

First Term Exam – 2017-2018

Class – XI

Subject – CHEMISTRY

Time: 3 Hours

Max. Marks: 70

1. Out of molarity and molality which is a better method for finding out the concentration of a solution and why? [1]
2. What are the values of l and m for $2s$ orbital? [1]
3. Name an element that shows diagonal relationship with magnesium? [1]
4. Why are electron gain enthalpies of Be and Mg positive? [1]
5. Why is the size of a noble gas atom larger than preceding halogen atom? [1]
6. Hydrogen gas is prepared in the laboratory by reacting dilute HCl with granulated zinc. Following reaction takes place: $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
Calculate the volume of hydrogen gas liberated at STP when 32.65g of zinc reacts with HCl . Atomic mass of $Zn=65.3u$ [2]
7. In the reaction $2A + 4B \rightarrow 3C + 4D$, when 5 moles of A react with 6 moles of B , then
a) What is the limiting reagent?
b) Calculate the amount of C formed. [2]
8. If the concentration of glucose ($C_6H_{12}O_6$) in blood is $0.9gL^{-1}$, what will be the molarity of glucose in blood?

OR

9. What is the concentration of sugar ($C_{12}H_{22}O_{11}$) in $molL^{-1}$ if its 20g are dissolved in enough water to make a final volume up to 2L? [2]
- Give reasons:
- a) Ice floats on the surface of water.
b) The dipole moment of NH_3 is higher than NF_3 . [2]
10. What is a disproportionation reaction? Give one example. [2]
11. Commercially available nitric acid (HNO_3) is 69% by mass. Calculate the molarity of the solution if its density is $1.41g/mL$. Given Atomic mass ($N=14, H=1, O=16$) [2]

12. a) What is photoelectric effect? Why does photoelectric effect require a certain minimum frequency to occur?
b) Draw the shape of dx^2-y^2 orbital

OR

State:

- i) Aufbau's principle
ii) Pauli's exclusion principle
iii) Hund's Rule of maximum multiplicity. [3]
13. a) Name the series of lines in emission spectrum of hydrogen that is obtained due to electronic transition from outer orbits to second orbit.
b) Give reasons for extra stability of half filled and fully filled configuration [1+2]
14. The velocity associated with a proton moving in a potential difference of 1000V is $4.37 \times 10^5 \text{ ms}^{-1}$. If the hockey ball of mass 0.1 kg is moving with this velocity, calculate the wavelength associated with this velocity. [3]

15. a) What is meant by electronegativity of an element?
b) The electron affinity of chlorine is more than that of fluorine. Give reasons [1+]

16. a) Arrange the following species in the order of increasing ionic radii
 $K^+, S^{2-}, Cl^-, Ca^{2+}$
b) The first ionization enthalpy values of group 13 elements are:
- | | | | | |
|-----|-----|-----|-----|-----|
| B | Al | Ga | In | Tl |
| 801 | 577 | 579 | 558 | 589 |

How would you explain this deviation from the general trend?

17. Draw the shapes of following molecules on the basis of VSEPR theory :

- a) H_2O
b) ClF_3
c) SF_6

18. Give reasons:

- a) CO_2 is a linear molecule but SO_2 has a bent shape

- b) Although geometries of both NH_3 and H_2O molecules are distorted tetrahedral, bond angle in water is less than that in ammonia
- c) He_2 does not exist but He_2^+ exists

OR

- a) Draw the resonating structure for nitrate ion.
- b) Write the hybridization and shape of XeF_4 molecule
- c) Arrange the following in the increasing order of covalent character: CsCl , CsI , CsF , CsBr [3]
19. (a) CCl_4 is non polar inspite of the presence of polar bonds. Why?
- (b) Explain why PCl_5 is a highly reactive molecule?

OR

- (a) Differentiate between intermolecular and intra molecular hydrogen bonding with examples. 5 1
- (b) Find the formal charge on the carbon atom of carbonate (CO_3^{2-}) ion. [2+1]
20. Calculate the total pressure in a mixture of 8g of dioxygen and 4g of dihydrogen confined in a vessel of 1dm^3 at 27 degree Celsius. ($R=0.082\text{ bar dm}^3\text{ K}^{-1}\text{ mol}^{-1}$) [3]
21. Balance the following equation by the half reaction method in acidic medium:
- $$\text{Fe}^{2+} + \text{Cr}_2\text{O}_7^{2-} \rightarrow \text{Fe}^{3+} + \text{Cr}^{3+}$$
- [3]
22. a) Write the oxidation number of the underlined elements in the given compounds:
- KMn O_4
- HO O_2
- b) Consider the elements: Cs, Ne, I and F
- i) Identify the element that exhibits only negative oxidation state
- ii) Identify the element that exhibits only positive oxidation state [3]

Geeta Devi is a poor tribal woman living in the hills and her husband Suresh is a daily wager. It takes her too long to cook vegetables in an open utensil and as a result her husband gets late to work. One day her husband bought her a pressure cooker. Geeta Devi found that the vegetables cooked faster in a cooker and her

husband could leave on time. Also she could do more household chores in lesser time. As a student of chemistry answer the following questions:

- (i) Why the vegetables take lesser time to cook in a pressure cooker?
 (ii) What are the values associated with Suresh's decision to buy a pressure cooker? [4]
24. (a) What is the number of photons of light with a wavelength of 4000nm that provide 1J of energy?
 (b) A photon of wavelength 4×10^{-7} m strikes on metal surface, the work function of the metal being 2.13eV. Calculate i) the energy of the photon (eV) ii) the kinetic energy of the emission and iii) the velocity of the photoelectron ($1\text{eV} = 1.6 \times 10^{-19}\text{J}$) [2+3]

OR

- (a) Calculate the wavenumber for the longest wavelength transition in the Balmer series of atomic hydrogen.
 (b) A golf ball has a mass of 40g and a speed of 45m/s. If the speed can be measured within accuracy of 2%, calculate the uncertainty in the position? ($h = 6.626 \times 10^{-34}\text{Js}$) [3+2]
25. Draw the molecular orbital diagram for O_2 molecule.
 (i) Calculate its bond order
 (ii) Predict its magnetic behavior. [3+1+1]

OR

Draw the molecular orbital diagram for N_2 . Explain with the help of bond order why the bond dissociation energy of N_2 is higher than N_2^{+} ? [3+2]

26. a) Critical temperature for CO_2 and CH_4 are 31.1 and -81.9 degree Celsius respectively. Which of these have stronger intermolecular forces and why?
 b) At 25 degree Celsius and 760 mm of pressure a gas occupies 600 ml volume. What will be its pressure at a height where temperature is 10 degree Celsius and volume of the gas is 640 ml? [OR]
 (b) Density of a gas is found to be 5.46 g/dm^3 at 27 degree Celsius at 2 bar pressure. What will be the density at STP? [2+3]

(a) (i) Are highly of gas (ii) SI units

