

H II

I term exam (2016-17)

Time : 3 hours

Maximum Marks : 70

General Instructions :

1. All questions are compulsory.
2. Question no. 1 to 5 carry 1 mark each. Answer in around one line.
3. Question no. 6 to 10 carry 2 marks each. Answer in around 30 words.
4. Question no. 11 to 22 carry 3 marks each. Answer in around 40 words.
5. Question no. 23 is value based question carrying 4 marks.
6. Question no. 24 to 26 carry 5 marks each. Answer in around 70 words.

Use log tables if necessary, use of calculators is not allowed.

Q1. What is the effect of temperature on molality?

Q2. Define Charles's law, giving its graphical representation.

Q3. Write the Lewis dot structure of O_2 and CO_2 .

Q4. Write the electronic configuration of Cr and F^- .

Q5. What are degenerate orbitals?

Q6. Calculate the number of significant figures in

- i) 0.00580
- ii) 2.6×1.05

Q7. What is meant by 'Polar Covalent Bond'? Give suitable example.

Q8. In each of the following pairs, which of the following has a smaller size and why?

- i) Mg or Mg^{2+}
- ii) O^2- or F^-

Q9. i) What property of molecules of real gases is indicated by Vander waal's constant 'b'?

ii) Under what conditions do real gases tend to show ideal gas behaviour?

Q10. If an electron is moving with a velocity 600 m/s which is accurate up to 0.005%, then calculate the uncertainty in its position. [$h = 6.626 \times 10^{-34}$ Js and mass of electron = 9.11×10^{-31} kg]

OR

Calculate the energy and radius associated with the second orbit of Li^{2+}

Q11. i) Although fluorine is more electronegative than nitrogen, why the resultant dipole moment of NH_3 is greater than that of NF_3 .

ii) Under what conditions is it easier to form an ionic bond?

Q12. What is the wavelength of light emitted when the electron in a hydrogen atom undergoes transition from an energy level with $n=4$ to $n=2$?

Q13. i) What is the hybridization of Cl in case of ClF_3 ? What should be the position of lone pairs?

ii) Why are the axial bonds longer as compared to equatorial bonds?

Q14. Explain the following, giving examples

- i) Hund's rule
- ii) Heisenberg's uncertainty principle
- iii) Black body radiation

Q15. i) Why are tyres of automobiles inflated to lesser pressure, in summer than in winter?

ii) Mention the two assumptions of kinetic theory of gases that do not hold good.

Q16. Calculate the molarity of a solution of ethanol in water in which the mole fraction of ethanol is 0.40.

Q17. i) Differentiate between σ and π bond.

ii) Draw the molecular orbital diagram of N_2 molecule. Calculate the bond order.

Q18. What is resonance? Draw all the possible resonating structures of CO_3^{2-} . Calculate formal charge on all the three oxygen atoms.

Q19. i) An atomic orbital has $n=4$. What are the possible values of m_l and l ?

- ii) Using s, p, d, f notations, describe the orbital with following quantum numbers : i) $n=2, l=1$
ii) $n=4, l=0$

iii) An atom has 29 protons and 35 neutrons. What are the number of electrons and write the electronic configuration of the element.

Q20. The density of 3 M solution of NaCl is 1.25 g ml^{-1} . Calculate molality and normality of the solution.

Q21. What is the empirical formula of a compound which has the following percentage composition: Carbon 80%, Hydrogen 20%? If the molecular mass is 30, calculate its molecular formula

Q22. i) What is photoelectric effect?

ii) Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800 \AA . Calculate threshold frequency and work function of the metal.

OR

- i) Calculate (a) wavenumber and (b) frequency of yellow radiation having wavelength 5800 \AA .
- ii) What is the difference between absorption and emission spectra?

Q23. Industrial wastes and effluents is one of the major reason for global warming. Different measures are being taken to check the pollution of atmosphere and environment. Write a brief note about the consequences of pollution caused by industries and what measures can be taken to control it and create more awareness.

Q24. Explain Rutherford's alpha particle scattering experiment with the help of labeled diagram.

OR

Define ionization enthalpy. How does it vary in a group and a period. Discuss the factors that influence the magnitude of ionization enthalpy.

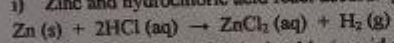
Q25. What is a limiting reagent? In the following chemical reaction



- Calculate the mass of ammonia produced if 4.00 Kg dinitrogen reacts with 2.00 Kg of dihydrogen.
- Will any of the two reactants remain unreacted?
- If yes, what is its amount left?

OR

i) Zinc and hydrochloric acid react according to the reaction



If 0.30mol Zn are added to hydrochloric acid containing 0.52mol of HCl, how many moles of H_2 are produced?

ii) Two bulbs A and B of equal capacity contain 10g oxygen (O_2) and ozone (O_3) respectively. Which will have greater number of oxygen atoms and which will have greater number of molecules?

Q26. i) With the help of gas laws, deduce an expression for the ideal gas equation.

ii) Calculate the total pressure in a mixture of 8.0 g of oxygen and 4.0 g of hydrogen confined in a vessel of 1 dm^3 at 27°C . $R = 0.083 \text{ bar dm}^3 \text{ K}^{-1} \text{ mol}^{-1}$.

OR

i) Compressibility factor (Z) of a gas is given as $Z = \frac{pV}{nRT}$

- What is the value of Z for an ideal gas?
- For real gas, what will be effect of value of Z above Boyle temperature?

- Why is it not possible to cool a gas to a temperature of absolute zero (0°K)?
- What is Boyle's law. Give its mathematical and graphical representation.

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