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Grade : XI	Subject : Chemistry	Name:
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General Instructions:

- All questions are compulsory.
- This question paper has four sections: Section A, Section B, Section C and Section D.
- Section A contains **one** mark question each, section B contains questions of **two** marks each, section C contains questions of **three** marks each, section D contains questions of **five** marks each.

SECTION – A

- A gaseous hydrocarbon gives upon combustion 0.72 g of water and 3.08 g of CO₂. The empirical formula of the hydrocarbon is: [IIT-JEE Mains 2013]
 - C₂H₄
 - C₃H₄
 - C₆H₅
 - C₇H₈
- The volume of oxygen evolved at STP, by decomposition of 0.68 g '20 volume' hydrogen peroxide solution, is
 - 2.24 mL
 - 22.4 mL
 - 224 mL
 - 2240 mL
- The system that contains the maximum number of atoms is [WBJEEM 2014]
 - 4.25 g of NH₃
 - 8 g of O₂
 - 2 g of H₂
 - 4 g of He
- 10 g of a mixture of BaO and CaO requires 100 cm³ of 2.5 M HCl to react completely. The percentage of calcium oxide in the mixture is approximately (Given: molar mass of BaO = 153) [Karnataka CET 2014]
 - 52.6
 - 55.1
 - 44.9
 - 47.4
- The molarity of a solution obtained by mixing 750 mL of 0.5(M) HCl with 250 mL of 2(M) HCl will be : [IIT-JEE Mains 2013]
 - 0.875 M
 - 1.00 M
 - 1.75 M
 - 0.975 M
- The oxide of a metal contains 40% of oxygen. The valency of metal is 2. What is the atomic weight of the metal? [EAMCET 2014]
 - 24
 - 13
 - 40
 - 36

7. The number of water molecules is maximum in [AIPMT 2015]
- 18 gram of water
 - 18 moles of water
 - 18 molecules of water
 - 1.8 gram of water
8. The de Broglie wavelength of a ball of mass 10g moving with a velocity of 10 ms^{-1} is ($h = 6.626 \times 10^{-34} \text{ Js}$)
- $6.626 \times 10^{-33} \text{ m}$
 - $6.626 \times 10^{-29} \text{ m}$
 - $6.626 \times 10^{-31} \text{ m}$
 - $6.626 \times 10^{-36} \text{ m}$
9. Given: The mass of electron is $9.11 \times 10^{-31} \text{ kg}$, Planck constant is $6.626 \times 10^{-34} \text{ J}$, the uncertainty involved in the measurement of velocity within a distance of 0.1 \AA is
- $5.79 \times 10^8 \text{ m s}^{-1}$
 - $5.79 \times 10^5 \text{ m s}^{-1}$
 - $5.79 \times 10^6 \text{ m s}^{-1}$
 - $5.79 \times 10^7 \text{ m s}^{-1}$
10. The electronic configuration, $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$, represents a
- Metal atom
 - Non-metal atom
 - Non-metallic anion
 - Metallic cation
11. Which of the following sets of quantum numbers represents the highest energy of an atom?
- $n=0, l=0, m=0, s=+1/2$
 - $n=3, l=1, m=1, s=+1/2$
 - $n=3, l=2, m=1, s=+1/2$
 - $n=4, l=0, m=0, s=+1/2$
12. What is the maximum number of electrons in an orbital which has the following quantum numbers; $n = 4, m_l = +1$?
- 4
 - 15
 - 3
 - 2
13. The sp^3 hybridization of central atom of a molecule would lead to
- Square planar geometry
 - Tetrahedral geometry
 - Trigonal bipyramidal geometry
 - Both a and b
14. Which of the following group consists entirely of inert gas?
- 18
 - 2
 - 14
 - 15
15. During the formation of a chemical bond [Karnataka CET 2007]
- energy decreases
 - energy increases
 - energy of the system does not change
 - electron-electron repulsion becomes more than the nucleus-electron attraction
16. AZT (azidothymidine) is used for victims of _____.
17. Medicines used to reduce tension are called _____.
18. Elements which possess the characteristics of metals as well as non-metals are called _____.
19. 1 yoctometre is _____ m whereas 1 yottametre is _____ m.
20. The number of significant figures present in 0.0200 is _____ whereas number of significant figures in a dozen (12) is _____.
21. The number of molecules present in 1 kg mole is _____.
22. The number of atoms present in one molecule of a substance is called its _____.
23. The normality of 500 mL of 0.2M sulphuric acid is _____.
24. The amount of oxalic acid $(\text{COOH})_2 \cdot 2\text{H}_2\text{O}$ in grams required to prepare 200 mL of 0.5 M oxalic acid solution is _____.
25. On mixing two reactants, the substance that reacts completely is called _____ whereas the other is called _____.
26. Proton was discovered by _____.

27. Balmer series of the hydrogen spectrum lies in the _____ region.
28. According to Heisenberg's uncertainty principle, the product of uncertainty in position and uncertainty in momentum should be \geq _____.
29. The quantum number which tells about the orientation of different orbitals of an atom is called _____.
30. The number of spherical nodes and planar nodes present in $4d_{x^2-y^2}$ are _____ and _____ respectively.

SECTION-B

31. a) Define mole fraction.
b) What is the relationship between wavelength and the momentum?
32. What do you mean by electron affinity and electronegativity?
33. What is formal charge? Calculate the formal charge of 'O' atom present in O_3 molecule.
34. Which of the following species will have the largest and the smallest size?
Mg, Mg^{2+} , Al, Al^{3+}
35. Calculate the amount of carbon dioxide that could be produced when
i. 1 mole of carbon is burnt in air. ii. 1 mole of carbon is burnt in 16 g of dioxygen.
36. Write the state of hybridization of carbon in the following compounds and shapes of each of the molecules.
i. CH_3F ii. $HC \equiv N$
37. (i) An atomic orbital has $n=3$. What are the possible values of l and m_l ?
(ii) List the quantum numbers (m_l and l) of electrons for 3d orbital.
(iii) Which of the following orbitals are possible? 1p, 2s, 2p and 3f.
38. A golf ball has a mass of 40 g, and a speed of 45 m s^{-1} . If the speed can be measured within accuracy of 2%. Calculate the uncertainty in the position.
39. How are 0.50 mol Na_2CO_3 and 0.50M Na_2CO_3 different?

SECTION-C

40. List the differences between a sigma and a pi bond. (atleast 3 points)
41. Describe the hybridisation in case of PCl_5 . Why are the axial bonds longer as compared to equatorial bonds?
42. Write the important conditions required for the linear combination of atomic orbitals to form molecular orbitals.
43. (a) Dinitrogen and dihydrogen react with each other to produce ammonia according to the following chemical equation: $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
(i) Calculate the mass of ammonia produced if $2.00 \times 10^3\text{ g}$ dinitrogen reacts with $1.00 \times 10^3\text{ g}$ dihydrogen.
(ii) Will any one of the two reactants remain unreacted?
(iii) If yes, which one and what would be its mass?
44. (a) What is ionization enthalpy?
(b) Among the second period elements, the actual ionization energies are in the order: $Li < Be < C < O < N < F < Ne$. Explain why
(i) Be has higher $\Delta_i H$ than B
(ii) O has lower $\Delta_i H$ than N and F?

SECTION-D

45. What is meant by the term bond order? Calculate the bond order of O_2^- and draw M.O. diagram of O_2^- molecule and determine its magnetic property.
46. What are the laws of Chemical Combination? Discuss any 4 laws in detail.