

**FIRST TERMINAL EXAMINATION**  
**CLASS—XI CHEMISTRY- (JUNE-2014)**

**SET - A**

**TIME: 3 HOURS**

**MAX.MARKS:70**

**General Instructions:**

1. All questions are compulsory.
2. Question nos.1 to 5 are very short answer questions and carry 1 mark each.
3. Question nos. 6 to 10 are short answer questions and carry 2 marks each.
4. Question nos.11 to 22 are short answer questions and carry 3 marks each.
5. Question no. 23 is a value based question carrying 4 marks.
6. Question nos.24, 25 & 26 are long answer questions and carry 5 marks each.
7. Use log tables if necessary.

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|---|---|---|
| 1 | How many sigma ( $\sigma$ ) and pi ( $\pi$ ) bonds are present in benzene?  | 1 |
| 2 | Write the general electronic configuration of f – block elements.   | 1 |
| 3 | State Avogadro law.   | 1 |
| 4 | What is diagonal relationship?  | 1 |
| 5 | Write the electronic configuration of Copper (Atomic number - 29).  | 1 |
| 6 | (a) How many electrons in an atom may have the following quantum numbers?<br>$n = 4 ; m_s = -\frac{1}{2}$   | 2 |
|   | (b) What is the total number of orbitals associated with Principal quantum number:<br>$n = 3$ ?   |   |
| 7 | (a) Write the hybridization states of each Carbon atoms in $\text{CH}_3\text{COCH}_3$ .<br>(b) Write the bond line formula for 3-ethyl-2,3-dimethylpentane.   | 2 |
| 8 | Explain why:<br>(i) Be has a higher ionization enthalpy than B.<br>(ii) The electron gain enthalpy of Fluorine is less negative compared to that of Chlorine. | 2 |

OR

What is the difference between electronegativity and electron gain enthalpy?

- 9 (a) What are electrophiles? Give an example.

- (b) Categorise the following molecules or ions as nucleophile and electrophile. 2  
 $\text{OH}^-$ ,  $\text{BF}_3$ ,  $\text{NH}_3$ ,  $\text{NO}_2^+$ .
- 10 Explain the shape of the following compounds using VSEPR theory: 2  
 (a)  $\text{SF}_4$  (b)  $\text{BCl}_3$
- 11 (a) State and explain the law of multiple proportion. 3  
 (b) How many atoms of Calcium are there in 2g of Calcium? (Atomic mass of Calcium - 40)
- 12 (a) Explain with the help of a suitable example: polar covalent bond. 3  
 (b) Draw the Lewis dot structure of Carbon monoxide.  
 (c)  $\text{H}_2\text{S}$  is a gas while  $\text{H}_2\text{O}$  is a liquid. Why?
- 13 (a) Give the IUPAC name of the following compounds: 3  
 (i)  $\text{CH}\equiv\text{C}-\text{CH}=\text{CH}-\text{CH}=\text{CH}_2$   
 (ii)  $(\text{CH}_3)_3\text{C}-\text{CH}(\text{CH}_3)-\text{CH}(\text{I})-\text{CH}_2-\text{CH}_3$   
 (b) Write the structural formula of 4-Chloro pent - 2 -ene
- 14 (a) Draw the shape of 'p' orbitals. 3  
 (b) The mass of an electron is  $9.1 \times 10^{-31}$  kg. If its kinetic energy is  $3.0 \times 10^{-25}$  J, calculate its wavelength. ( $h = 6.6 \times 10^{-34}$  Js)
- 15 (a) What is limiting reagent? 3  
 (b) Calcium Carbonate reacts with aqueous HCl to give  $\text{CaCl}_2$  and  $\text{CO}_2$  according to the reaction:
- $$\text{CaCO}_3(\text{s}) + 2 \text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$$
- What mass of  $\text{CaCO}_3$  is required to react completely with 25 ml of 0.75 M HCl?  
 ( Atomic masses : Ca = 40 u, Cl = 35.5 u, H = 1 u, C = 12 u, O = 16 u )
- 16 (a) Describe the postulates of Bohr's model of an atom. 3  
 (b) Write Bohr – frequency rule
- 17 (a) Describe the hybridization in the case of  $\text{PCl}_5$ . 3  
 (b) Why are axial bonds longer than the equatorial bonds in  $\text{PCl}_5$ .
- 18 (a) Account for the following: 3  
 Dipole moment of Ammonia is more than that of  $\text{NF}_3$ .  
 (b) Write the favorable factors for the formation of an ionic compound.  
 (c) Although the geometries of Ammonia and water molecules are distorted tetrahedral, the bond angle in water is less than that of Ammonia. Discuss.
- 19 (a) Explain the important aspects of resonance with reference to the  $\text{CO}_3^{2-}$  ion. 3  
 (b) Define resonance energy.
- 20 (i) Consider the following species: 3  
 $\text{N}^{3-}$ ,  $\text{O}^{2-}$ ,  $\text{F}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$  and  $\text{Al}^{3+}$   
 (a) What is common in them?  
 (b) Arrange them in the order of increasing ionic radii.  
 (ii) How would you justify the presence of 18 elements in fifth period of the periodic

