

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

CLASS XI

1. SOME BASIC CONCEPT OF CHEMISTRY

- 1) Determine the Empirical Formula of an oxide of iron which has 69.9% iron and 30.1% dioxygen by mass.
- 2) How many nitrogen and dioxygen react with each other to produce ammonia according to the Habbers process
  - a) Calculate the mass of ammonia produce if  $2.000 \times 10^3$  g of dinitrogen react with  $1.000 \times 10^3$  g of dihydrogen.
  - b) Will any of two reactant remain unreacted?
  - c) If yes which one and what would be its mass.
- 3) 18% glucose solution by mass has density  $1.2 \text{ g ml}^{-1}$ . Determine its molarity, Molality & mole fraction.
- 4) Calculate the concentration of Nitric acid in moles per liter in a sample which has density  $1.41 \text{ g ml}^{-1}$  and the mass % of Nitric acid in it being 69%.
- 5) Define following:-
  - i) Molarity
  - ii) Molality
  - iii) Mole Fraction
  - iv) P.P.M.
  - v) Limiting reactant
- 6)
  - i) What will be the mass of one  $\text{Cl}_2$  atom in gram?
  - ii) Calculate mass % of different element in  $\text{Na}_2\text{SO}_4$ .
- 7) (i) 50 kg of  $\text{N}_2(\text{g})$ , and 10 kg  $\text{H}_2(\text{g})$  are mixed to produce  $\text{NH}_3(\text{g})$  calculate the  $\text{NH}_3(\text{g})$ . 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.
- 8) (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 & molar formulas?

2. ATOMIC STRUCTURE

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)  $\text{Cr}^+$       d) Fe (26)      e)  $\text{Fe}^{2+}$
- 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) 1) Explain Photoelectric effect.  
2) The threshold frequency ( $\nu_0$ ) 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.
- 13) 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.
- 14) 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.
- 15) What is the total number of orbital's associated with the principle quantum number  $n=3$ ?
- 16) (i) Calculate energy of one mole of photon of radiation. Whose frequency is  $5 \times 10^{14} \text{ Hz}$ .  
(ii) A 100 Watt bulb emits monochromatic light of wavelength 400 nm. Calculate the Number of Photos emitted Per second by bulb.
- 17) (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 & 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 basic 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, Mg<sup>2+</sup>, Al, Al<sup>3+</sup>

26) Consider the following species: N<sup>3-</sup>, O<sup>2-</sup>, F<sup>-</sup>, Na<sup>+</sup>, Mg<sup>2+</sup>, Al<sup>3+</sup>

a) What is common in them?

b) Arrange them in the order of increasing ionic radii.

27) i) How would you justify the presence of 18 elements in the 5<sup>th</sup> period of the periodic table

ii) Consider following element B, Be, B, C, N, O, F

Arrange them in increasing order of First ionization enthalpy.

### 4 CHEMICAL BONDING

28) Explain octet rule & its limitation.

ii) Draw the Lewis structure of following:



29) Explain the following type of bonds with example:

- i) Ionic bond      ii) Covalent bond      iii) Coordinate bond

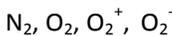
i) Write the difference between sigma and pi bond.

ii) Write the difference between polar and nonpolar covalent bond.

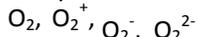
30) Define hydrogen bond. Is it weaker or stronger than the vander waals forces?

ii) Explain intermolecular and intramolecular hydrogen bond with suitable example.

31) What is meant by term bond order? Calculate the bond order of:



32) Compare the relative stability of the following species and indicate their magnetic properties. -



33) i) What is meant by hybridisation of atomic orbitals?

- ii) Describe the shape of  $sp$ ,  $sp^2$ ,  $sp^3$  hybrid orbital.
- 34) Depict orbital diagram of:  $CH_4$ ,  $C_2H_4$ ,  $C_2H_2$
- 35) Determine the shape of following species on the basis of V.S.E.P.R. theory.  
 $NH_3$ ,  $H_2O$ ,  $SF_4$ ,  $XeF_4$ ,  $XeOF_2$
- 36) i) Explain resonance with suitable example.  
 ii) Write the resonance structure for  $SO_3$ ,  $NO_2$ ,  $NO_3^-$ ,  $CO_3^{2-}$
- 37) Explain following:-  
 (i) Octet rule  
 (ii) Formation of different types of bond.  
 (iii) Intermolecular and Intra molecular Hydrogen bond. (iv) Polar & Non-polar covalent bond.

#### 4. STATE OF MATTER

38) Explain following with graph:

- (i) Boyle's law (ii) Charles's law  
 (iii) Avogadro's law (iv) Gay Lussac's law  
 (v) Ideal & nonideal gas

39) 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  $9 \text{ dm}^3$  of flask of  $27^\circ\text{C}$ .

40) Explain kinetic molecular theory of gases.

41) Define following:

- ii) Compressibility factor (C)  
 iii) Critical temperature ( $T_c$ )  
 iv) Critical pressure ( $P_c$ )  
 v) Critical volume ( $V_c$ )  
 vi) Boyle's temperature

42) i) Explain the physical significance of Vanderwaal parameter.

ii) Write the unit of Vanderwaal constant a and b.

43) Define surface tension and viscosity. Explain their variation with temperature.

44) Calculate the temperature of 4.0 mol of gas occupying  $5 \text{ dm}^3$  at 3.32 bar ( $R=0.083 \text{ bar dm}^{-3} \text{ K}^{-1} \text{ mol}^{-1}$ ).

The drain cleaner, Drainx contains small bits of aluminium which react with caustic soda to produce dihydrogen. What volume of dihydrogen at  $20^\circ\text{C}$  and 1 bar will be released when 0.15 g of aluminium react.

45) In terms of Charles's law explain why  $-273^\circ\text{C}$  is the lowest possible temperature.

46) What would be the S.I unit for the quantity  $PV^2T^2/n$ ?

47) A mixture of dihydrogen and dioxygen at one bar pressure contain 20% by weight of dihydrogen. Calculate the partial pressure of dihydrogen.

48) Critical temperature for  $CO_2$  and  $CH_4$  are  $31.1^\circ\text{C}$  and  $-81.9^\circ\text{C}$  respectively. Which of these has stronger intermolecular force?

49) 0.5 ml of phosphorus vapour weigh 0.0625g at  $546^\circ\text{C}$  and 0.1 bar pressure. What is the molar mass of phosphorus?

50) What is the increase in volume when the temperature of 800 ml of air increase from  $27^\circ\text{C}$  to  $47^\circ\text{C}$  under constant pressure of 1 bar?