

**CHEMISTRY:****Max. Marks: 60****SECTION – I****(MULTIPLE CORRECT CHOICE TYPE)**

This section contains **8 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONE OR MORE is/ are correct**

21. Which transitions mentioned below give “UV” spectral lines?

A)  $(n = 2) \rightarrow (n = 1)$  in ‘H’ atom

B)  $(n = 4) \rightarrow (n = 2)$  in  $He^+$  ion

C)  $(n = 6) \rightarrow (n = 3)$  in  $Li^{+2}$  ion

D)  $(n = \infty) \rightarrow (n = 2)$  in  $Be^{+3}$  ion

22. Which statement(s) is(are) correct?

A) Vanderwaal adsorption is more favourable at higher temperatures.

B) Gases with high critical temperature are more favourable for physical adsorption

C) Extent of adsorption in solutions depends on concentration and temperature

D) Adsorption of gases on solids are associated with  $\Delta H < 0$  and  $\Delta S < 0$

23. 30gms of an organic compound on combustion produced 44gms of  $CO_2$  and 18gms of  $H_2O$ .

What can we conclude?

- A) The compound contains 40% carbon by mass
- B) The compound contains 6.6% hydrogen by mass
- C) The sample consumed 32gms of oxygen for combustion
- D) The sample is a hydro carbon

24.  $Cl_2$  disproportionates into  $Cl^-$  and  $ClO_3^-$  in alkali. What can we conclude?

- A)  $\frac{5}{6}$ th parts of chlorine is reduced
- B) Equivalent weight of oxidised chlorine is 7.1
- C) Equivalent weight of reduced chlorine is 35.5
- D) Equal number of equivalents of  $Cl_2$  involve in oxidation and reduction half reactions.

25. Which statement(s) is(are) True?

A) In the formation of micelle  $\Delta S = +ve, \Delta H = +ve$

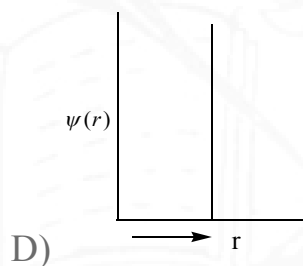
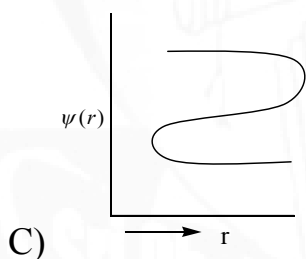
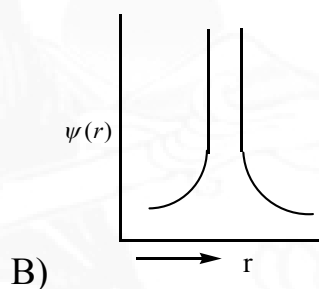
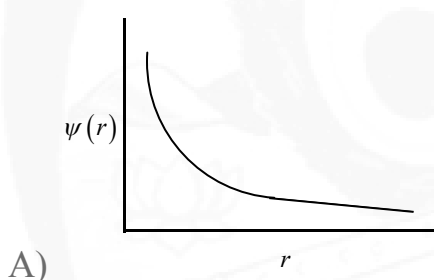
B) Brownian movement in solutions is due to unbalanced bombardments of 'sol' particles and Medium

C) Greater the difference in the refractive index between dispersed phase and the medium

greater the tyndal effect in a sol.

D) Gold sol if flocculated can be restored by adding some electrolyte

26. Which of the following is(are) NOT acceptable curve(s) for selection of a solution of shrodinger equation for hydrogen atom?



27. A solution containing  $Mn^{+2}$  is reacted with “V” ml of  $0.2M MnO_4^-$  in aqueous medium such that the species disproportionate completely into  $Mn^{+3}$ . The resultant solution consumed 50ml  $0.1M$  Hypo in iodometry. What can be concluded? ( $Mn^{+3} + I^- \rightarrow Mn^{+2} + I_2$ )
- A) The value of ‘V’ in the question is 5.
- B) The equivalent weight of  $Mn^{+3}$  is not same in both reactions
- C) The first solution contains ‘4’ millimoles of  $Mn^{+2}$
- D) The number of equivalents of  $Mn^{+3}$  is same in disproportionation and iodometry
28. Which of the following are(is) correct in H – atom? (CGS)
- A)  $\frac{n^2 h^2}{4\pi^2 m e^2}$  = radius of orbit
- B)  $-2(I.P)$  = potential energy of electron( ground state)
- C)  $\frac{2\pi^2 m e^4}{h^3 c}$  = wave number of most energetic spectral line
- D)  $\frac{2\pi^2 m e^4}{h^2}$  = kinetic energy of electron in K – shell.

