

GURU GOBIND SINGH PUBLIC SCHOOL
SECTOR-V, B.S.CITY, BOKARO
CLASS-XI, CHEMISTRY
LEVEL -1

[1] Some Basic Concepts of Chemistry

1. Define followings:-
 - (i) Law of constant proportion.
 - (ii) Law of multiple proportion
 - (iii) Avogadro's law
 - (iv) Limiting reactant & excess reagent
 - (v) Atomic mass, molecular mass & mols.
2. (i) 50 kg of $N_2(g)$, and 10 kg $H_2(g)$ are mixed to produce $NH_3(g)$ calculate the $NH_3(g)$. Formed Identify the limiting reactant.
(ii) Calculate Molarity of NaOH in the solution prepared by dissolving its 4g in enough water to form 250ml of solution.
3. (i) Define Empirical molecular formula.
(ii) A compound containing 4.07% of hydrogen. 24.27% carbon and 71.65% Chlorine. Its molar mass is 98.96 g. What are its empirical & molecular formulas?

[2] Atomic Structure

4. State following:-
 - (i) Aufbau principle. Pauli exclusion principle. Hund's rule of Maximum multiplicity.
 - (ii) Heisenberg uncertainty principle.
 - (iii) Photoelectric effect.
 - (iv) Atomic number and mass number
 - (v) Isobar and Isotone.
5. (i) Write electronic configuration of followings :-
Fe, Cu, Cu^+ , Cu^{2+} , Mn, Cr
(ii) Write all four quantum number of last electron
In case of O, N, S, P
6. (i) Calculate energy of one mole of photon of radiation. Whose frequency is $5 \times 10^{14} Hz$.
(ii) A 100 Watt bulb emits monochromatic light of wavelength 400 nm. Calculate the number of photons emitted per second by bulb.
7. (i) What are the frequency and wavelength of a photon emitted during a transition from $n=5$ to the $n=2$ state in the hydrogen atom?
(ii) Calculate the energy associated with the first orbit of H. What is the radius of this orbit?

[3] Classification of elements and periodicity in properties

8. Explain following:-
 - (i) Modern periodic law.
 - (ii) Atomic & Ionic radius
 - (iii) Ionization enthalpy
 - (iv) Electron gain enthalpy

- (v) Electron negativity
9. (i) How would you justify the presence of 18 elements in the 5th period of the periodic table 1.
- (ii) The element Z=115, 116, 117 and 120. In which Family, group & period would you place these elements.
- (iii) Which of the following has largest and smallest size? Mg, Mg²⁺, Al, Al³⁺.
10. (i) Consider the following species :
N³⁻, O²⁻, F⁻, Na⁺, Mg²⁺ and Al³⁺
- (a) What is common in them?
- (b) Arrange them in increasing order of ionic radius.
- (ii) Consider following element
B, Be, B, C, N, O, F
- (a) Arrange them in increasing order of First ionization enthalpy.

[4] Chemical Bonding

11. Explain following:-
- (i) Octet rule
- (ii) Formation of different types of bond.
- (iii) Hybridisation.
- (iv) Intermolecular and Intramolecular Hydrogen bond.
- (v) Bond length, Bond angle, Bond enthalpy.
- (vi) Polar & Non-polar covalent bond.
12. (i) Draw the Lewis structures for the following
H₂S, CO₃²⁻, N₂SO₄, HNO₃
- (ii) Discuss the shape of following molecules using VS.E.P.R theory
BeCl₂, BCl₃, SiCl₄, PCl₅, SF₆
13. (i) Write the resonance structure for
SO₃, NO₂ and NO₃⁻
- (ii) Which hybrid orbitals are used by carbon atom in following Molecules
- (a) CH₃ – CH₃ (b) CH₃CH = CH₂ (c) CH₃CH₂ – OH
- (d) CH₃CHO (e) CH₃COOH
14. (i) Compare the relative stability of following species and indicate their magnetic properties
O₂, O₂⁺, O₂⁻ and O₂²⁻
- (ii) What is meant by term bond order?
Calculate the Bond order of N₂ N₂⁺ N₂⁻

[5] State of matter

15. State following:-
- (i) Boyle's Law
- (ii) Charles Law
- (iii) Avogadro's Law
- (iv) Ideal and real gas
- (v) Compressibility factor (z)
- (vi) Critical temperature, (T_c) critical pressure (P_c) and critical volume (V_c)

16. (i) What will be the pressure exerted by mixture of 3.2g of methane and 4.4 g of carbon dioxide in a 9 CM³ Flask of 27⁰C
(ii) What will be the minimum pressure require to compress 500 dm³ of air at 1 bar to 200 dm³ at 30⁰C.
17. (i) Write the Vanderwaal equation.
(ii) Explain the physical significance of Vanderwaal parameter.
(iii) Write the unit of Vanderwaal constant a & b.
18. Explain following:-
(i) System, Surrounding & Boundary
(ii) State Function & State Variables
(iii) Extensive & Intensive properties
(iv) Internal energy Enthalpy, Entropy
(v) Gibbs free energy change.
19. For a reaction at 298K.

$$2A + B \longrightarrow C$$

$$\Delta H = 400 \text{ KJ Mol}^{-1} \text{ and } \Delta S = 0.2 \text{ KJK}^{-1} \text{ Mol}^{-1}$$
At what temperature will the reaction become spontaneous range.
20. (i) Enthalpy of combustion of carbon to CO₂ is – 393.5 KJ Mol⁻¹.
Calculate the heat released upon formation of 35.2 g m² CO₂ from carbon & Di-Oxygen.
(ii) Enthalpies of formation of CO (g) , CO₂ (g) N₂O (g) & N₂O₄ (g) are -110, -393.81 and 9.7 KJ Mol⁻¹ respectively. Find the value of ΔH for the reaction:

$$\text{N}_2\text{O}_4(\text{g}) + 3\text{CO}(\text{g}) \longrightarrow \text{N}_2\text{O}(\text{g}) + 3\text{CO}_2(\text{g})$$