First Terminal Examination 2014-2015

Chemistry

Class-XI

Time: 3 Hours

Maximum Marks: 70

Instructions:

- (i) All questions are compulsory.
- (ii) Questions 1-5 carry 1 mark each.
- (iii) Questions 6-10 carry 2 marks each.
- (iv) Questions 11-22 carry 3 marks each.
- (v) Questions 23 carries 4 marks.
- (vi) Ouestions 24-26 carry 5 marks each.
- Out of molarity and molality which changes with temperature and why?
- 12. Name the orbitals with the following quantum numbers :

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- (i) n=2, l=1, 2 p
- (ii) n = 4, l = 0 45
- 3. Write the electronic configuration of Cu⁺ ion (Atomic number of Cu = 29)
- The 4f subshell of an atom contains 9 electrons. What is the maximum number of electrons having spin in the same direction?
- Why Bohr's orbits are also called stationary states?
- Arrange O²⁻, F⁻ and Ne in increasing order of radius. Justify your answer.
- Explain why chlorine can be converted into chloride ion more easily as compared to fluoride ion from fluorine.
- Explain why IE₁ of Mg is more than Na while IE₂ of Na is more than Mg?
- 9. X belongs to group II and Y belongs to group XV of periodic table. What is the formula of the compound formed by them?
 - (6) IE₁ of Ga is more than expected why?
- 10. (a) What is the basic difference between electron gain enthalpy and electronegativity?

- Do you agree with the statement that electronegativity of nitrogen is 3.0 in all the nitrogen compounds. Justify your answer.
- 11. Would you expect the second electron gain enthalpy of O as positive, more negative or less negative than the first. Justify your answer.
 - (b) Why IE₁ of Be is higher than that of B?
- 12. If the density of methanol is 0.793 kg l⁻¹? What is its volume needed for making 2.5 litres of its 0.25 M solution.
 - (b) How many moles of carbon atoms are present in 2 moles of C₂H₆.
- Calculate the mass of Ca₃(PO₄)₂ formed when 1.11 g of CaCl₂ is reacted with 20 ml of 2 MH₃PO₄ solution. What is the limiting reagent? How much of the limiting reagent is left?

$$3\text{CaCl}_2 + 2\text{H}_3\text{PO}_4 \longrightarrow \text{Ca}_3(\text{PO}_4)_2 + 6\text{HCl}$$

(Ca = 40, Cl = 35.5, P = 31, O = 16)

- 14. (a) Calculate the molarity of a 2 molal aqueous H₂SO₄ solution. Density 1.5 g ml⁻¹.
 - What is the mole fraction of water and NaCl in 2.0 molar aqueous solution of NaCl. Density is 1.2 g ml^{-1} (Na = 23, H = 1, O = 16)
- 20.0 g of impure CaCO₃ reacted completely with excess of HCl to produce 5.0 g CO₂.

 What is the % purity of CaCO₃.
- 17. (a) Why half filled and completely filled orbitals are associated with extra stability.
 - (b) Define and explain Aufbaus principle with examples.
- Why is the electronic configuration of oxygen $1s^2 2s^2 2p_x^2 2p_y^1 2p_z^1$ and not $1s^2 2s^2 2p_x^2 2p_y^2$. Name and state the rule.
 - (b) How many nodes are presentation 3p orbitals?
- 19. (a) Draw and explain the shape of ethene molecule (orbital overlap diagram).
 - (b) What is the hybridisation of carbon in ethane and ethyne molecule.
- 20. Find bond order of molecular species O_2, O_2^- and O_2^+ . Arrange them in the order of their stability.
- 21. (a) Why NF₃ is pyramidal while BF₃ is triangular planar.
 - (b) Why H₂O is a liquid while H₂S is a gas?

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(b) How many σ and π-bonds are present in CH₃—C—OH molecule? What human value can be associated with (i) ionic bond (ii) covalent bond What is the change in hybridisation of B and N in $BF_3 + NH_3 \longrightarrow F_3B \rightarrow NH_3$ (Initial and final) Although geometries of H2O and NH3 are distorted tetrahedra but bond angle in H₂O is smaller than NH₃, why. (a) Qut of NH3 and NF3 which is more polar and why? 24. Write four differences between bonding molecular orbitals and antibonding molecular orbitals. Draw the shapes of $\sigma_2 p_2$ and $\sigma_2 p_2$ orbitals. 25. (a) What difference in observations would be observed in Rutherford's experiment if instead of gold foil, an aluminium foil is used. What is the wavelength of the light emitted when the electron in a hydrogen atom undergoes transition from n = 4 to n = 2? What do you observe on heating an iron rod for short intervals of time and for longer duration? How does it prove particle nature of radiation? 26. L(a) Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800 Å (1 Å = 10^{-10} m). Calculate the work function and the threshold frequency. • Write the electronic configuration of phosphorus (At. No. 15). Write value of n, l, mquantum numbers for the unpaired electrons. Chemistry / Class-

(a) Draw Lewis dot structure of CO₃²⁻ ion with resonating structures.

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