

GURU GOBIND SINGH PUBLIC SCHOOL
SECTOR – V, B. S. CITY, BOKARO

CLASS XI

CHEMISTRY

LEVEL – 2

1. SOME BASIC CONCEPT OF CHEMISTRY

- 1) Define Following :-
 - a) Atomic Mass
 - b) Average Atomic Mass
 - c) Molecular Mass
 - d) Formula Mass
 - e) Empirical Formula
- 2) Determine the Empirical Formula of an oxide of iron which has 69.9% iron and 30.1% dioxygen by mass.
- 3) How many significant figures are present in following :-
 - a) 0.0048
 - b) 234000
 - c) 8008
 - d) 500.0
 - e) 6.0012
- 4) Dinitrogen and dioxygen react with each other to produce ammonia according to the following equation:
 - a) Calculate the mass of ammonia produce if 2.000×10^3 g of dinitrogen react with 1.000×10^3 g of dihydrogen.
 - b) Will any of two reactant remain unreacted?
 - c) If yes which one and what would be its mass.
- 5) 18% glucose solution by mass has density 1.2 g ml^{-1} . Determine its molarity, Molality & mole fraction.
- 6) Calculate the concentration of Nitric acid in moles per liter in a sample which has density 1.41 g ml^{-1} and the mass % of Nitric acid in it being 69%.
- 7) Define following:-
 - i) Molarity
 - ii) Molality
 - iii) Mole Fraction
 - iv) P.P.M.
 - v) Limiting reactant
- 8)
 - i) What will be the mass of one Cl_2 atom in gram?
 - ii) Calculate mass % of different element in Na_2SO_4 .

2. SOME BASIC CONCEPT OF CHEMISTRY

- 9) STATE FOLLOWING:-
 - i) Aufbau Principle
 - ii) Pauli exclusion principle
 - iii) Hund's rule of maximum multiplicity
- 10) Write the electronic configuration of following:-
 - a) Sc (21)
 - b) Cr (24)
 - c) Cr^+
 - d) Fe (26)
 - e) Fe^{2+}
- 11) Write all four quantum of last electron of following:-
 - a) Mn (25)
 - b) Ca (20)
 - c) Cl (17)
 - d) Br (55)
 - e) Si (14)
- 12) Determine the mass and charge of one mole of
 - a) Electron
 - b) Proton
 - c) Neutron

- 13)
 - 1) Calculate number of protons, neutrons and electron in ${}_{35}^{80}\text{Br}$
 - 2) The number of electrons, protons and neutrons in a species are equal to 18, 16 and 16 respectively. Assign the symbol to the species.
- 14)
 - 1) Explain Photoelectric effect.
 - 2) The threshold frequency (ν_0) for a metal is $7.0 \times 10^{14} \text{ s}^{-1}$. Calculate the kinetic energy of an electron emitted when radiation of frequency $\nu = 1.0 \times 10^{15} \text{ s}^{-1}$ hits the metal.
- 15) What are the frequency and wavelength of a photon emitted during a transition from $n=5$ state to the $n=2$ state in the hydrogen atom.
- 16) A golf ball has mass of 40 g, and a speed of 45 m/s. If the speed can be measured within accuracy of 2%, calculate the uncertainty in position.
- 17) What is the total number of orbital's associated with the principle quantum number $n=3$?

3. CLASSIFICATION OF ELEMENTS & PERIODICITY IN PROPERTIES

- 18) Define following terms:-
 - i) Atomic & ionic radii
 - ii) Ionization enthalpy
 - iii) Electron gain enthalpy

- iv) Electronegativity
- 19) i) Determine family group and period of following element whose atomic number is 117, 120, 118.
- ii) Write the IUPAC name & symbol of the following element with atomic number:
 a) 101 b) 110 c) 117 d) 118
- 20) i) On the basis of quantum number justify the sixth period of periodic table should have 32 elements.
- ii) Write the atomic number of an element present in third period and seventeenth group of the periodic table.
- 21) i) Would you expect the first ionization enthalpies for two isotopes of the same element to be the same or different? Justify your answer.
- ii) Write in increasing order of first and second ionisation enthalpy of following:
 Li, B, Be, Cl, O, N, F, Ne
- 22) i) Would you expect the second electron gain enthalpy of oxygen as positive, more negative or less negative than first? Justify your answer.
- ii) Which of the following pairs of elements would have a more negative electron gain enthalpy?
 a) O .. F b) F .. Cl
- 23) What is the basis difference in approach between the Mendeleev's periodic law and modern periodic law?
- 24) What is the significance of the terms – isolated gaseous atom and ground state while defining the ionization enthalpy and electron gain enthalpy?
- 25) i) Which of the following species will have the largest and the smallest size?
 Mg, Mg²⁺, Al, Al³⁺
- ii) Consider the following species:
 N³⁻, O²⁻, F⁻, Na⁺, Mg²⁺, Al³⁺
- a) What is common in them?
 b) Arrange them in the order of increasing ionic radii.

