

M.Sc Part - I  
**Sem.-II**  
Physical Chemistry  
Paper –I  
Sample Questions

**Unit-I, Chemical Thermodynamics - II**

1. The phosphate groups used during glycolysis are \_\_\_\_\_
  - a) Organic
  - b) Inorganic
  - c) Neutral
  - d) None
  
2. For endoergic reaction, the sum of  $\Delta G^0$  value of final Product is ----- the sum of  $\Delta G^0$  value of initial reactant .
  - a) Less than
  - b) More than
  - c) Equal to
  - d) Is not related to
  
3. Expression for Pressure difference along the curved surface is given by -----
  - a) Laplace Equation.
  - b) Kelvin's equation
  - c) Kirchoff's equation
  - d) Vander Waal's equation
  
4. According to ----- postulates, the adsorbed molecules can hold other gas molecules by Vander Waal forces so multilayer adsorption is possible.
  - a) Langmuir adsorption isotherm
  - b) BET adsorption isotherm
  - c) Freundlich adsorption isotherm
  - d) Atomic theory

5 ----- assumed that surface to be energetically homogeneous that is heat of adsorption is constant throughout.

- a) Langmuir adsorption isotherm
- b) BET adsorption isotherm
- c) Freundlich adsorption isotherm
- d) Atomic theory

6) In Kelvin equation, the term  $\gamma$  means -----

- a) Surface Tension
- b) Vapour Pressure
- c) Liquid molecular weight
- d) Temperature

7) Gain of electron is termed as-----

- a. Metabolism
- b. Cannibalism
- c. Oxidation
- d. Reduction

8) Gibbs-Duhem equation -----

- a) States that  $n_1 d\mu_1 + n_2 d\mu_2 + \dots n_j d\mu_j = 0$ , for a system of definite composition at constant temperature and pressure
- b) Applies only to binary systems
- c) Finds no application in gas-liquid equilibria involved in distillation
- d) None of these Answer:

9) For a multi-component system, the term chemical potential is equivalent to the-----

- a) Molal concentration difference
- b) Molar free energy
- c) Partial molar free energy
- d) Molar free energy change

10) If an ideal solution is formed by mixing two pure liquids in any proportion, then the \_\_\_\_\_ of mixing is zero

- a) Enthalpy
- b) Volume
- c) Both 'a' & 'b'
- d) Neither 'a' nor 'b' Answer: Option C

## Unit-2, Quantum Chemistry

- 1) For normalized wave function  $\psi \rightarrow 0$  as  $r \rightarrow \dots\dots$   
(a) 0 (b) 1 (c)  $\alpha$  (d) -1
- 2) The square of the magnitude of the wave function is called \_\_\_\_\_  
(a) current density (b) probability density (c) zero density (d) volume density
- 3) How many energy levels will be present in a linear conjugated polyene containing 3 carbon in  $\pi$ -system?  
(i) 2 (ii) 3 (iii) 4 (iv) one non degenerate energy level and one energy level having doubly degenerate energy state
- 4) Which of the following function is orthogonal to each other?  
(i)  $\int \psi_2 \psi_2 d\tau = 0$  (ii)  $\int \psi_1 \psi_2 d\tau = 0$  (iii)  $\int \psi_1 \psi_2 d\tau = 1$  (iv)  $\int \psi_2 \psi_2 d\tau = 1$ .
- 5) If the number of carbon atom in a  $\pi$ -system is 4 the secular determinant will be of the order  
(i) 2X2 (ii) 3X3 (iii) 4X4 (iv) can not be predicted without solveing .
- 6) Which of the following has zero delocalization energy?  
(i) benzene (ii) 1,3-butadiene (iii) cyclo butadiene (iv) cyclopentadiene
- 7) The  $\pi$ -bond energy of benzene is  
(i)  $8\beta$  (ii)  $-8\beta$  (iii)  $2\beta$  (iv)  $-2\beta$
- 8) Which of the following has two degenerate MO?  
(i) cyclo butadiene (ii) benzene (iii) cyclopropenyl cation (iv) (i) & (iii) both
- (9) How many angular nodes are present in the 5d orbital  
(i) 0 (ii) 1 (iii) 2 (iv) 4
- 10) Which of the following statement is correct?  
(i) The periodic time of a particle moving with simple harmonic motion is the time taken by a particle for one complete oscillation.  
(ii) The periodic time of a particle moving with simple harmonic motion is directly proportional to its angular velocity.  
(iii) The velocity of a particle moving with simple harmonic motion is zero at the mean position.  
(iv) The acceleration of the particle moving with simple harmonic motion is maximum at the mean position.

