



- Q7. A vessel of 120ml capacity contains a certain amount of gas at  $35^{\circ}\text{C}$  and 1.2 bar pressure. The gas is transferred to another vessel of volume 180ml at  $35^{\circ}$ . What would be its pressure?
- Q8. Calculate the molarity of NaOH in the solution prepared by dissolving its 4g in enough water to form 250ml of the solution.
- Q9. Using s,p,d notations, describe the orbital with the following quantum numbers.  
(a)  $n=1, l=0$                       (b)  $n=3, l=1$                       (c)  $n=4, l=2$                       (d)  $n=4, l=3$
- Q10. Use molecular orbital theory to explain why the  $\text{Be}_2$  molecule does not exist?
- Q11. Explain the structure of  $\text{CO}_3^{2-}$  ion in terms of resonance.
- Q12. Consider the following species.  
 $\text{N}^{3-}, \text{O}^{2-}, \text{F}^{-}, \text{Na}^{+}, \text{Mg}^{2+} \text{ \& } \text{Al}^{3+}$
- (a) What is common in them?  
(b) Arrange them in the order of increasing ionic radii.
- (c) Define the term used for such species.
- Q13. 50kg of  $\text{N}_2$  & 10kg of  $\text{H}_2$  are mixed to produce  $\text{NH}_3$ . Calculate the amount of  $\text{NH}_3$  formed. Identify the limiting reagent in the production of  $\text{NH}_3$  in this situation.
- Q14. What are the frequency and wavelength of a photon emitted during a transition from  $n=5$  state to  $n=2$  state in the hydrogen atom?

- Q15. An element with mass no 81 contains 31.7% more neutrons as compared to proton. Assign a symbol to the element.
- Q16. Compare the relative stability of following species and indicate their magnetic properties.  
 $O_2$ ,  $O_2^+$ ,  $O_2^-$  (Superoxide)  $O_2^{2-}$  (Peroxide).
- Q17. Calculate the volume occupied by 8.8g of  $CO_2$  at  $31.1^\circ C$  and 1bar pressure.  $R=0.083 \text{ bar L K}^{-1} \text{ mol}^{-1}$ .
- Q18. Calculate wave number and frequency of yellow radiation having wavelength 5800 Armstrong.
- Q19. Write short note on:-  
(a) Photoelectric effect  
(b) Heisenberg's uncertainty principle.
- Q20. Write short note on:-  
(a) Hund's Rule of maximum multiplicity.  
(b) Pauli's exclusion principle.
- Q21. Describe the hybridization in case of  $PCl_5$ . Why are the axial bonds longer as compared to equatorial bonds?
- Q22. The density of 3M solution of NaCl is 1.25g/ml. Calculate the molality of the solution.
- Q23. Sohan told Mohan that Mathura refinery near Agra is responsible for yellowing of marble of Taj Mahal. Mohan said how it is possible. The refinery is located at a distance. Then Sohan explained all the reactions involved.

- (a) What are the values associated with Sohan?
- (b) What could be Sohan's explanation?
- (c) What is Global Warming?
- (d) What is Smog?

Q24. A compound contains 4.07% hydrogen, 24.27% carbon & 71.65% chlorine. Its molar mass is 98.96g. What are the empirical & molecular formulas?

Or

A welding fuel gas contains carbon & hydrogen only. Burning a small sample of it in oxygen gives 3.38g of  $\text{CO}_2$ , 0.690g of water and no other products. A volume of 10.0L (measured at STP) of this welding gas is found to weigh 11.6g. Calculate (i) Empirical Formula (ii) Molar mass of the gas (iii) Molecular formula.

Q25. Explain  $\text{sp}^3$  hybridization in methane.

(b) Explain why cations are smaller and anions larger in radii than their parent atoms?

Or

(a) Explain  $\text{sp}^2$  hybridisation in ethane.

(b) Define Ionization enthalpy & list the factors on which it depends.

Q26. A neon-dioxygen mixture contains 70.6g dioxygen & 167.5g neon. If pressure of the mixture of gases in the cylinder is 25bar. What is the partial pressure of dioxygen & neon in the mixture.

Or

**Pay** load is defined as the difference between the mass of displaced and mass of the balloon. Calculate the pay load when a balloon of radius 10m, mass 100kg is filled with Helium at 1.66 bar at  $27^\circ\text{C}$ .

(Density of air =  $1.2\text{kg m}^{-3}$  &  $R = 0.083\text{ bar dm}^3\text{K}^{-1}\text{mol}^{-1}$ )