**SECTION - II**  
**(COMPREHENSION TYPE)**

This section contains **4 groups of questions**. Each group has 2 multiple choice questions based on a paragraph. Each question has 4 choices A), B), C) and D) for its answer, out of which **ONLY ONE** is correct.

**Paragraph for Questions 29 and 30**

2 moles each of methane and  $O_2$  are injected into an evacuated closed container of volume 100L. The mixture is ignited at a temperature at  $87^\circ C$  (all measurements made at). (aq. tension at  $87^\circ C$  is 380torr and assume  $0.0821 \times 360 = 30$ ) (assume ideal behaviour)

29. What is the net pressure developed in the flask at the completion of reaction?
- A) 1.2 atm      B) 0.6 atm      C) 1.1 atm      D) 0.9 atm
30. What is the ratio of masses of liquid and vapour phases of water formed respectively
- A) 5 : 1      B) 2 : 3      C) 3 : 2      D) 1 : 5

**Paragraph for Questions 31 and 32**

The wave nature of a charged micro particle (mass = m) is described in one dimension with an equation (wave function)

$$\psi = A \sin \frac{2\pi x}{\lambda} \dots\dots\dots (1)$$

Where  $\psi$  = amplitude function, x = distance of propagation

$\lambda$  = wave length, A = maximum amplitude

As per Debroglie's concept of dual nature of electron, the wave length of moving electron is

given by  $\lambda = \frac{h}{p} \dots\dots\dots (2)$

where p = momentum, h = plank's constant

31. the function " $\frac{\partial^2 \psi}{\partial x^2}$ " for the mentioned particle is given by

A)  $\frac{-8\pi^2 m (KE)}{h^2} \psi$

B)  $\frac{-4\pi^2 m (PE)}{h^2} \psi$

C)  $\frac{-4\pi^2 m (KE)}{h^2} \psi$

D)  $\frac{-2\pi^2 m (E_{total})}{h^2} \psi$

32. The wave function gets maximum and zero values after travelling distances equal to \_\_\_ and \_\_\_ respectively ( from  $x = 0$  )

A)  $\frac{\lambda}{4}, \frac{\lambda}{2}$

B)  $\frac{\lambda}{4}, \frac{\lambda}{3}$

C)  $\lambda, \frac{\lambda}{3}$

D)  $\lambda, \lambda$

**Paragraph for Questions 33 and 34**

A "100 cc" mixture of  $C_3H_8$ ,  $CO$  and  $O_2$  gases is ignited at room temperature conditions. After ignition the contents are brought back to room temperature and the gases are dried up. The net gaseous volume is found to be 65cc. This mixture when passed through pyrogallol suffered a volume loss of 25cc.

33. What is the mole fraction of  $O_2$  in the given mixture?

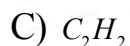
A) 0.8

B) 0.6

C) 0.9

D) 0.75

34. Which of the following should replace 'CO' in the initial mixture with same volume, Such that the dry gaseous products do not suffer any volume loss in pyrogallol?



**Paragraph for Questions 35 and 36**

Flocculation is a phenomenon of destabilising a solution by adding a selective electrolyte. The ions present in the electrolyte neutralise the charge present on the solution particles and cause flocculation. The flocculating ability of the electrolyte is greater if the charge on the ion is more.

