule :
i) Write the electronic configuration
ii) Calculate its bond order
iii) State its magnetic property.
32. Mention the shapes of following molecules based on VSEPR theory.
i) CH_4 ii) BCl_3 iii) SF_6

V Answer any THREE of the following. Each question carries THREE marks. 3x3=09

33. a) State law of multiple proportions. **2**
b) Define Limiting reagent. **1**
34. Give any three postulates of Bohr's model of an atom.
35. Write the significance of principal quantum number, Azimuthal quantum number and spin quantum number.
36. a) Define entropy. What is its value for a perfectly Crystalline solid ? **2**
b) Enthalpy is an extensive property. Give reason. **1**
37. a) State Hess' law of constant Heat summation. **2**
b) Write the mathematical form of first law of thermodynamics. **1**

(P.T.O.)

PART-D

- VI Answer any TWO of the following. Each question carries FIVE marks. 2x5=10**
38. a) Classify the following species into nucleophiles and electrophiles : BF_3 , Cl^- , H_2O 3
 b) What are heterocyclic compounds ? Give an example. 2
39. a) Which type of structural isomerism is shown by
 i) $\text{C}_2\text{H}_5\text{OH}$ and CH_3OCH_3
 ii) n-pentane and isopentane 2
 b) Give any two differences between inductive effect and electromeric effect. 2
 c) Which of the following group shows +R effect $-\text{COOH}$, $-\text{OH}$, $-\text{CHO}$ 1
40. a) For a compound $\text{HC} \equiv \text{C} - \text{CH} = \text{CH}_2$
 i) Calculate the number of σ and π bonds 2
 ii) Identify the type of hybridization of each carbon atom. 2
 iii) Write the bond line formula of the compound. 1
41. a) How do you detect the presence of carbon and hydrogen in an organic compound by copper oxide method ? 3
 b) Write the IUPAC names for the following compounds:
- i) $\text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{Cl}}{\text{C}}} - \text{CH}_3$ ii) $\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_3$ 2

PART-E (Numerical Problems)

- VII Answer any FOUR of the following. Each question carries THREE marks. 4x3=12**
42. An organic compound is found to contain 39.9% carbon, 6.7% hydrogen and the rest is oxygen. Determine the empirical formula of the compound.
 [Given : Atomic masses : H = 1u, C = 12u, O = 16u]
43. Calculate the mass percentage of Carbon, hydrogen and oxygen in glucose. ($\text{C}_6\text{H}_{12}\text{O}_6$)
 [Given : Atomic masses : H = 1u, C = 12u, O = 16u]
44. The Vividh Bharati station of All India Radio, Delhi, broadcasts on a frequency of 1,368 KHz (Kilo hertz). Calculate the wavelength of the electromagnetic radiation emitted by transmitter.
45. Calculate the wavenumber of the first spectral line of Lyman series of hydrogen spectrum.
 (Given : Rydberg constant (R) = $1.097 \times 10^7 \text{ m}^{-1}$)
46. 5 moles of an ideal gas undergoes a reversible and isothermal expansion from a volume of 5L to 20L at 300 K. Calculate the work done by the gas in this expansion.
 (Given : $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$)
47. Enthalpy of combustion of ethene (C_2H_4) at 300K and at constant volume is -1455 KJ . Calculate the enthalpy of combustion at constant pressure.
 (Given : $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$)
48. Calculate the enthalpy of formation of ethyl alcohol from the following data :
- $\text{C}_{(\text{s})} + \text{O}_{2(\text{g})} \rightarrow \text{CO}_{2(\text{g})} ; \Delta H = -393.5 \text{ KJ}$
- $\text{H}_{2(\text{g})} + \frac{1}{2} \text{O}_{2(\text{g})} \rightarrow \text{H}_2\text{O}_{(\text{l})} ; \Delta H = -285.8 \text{ kJ}$
- $\text{C}_2\text{H}_5\text{OH}_{(\text{l})} + 3\text{O}_{2(\text{g})} \rightarrow 2\text{CO}_{2(\text{g})} + 3\text{H}_2\text{O}_{(\text{l})} ; \Delta H = -1367 \text{ kJ}$