4. CHEMICAL BONDING

- 26) i) Explain octet rule & its limitation.
- ii) Draw the Lewis structure of following:
 HNO₃, H₂SO₄, CO₃²⁻, NH₃, NH₄⁺
- 27) Explain the following type of bonds with example:
 i) Ionic bond ii) Covalent bond iii) Coordinate bond
- 28) i) Write the difference between sigma and pi bond.
- ii) Write the difference between polar and nonpolar covalent bond.
- 29) i) Define hydrogen bond. Is it weaker or stronger than the vander waals forces?
- ii) Explain intermolecular and intramolecular hydrogen bond with suitable example.
- 30) What is meant by term bond order? Calculate the bond order of:
 N₂, O₂, O₂⁺, O₂⁻
- 31) Compare the relative stability of the following species and indicate their magnetic properties. - O₂, O₂⁺, O₂⁻, O₂²⁻
- 32) i) What is meant by hybridisation of atomic orbitals?
- ii) Describe the shape of Sp, Sp², Sp³ hybrid orbital.
- iii) Depict orbital diagram of: CH₄, C₂H₄, C₂H₂
- 33) Determine the shape of following species on the basis of V.S.E.P.R. theory.
 NH₃, H₂O, SF₄, XeF₄, XeOF₂
- 34) i) Explain resonance with suitable example.
- ii) Write the resonance structure for SO₃, NO₂, NO₃⁻, CO₃²⁻

5. STATE OF MATTER

- 35) Explain following with graph:
 i) Boyle's law ii) Charle's law iii) Avogad's law
 iv) Gay Lussac's law v) Ideal & nonideal gas
- 36) i) Define Dalton's law of partial pressure.
- ii) What will be the pressure exerted by mixture of 3.2 g of Methane and 4.4 g of Carbon dioxide contained in a 9 dm³ of flask of 27°C.

- 37) Explain kinetic molecular theory of gases.
- 38) Define following:
- Compressibility factor (C)
 - Critical temperature (T_c)
 - Critical pressure (P_c)
 - Critical volume (V_c)
 - Boyle's temperature
- 39) i) Explain the physical significance of Nanderwall parameter.
ii) Write the unit of Vander waal constant a and b.
- 40) Define surface tension and viscosity. Explain their variation with temperature.
- 41) Calculate the temperature of 4.0 mol of gas occupying 5 dm³ at 3.32 bar ($R=0.083 \text{ bar dm}^{-3} \text{ K}^{-1} \text{ mol}^{-1}$).
- 42) The drain cleaner, Drainx contains small bits of aluminium which react with castic soda to produce dihydrogen. What volume of dihydrogen at 20°C and 1 bar will be released when 0.15 g of aluminium react.
6. THERMODYNAMICS
- 43) Define following:
- System & surrounding
 - Intensive & Extensive properties
 - Reversible & Irreversible process
 - State Function
- 44) i) Define Hess law.
ii) Entalpis of formation of – CO (g), CO₂ (g), N₂O (g) and N₂O₄ (g) are -110, -393.81 and 9.7 KJmol⁻¹ respectively. Find the value of $\Delta_r H$ for the reaction.
$$\text{N}_2\text{O}_4 (\text{g}) + 3\text{Co} (\text{g}) \rightarrow \text{N}_2\text{O} (\text{g}) + 3\text{Co}_2 (\text{g})$$
- 45) Enthalpy of neutralisation of a 1g equivalent of strong acid and strong base is always constant. Why?
- 46) For the reaction at 298 k –
$$2\text{A} + \text{B} \rightarrow \text{C}$$

 $\Delta H = 400 \text{ KJ mol}^{-1}$ and $\Delta S = 0.2 \text{ KJ mol}^{-1}$.
At what temperature will the reaction become spontaneous considering ΔH & ΔS to be constant over the temperature range.
- 47) Calculate the enthalpy change on freezing of 1.0 mol of water at 10°C to ice at -100°C,
 $\Delta_{fus}H = 6.03 \text{ KJmol}^{-1}$ at 0°C.
 $C_p[\text{H}_2\text{O} (1)] = 75.3 \text{ J mol}^{-1} \text{ K}^{-1}$
 $C_p[\text{H}_2\text{O} (8)] = 36.8 \text{ J mol}^{-1} \text{ K}^{-1}$
- 48) The equilibrium constant for a reaction is 10. What will be the value of $\Delta G^{(-)}$?
($R= 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$, $T = 300\text{k}$)
- 49) Calculate the entropy change in surroundings when 1.00 mol of H₂O (1) is formed under standard conditions. $\Delta_f H^{(-)} = -286 \text{ KJ mol}^{-1}$.
- 50) Given-
 $\text{N}_2 (\text{g}) + 3\text{H}_2 (\text{g}) \rightarrow 2\text{NH}_3 (\text{g}); \Delta_r H^{(-)} = -92.4 \text{ KJ mol}^{-1}$. What is the standard enthalpy of formation of NH₃ gas?