### Unit3---Chemical kinetics and molecular reaction dynamic

- 1) In non-competitive inhibition the quantity which remains same as the reaction proceed is.....
- a)  $V_{max}$    b)  $K_m$    c)  $K_a$    d)  $V_o$
- 2) Which of the following statements is true about uncompetitive inhibitors?
- a) They bind covalently at a site distinct from the substrate active site
- b) In the presence of a uncompetitive inhibitor, the Michaelis-Menten equation becomes  
$$V_0 = V_{max}[S]/\alpha K_m + [S]$$
- c) They increase the measured  $V_{max}$
- d) Apparent  $K_m$  also increases
- 3) A competitive inhibitor of an enzyme is usually-----
- a) a highly reactive compound
- b) a metal ion such as  $Hg^{2+}$  or  $Pb^{2+}$
- c) structurally similar to the substrate.
- d) water insoluble
- 4) Which of the following statements is true about competitive inhibitors?
- a) It is a common type of irreversible inhibition
- b) In the presence of a competitive inhibitor, the Michaelis-Menten equation becomes  
$$V_0 = V_{max}[S]/\alpha K_m + [S]$$
- c) The apparent  $K_m$  decreases in the presence of inhibitor by a factor  $\alpha$
- d) The maximum velocity for the reaction decreases in the presence of a competitive inhibitor
- 5) The molecule which acts directly on an enzyme to lower its catalytic rate is \_\_\_\_\_
- a) Repressor
- b) Inhibitor
- c) Modulator
- d) Regulator
- 6) Which of the following statement true regarding enzyme inhibition
- a) it may be reversible and irreversible
- b) reversible can be competitive and non-competitive
- c) both a and b
- d) it always reversible

7) Competitive inhibitors and real substrate often have similar.....

- a) structure
- b) chemical properties
- c) physical properties
- d) mechanism of action

8) The types of inhibition pattern based on Michaelis Menten equation are

- a) Competitive
- b) non-competitive
- c) Uncompetitive
- d) all of the above

9) Enzymes are chemically.....

- a) Proteins
- b) Proteins and nucleic acid
- c) Proteins and rarely ribonucleic acid
- d) Proteins and rarely carbohydrate

10) Competitive inhibitors and real substrate often have similar.....

- a) Structure
- b) Chemical properties
- c) Physical properties
- d) Mechanism of action

#### Unit-4: Solid state chemistry and phase equilibria

- 1) Any deviation from a chemically pure, stoichiometric, perfect crystal is called \_\_\_\_\_.  
a. Defect  
b. Lattice  
c. Diffusion  
d. Faults
- 2) A vacancy is created in a metal by migration of metal to the surface, it is  
a. Vacancy defect  
b. Frenkel defect  
c. Schottky defect  
d. Interstitial defect
- 3) What is the number of degree of freedom in a system with 2 components and 2 phases?  
a. 0  
b. 1  
c. 2  
d. 3
- 4) \_\_\_\_\_ are the best example of substitutional solid solutions  
a. Salts  
b. Alloys  
c. Buffer  
d. Metals
- 5) This is the type of surface imperfection  
a. Stacking faults  
b. Colour centres  
c. Edge dislocation  
d. Grain boundaries

6) Hydrate formation system also known as

- a. Copper sulphate system
- b. Amino compound formation
- c. Potassium-Silver nitrate- Water system
- d. Water- Silver nitrate- Ammonium nitrate system

7) Gibbs phase rule for condensed system:

- a.  $F+2= C-P$
- b.  $F= C-P+2$
- c.  $F= C-P+1$
- d.  $F+1= C-P$

8) As the grain size of a metal decreases, its strength \_\_\_\_\_

- a. Increases
- b. Decreases
- c. Remains constants
- d. No effect of grain size on strength

9) A point at which 2 solid phases separate out is known as

- a. Congruent melting point
- b. Eutectic point
- c. Incongruent melting point
- d. Cryohydric point

10) According to phase rule, degree of freedom (F)= 1, then system becomes

- a. Bivariant
- b. Univariant
- c. Nonvariant
- d. Trivariant