table?

OR

(a) The first ionization enthalpy values (in KJ/mol) of group 13 elements are

B	Al	Ga	In	Tl
801	577	579	558	589

How would you explain this deviation from general trend?

(b) 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?

(c) Assign the position of elements having outer electronic configuration:

$ns^2 np^4$  for  $n=3$

- 21 (a) State: 3
- (i) Hund's rule of maximum multiplicity.
  - (ii) Pauli exclusion principle.
- (b) Why are half filled orbitals more stable than other orbitals?
- 22 (a) What are carbocations? Give example. 3
- (b) Explain chain isomerism with an example.
- (c) Identify the type of isomerism shown by the compound with molecular formula  $C_2H_6O$ .
- 23 Chemical reactivity of elements is highest at the two extremes of a period and is lowest at the centre. Highly reactive elements do not occur in nature in free state, they usually occur in combined state. Two students, whose roll numbers are 87 and 119, are highly aggressive and keep on fighting with each other like highly reactive elements. Some students are sober and help each other and do not fight. 4
- (a) What is the IUPAC name and symbol of the element having atomic number 119?
  - (b) Element having atomic number 87 belongs to which block elements?
  - (c) What values are possessed by sober people?
  - (d) Which kind of people pick up fight, while driving on the road in case of accidents? What are its consequences? What should we do?
- 24 (a) Describe LCAO method for the formation of bonding and anti – bonding molecular orbital. 5
- (b) Compare the relative stabilities of the following species and indicate the magnetic properties of  $O_2, O_2^+, O_2^-, O_2^{2-}$ .
- (c) Write the important conditions required for the linear combination of atomic orbitals to form molecular orbitals.

(OR)

- (a) Explain the formation of hydrogen molecule on the basis of valence bond theory.
- (b) What are the differences between  $\sigma$  and  $\pi$  bonds?

(c) Draw the diagram showing the formation of double bonds in  $C_2H_4$  molecule.

25 (a) State and explain Heisenberg's Uncertainty principle.

(b) A golf ball has a mass of 40 g and a speed of 45 m/s. If the speed can be measured within the accuracy of 2%, calculate the uncertainty in position.

(c) What is photoelectric effect?

(OR)

(a) What are the frequency and wave length of a photon emitted during a transition from  $n=5$  state to the  $n=2$  state in the hydrogen atom? 5

(b) What are the limitations of Rutherford's model of an atom?

(c) Write any two properties of cathode rays.

26 (a) Define molality.

(b) Which is more concentrated 1M or 1m, why?

(c) Concentrated  $H_2SO_4$  is 98 % weight and has density  $1.84 \text{ g / cm}^3$ . What volume of concentrated acid is required to make 5L of 0.50 M  $H_2SO_4$ ? (molar mass of sulphuric acid = 98 u).

(OR)

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(a) What is empirical formula?

(b) A compound contains 24.27% Carbon, 4.07% Hydrogen and 71.65% Chlorine.

Determine its molecular formula if its molecular weight is 99 u.

( Atomic weight of C = 12 u, H = 1 u and Cl = 35.5 u )

(c) Boron occurs in the nature in the form of two isotopes:  $^{11}_5B$  and  $^{10}_5B$  in the ratio 81% and 19% respectively. Calculate its average atomic mass.

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