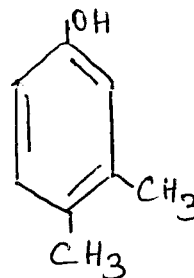


- 15) Although both CO_2 and H_2O are triatomic molecules, the shape of H_2O molecule is bent while that of CO_2 is linear. Explain this on the basis of dipole moment. 2

OR

Besides tetrahedral geometry, another possible geometry of CH_4 is square planar with four H atoms along the corners of the square and C atom at the centre. Why CH_4 can't adopt square planar geometry?

- 16) Give IUPAC name for the followings: 2



- 17) 2
- State Pauli's exclusion principle.
 - How many electrons in an atom can have the following quantum numbers?
 $n = 3, l = 1$ $n = 3, l = 2, m_l = 0$

- 18) The first ionization enthalpy values (kJ/mole) of group 13 elements are 2

B	Al	Ga	In	Tl
801	577	579	558	589

How would you account for the deviation in the trend?

- 19) 2
- Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800 \AA . Calculate threshold frequency (ν_0) and work function (W_0) of the metal. 2
 - Write the electronic configuration of the element Chromium. 1

- 20) 2
- Describe the hybridisation in case of PCl_5 . Why are the axial bonds longer as compared to equatorial bonds? 2
 - Write the favourable factors for the formation of an ionic bond. 1

- 21) 1 1/2
- Describe the shape of orbitals whose "l" value = 1. 1 1/2
 - Which orbitals get filled first 3d or 4s and why? 1 1/2

- 22) 3
- What is meant by bond order? Draw molecular orbital energy diagram for N_2 . Calculate the bond order and compare its stability with N_2^+ .

OR

- Compare the relative stability of the following species and indicate their magnetic Properties: O_2 , O_2^+ , O_2^- (superoxide), O_2^{2-} (peroxide).

- 23)
- The density of 3 M solution of NaCl is 1.25 g mL^{-1} . Calculate the molality of the solution. 2
 - What is the mole fraction of the solute in 2.5m aqueous solution? 1
- 24)
- A golf ball has a mass of 40g, and a speed of 45 m/s. If the speed can be measured within accuracy of 2%, calculate the uncertainty in the position. 2
 - Write Rydberg equation for Balmer series. 1
- 25)
- Predict the shapes of the molecules using VSEPR theory
 ClF_3 , SF_4 , PH_3 , XeF_4 2
 - Arrange the bonds in order of increasing ionic character in the molecules:
 LiF , K_2O , N_2 , SO_2 and ClF_3 . 1
- 26)
- What is limiting reagent? 1
 - Calcium carbonate reacts with aqueous HCl to give CaCl_2 and CO_2 according to the reaction,
 $\text{CaCO}_3 (\text{s}) + 2 \text{HCl} (\text{aq}) \rightarrow \text{CaCl}_2 (\text{aq}) + \text{CO}_2 (\text{g}) + \text{H}_2\text{O} (\text{l})$
 What mass of CaCO_3 is required to react completely with 25 mL of 0.75 M HCl? 2
- 27)
- Ar , K^+ , S^{2-} , Ca^{2+} , Cl^-
 What is common in them? Arrange them in ascending order of their size. $1_{1/2}$
 - Would you expect the first ionization enthalpies for two isotopes of the same element to be the same or different? Justify your answer. $1_{1/2}$
- 28)
- How would you explain the fact that the first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium? 2
 - Why do elements in the same group have similar physical and chemical properties? 1
 - Explain why chlorine has more negative electron gain enthalpy value than fluorine? 1
 - Place the following elements in the correct order of their nonmetallic characters
 B , N , C , F and Si . 1

OR

- Describe the theory associated with the radius of an atom as it
 - Gains an electron
 - loses an electron 2
- Identify the element which is likely to be
 - a non metal
 - an alkaline earth metal
 - an alkali metal 3
 Justify your answer with reason from the ionization enthalpy values given below:

KJ/mol	A	B	C
I.E(1)	408	550	1140
I.E (2)	2640	1060	2080

- 29)
- a) Explain the shape of the ethyne molecule on the basis of hybridization. 2
 - b) Write any two differences between sigma and pi bonds. 2
 - c) What is hydrogen bonding? Give an example. 1

OR

- a) Using molecular orbital theory explain why He_2 molecule does not exist? 1
- b) Which out of NF_3 and NH_3 has higher dipole moment and why? 2
- c) Explain the formation of H_2 molecule on the basis of valence bond theory. 2

- 30)
- a) Write any two properties of cathode rays. 1
 - b) Why are Bohr's orbits called stationary states? 1
 - c) The electron energy in hydrogen atom is given by $E_n = (-2.18 \times 10^{-18})/n^2$ J. Calculate the energy required to remove an electron from the $n = 2$ orbit. What should be the wavelength that can be used to cause this transition? ($h = 6.626 \times 10^{-34}$ Js, $c = 3 \times 10^8$ m/s.) 2
 - d) What is an orbital? 1

OR

- a) Show that the circumference of the Bohr orbit for the hydrogen atom is an integral multiple of the de – Broglie wave length associated with the electron revolving around it. 2
- b) Why half-filled and completely filled orbitals are highly stable? 1
- c) Define Photo electric effect. 1
- d) How many nodal surfaces are in (i) "1s" orbital (ii) "2s" orbital? 1