

Royal College of Arts Science and Commerce
T.Y.B.Sc.
Semester V Sample Questions
Chemistry I
USCH 501

Instructions:

- 1) Fill in the blanks with the most appropriate option
- 2) Each question is for 1m in Section I
- 3) Each question is for 2m in Sections II and III

Section I

- 1 The correct sequence of molecular energies is _____ .
 - a $E_{\text{ele}} > E_{\text{rot}} > E_{\text{vib}}$
 - b $E_{\text{ele}} > E_{\text{vib}} > E_{\text{rot}}$
 - c $E_{\text{vib}} > E_{\text{ele}} > E_{\text{rot}}$
 - d $E_{\text{rot}} > E_{\text{vib}} > E_{\text{ele}}$

- 2 Zero point energy is given by the expression
 - a $h\nu_0$
 - b $1/2h\nu_0$
 - c $1/3h\nu_0$
 - d $3/2h\nu_0$

- 3 _____ method is used for determination of Osmotic pressure.
 - a Beckmann method
 - b Barkeley and Hartley's method
 - c Rast method
 - d Ostwald and Walker method

- 4 To sustain a fission reaction, the multiplication factor K should be _____
 - a Greater than unity
 - b Less than unity
 - c zero
 - d One

- 5 In reverse osmosis , _____ moves from _____ .
 - a solvent moves from solution to solvent
 - b solvent moves from solvent to solution
 - c solute moves from solvent to solution
 - d solute moves from solution to solvent

- 6 1 a.m.u = _____
a 931 eV
b 931 MeV
c 193 MeV
d 391MeV
- 7 When a chemical reaction obeys collision theory , probability factor
is _____
a > 1
b 1
c < 1
d 0
- 8 Radioactivity is due to _____ .
a stable electronic configuration
b unstable nucleus
c stable nucleus
d unstable electronic configuration
- 9 In the process of adsorption of acetic acid on charcoal, charcoal acts
as _____
a absorber
b adsorbent
c adsorbate
d Absorbent
- 10 For vibrating anharmonic molecule selection rule is _____
a $\Delta v = \pm 1$
b $\Delta v = 0$
c $\Delta v = \pm 1 , \pm 2 , \pm 3 \dots$
d $\Delta v = 1 , 2 , 3 \dots$

Section II

- 11 The moment of inertia for a rotating molecule is expressed as _____
- a $\mu \cdot r^2$
 - b $\mu^2 \cdot r^2$
 - c $\mu^2 \cdot r$
 - d $\mu \cdot r$
- 12 Symmetrical stretching , vibration in CO₂ is _____ and _____.
- a Raman inactive , IR active
 - b IR inactive , Raman active
 - c Raman inactive , also IR inactive
 - d IR active , also Raman active
- 13 In general Reverse Osmosis system the solution from which pure water is obtained is called _____ .
- a permeate
 - b Reject stream
 - c Feed water
 - d Salt solution
- 14 If multiplication factor is 0.90 and we start with 100 neutrons ,in the next generation the number of neutrons will be ____
- a 190
 - b 900
 - c 90
 - D 100
- 15 Langmuir theory of unimolecular adsorption is valid only at _____ pressure and _____ temperature.
- a low , high
 - b high , low
 - c high , moderate
 - d moderate , low

Section III

- 16 A diatomic molecule is excited with a radiation of frequency $2.35 \times 10^6 \text{ m}^{-1}$. A Raman line appears at $2.18 \times 10^6 \text{ m}^{-1}$. Therefore Raman shift is _____ and line is a _____ line.
- a $0.17 \times 10^6 \text{ m}^{-1}$, Stoke's
 - b $0.17 \times 10^6 \text{ m}^{-1}$, Anti-Stoke's
 - c $4.53 \times 10^6 \text{ m}^{-1}$, Rayleigh
 - d $4.53 \times 10^6 \text{ m}^{-1}$, Anti-Stoke's
- 17 An aqueous solution of a non –electrolyte freezes at -1.24°C . At what temperature will it boil? ($K_b = 0.512\text{Kkg.mol}^{-1}$ and $K_f = 1.86\text{K.kg.mol}^{-1}$)
- a 100.34°C
 - b 0.34°C
 - c 0.34 K
 - d 100.34 K
- 18 Calculate the surface area of adsorbent if the number of molecules of H_2 gas adsorbed at STP on 1g copper is 4.03×10^{19} . The area occupied by each molecule is $15.75 \times 10^{-20} \text{ m}^2$.
- a 634 m^2
 - b 6.34 m^2
 - c 0.634 m^2
 - d 63.40 m^2
- 19 When ${}_{13}\text{Al}^{27}$ undergoes (α, n) reaction, the recoil nucleus formed is _____.
- a ${}_{15}\text{P}^{30}$
 - b ${}_{14}\text{Si}^{30}$
 - c ${}_{11}\text{Na}^{23}$
 - D ${}_{12}\text{Mg}^{24}$
- 20 A system is said to be in colloidal state if the particle size of the dispersed phase ranges from _____.
- a 1 nm to 100 nm
 - b 1mm to 10 mm
 - c Less than 1 nm
 - d 1 to 10A