

**SHRI S.H.KELKAR COLLEGE OF ARTS, COMMERCE AND SCIENCE, DEVGAD.  
(SINDHUDURG)**

**F.Y.B.Sc. SEMESTER I EXAMINATION NOVEMBER 2023**

**COURSE: General Chemistry I**

**COURSE CODE – USCH101**

**TIME :**

**MAX. MARKS:100**

**SET 1**

**DURATION: 3 HOURS**

- N.B.**
1. All the questions are compulsory
  2. Figures to the right indicates fullmarks
  3. The use of log table/Programmable calculators are allowed.
  4. Answers for the same question should be written together.

**Q. 1) (A) Select the correct option and complete the following statement. (12)**

- 1) For exothermic reaction, enthalpy change is.....  
a) negative                      b) positive                      c) zero
- 2) Molar heat capacity is.....  
a) extensive property              b) intensive property              c) colligative property
- 3) 1ppm solution of KCl contain.....  
a) 1mg of KCl per  $\text{dm}^3$               b) 1g of KCl per  $\text{dm}^3$               c) 1 $\mu\text{g}$  of KCl per  $\text{dm}^3$
- 4) State functions are.....  
a) path functions                      b) inexact differential                      c) path independent
- 5) According to modern periodic law, properties of elements are periodic functions of their.....  
a) atomic weight                      b) atomic number                      c) atomic mass
- 6) The shape of P orbital is.....  
a) dumb shape                      b) oval                      c) four leaf clover
- 7) 3 s-orbital has.....radial nodes.  
a) zero                      b) one                      c) two
- 8) Angular momentum of electron is define by.....quantum number  
a) n                      b) m                      c) l
- 9) ..... bond is formed by end to end or linear overlap of two orbital.  
a) sigma                      b) pi                      c) coordinate
- 10) Double bond between two carbon atoms suggest that the parent chain is .....  
a) alkane                      b) alkene                      c) alkyne
- 11) Bond axis is shown to link ..... of the two atoms.  
a) orbits                      b) nuclei                      c) electron
- 12) ..... is a non-polar molecule.  
a)  $\text{CCl}_4$                       b) HCl                      c)  $\text{H}_2\text{O}$

**(B) State whether following statements are True or False**

**(03)**

- 1) For endothermic reaction, enthalpy change is negative
- 2) In Lyman series of hydrogen spectrum, the value of  $n_1$  is one
- 3) When alkyl group binds to doubly bonded carbon atom it tends to increase the stability of alkenes.

**(C) Match the following columns**

**(05)**

**Column A**

- 1) Density
- 2) ppm in inner
- 3) f-block elements
- 4) inductive
- 5) Dipole

**Column B**

- Debye unit  
saturated compound  
intensive property  
transition elements  
1 part in  $10^6$  parts of solution

**Q. 2) Attempt any FOUR of the following.**

**(20)**

A) State and explain first law of thermodynamic, give its mathematical expression and explain terms involve in it.

**(5)**

B)(i) Give objective and limitations of thermodynamics

**(3)**

(ii) Define: Boundary and Extensive property

**(2)**

C) Explain following terms with example (i) Open system (ii) Isolated system (iii) Isothermal system (iv) Cyclic process (v) Exothermic and Endothermic system

**(5)**

D) (i) Describe enthalpy of combustion, explain its application

**(3)**

(ii) Explain with example: State function and Mole fraction

**(2)**

E)(i) Define Normality, Molarity, Mole fraction

**(3)**

(ii) To prepare 0.5 N NaOH for 500 cm<sup>3</sup> how much gm of NaOH is used

**(2)**

F)(i) 4.2 gm of oxalic acid dissolved in water to make 250 cm<sup>3</sup> solution, calculate molarity, normality of solution

**(3)**

(ii) Define: Formality and Molality

**(2)**

**Q. 3) Attempt any FOUR of the following.**

**(20)**

A) State postulates of Bohr's atomic model and discuss any two limitations

**(5)**

B) Why did Rutherford model fail to explain stability of atom

**(5)**

C) State Aufbau principle. What is mean by electron spin?

**(5)**

D) Define modern periodic law, explain briefly classification of elements

**(5)**

E) What is mean by atomic radius? Explain its variation in across the period and down the group

**(5)**

F) (i) Explain the term ionization enthalpy

**(2)**

(ii) Calculate effective nuclear charge experienced by 3d electron in zinc (At. No.30)

**(3)**

**Q. 4) Attempt any FOUR of the following.**

**(20)**

A) Draw the structure of the following compounds from the names given.

i. propane -1,3- dioic acid ii). But-1-en-3-yne iii) oct-2-en-1-al iv) pentane-1,3-diol

v) 1- methoxy-3-nitropropane.

(5)

B) Write a detail note on  $sp^3$  hybridisation.

(5)

C) What is resonance? Give the conditions necessary for the resonance.

(5)

D) What do you mean by formation of bonds? On the basis of their orientation of atomic orbital axis explain a) sigma bond b) pi bond

(5)

E) Explain Lowry-Bronsted concept of acid and bases.

(5)

F) Define dipole moment and explain the dipole nature of Methyl Chloride and Carbon tetrachloride.

(5)

**Q. 5) Attempt any FOUR of the following.**

**(20)**

A) Derive Kirchhoff's equation.

(5)

B) 25 gm of ethyl alcohol dissolved in 54 gm of water, calculate mole fraction of both

(5)

C) State and explain Heisenberg uncertainty principle

(5)

D) Derive and explain de Broglie wave equation

(5)

E) Distinguish between electrophilicity and acidity.

F) Write suitable IUPAC names of the following compounds whose structure are given