35. A solution is prepared by adding  $FeCl_3$  to excess of hot water. Which of the following electrolyte can most effectively flocculate the said 'sol'
- A)  $K_4[Fe(CN)_6]$                       B)  $Na_2SO_4$   
C)  $AlF_3$                                   D)  $NaCl$
36. An arsenic oxide slurry is agitated with water with a current of  $H_2S$  gas(excess) to obtain a solution. Which of the following can most effectively flocculate the 'sol'
- A)  $NaCl$                                   B)  $AlCl_3$   
C)  $Na_3PO_4$                               D)  $K_4[Fe(CN)_6]$



## SECTION – III

## (MATRIX MATCH TYPE)

This section contains **4 multiple choice questions**. Each question has matching lists. The codes for the lists have choices (A), (B), (C), and (D) out of which **ONLY ONE** is correct.

37.

## LIST I

(IP of 'H' atom = 13.6eV/atom)

- A) Energy of farthest Balmer line from Lyman series (H – atom)
- B) Energy of Lyman line closest to Balmer series (H – atom)
- C) KE of electron in 1<sup>st</sup> excited state of  $He^+$
- D) Energy of limiting Balmer line in H – atom

## LIST II

(Bohr's model)

- P) 1.88eV/atom
- Q) 3.4eV/atom
- R) 13.6 eV/atom
- S) 10.2 eV/atom

A) A – P, B – S, C – R, D – Q

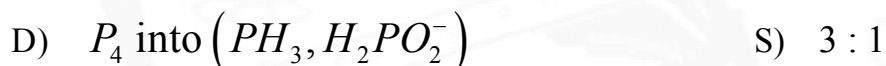
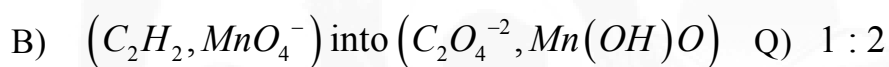
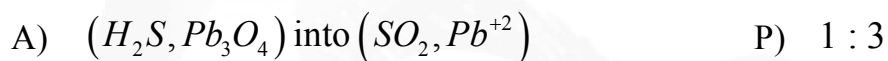
B) A – QSR, B – PQ, C – PS, D – R

C) A – P, B – QS, C – R, D – RS

D) A – QS, B – PQ, C – S, D – R

38. Redox reaction between:

The ratio of moles of oxidant and reductant involved (respectively)



A) A – P, B – S, C – R, D – Q

B) A – S, B – P, C – R, D – Q

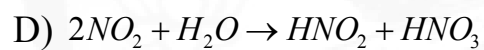
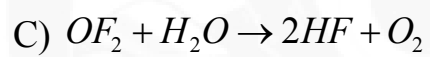
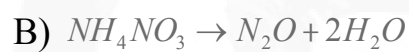
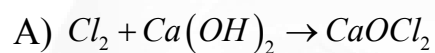
C) A – P, B – QS, C – R, D – RS

D) A – S, B – R, C – Q, D – P

39.

## LIST A

(Reaction)



A) A – P, B - S, C – R, D – Q

C) A – P, B - QS, C – R, D – RS

## LIST B

Gram equivalent weight of any

underlined chemicals M = GMW

P) 2M

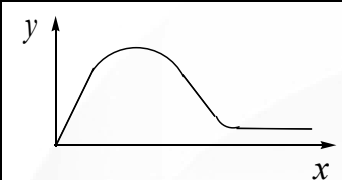
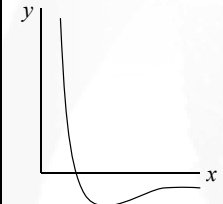
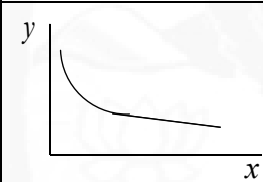
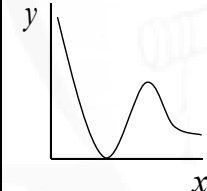
Q)  $\frac{M}{2}$ R)  $\frac{M}{4}$ 

S) M

B) A – S, B – QR, C – Q, D – P

D) A – S, B – R, C – Q, D – P

40.

List- I		List- II	
A)		P)	' $\psi^2$ ' Vs 'r' of '2s' orbital
B)		Q)	' $\psi$ ' Vs 'r' of '1s' orbital
C)		R)	Radial probability Vs r of 2p orbital
D)		S)	' $\psi$ ' Vs 'r' of '2s' orbital

A) A – P, B - S, C – R, D – Q

B) A – R, B – S, C – Q, D – P

C) A – P, B - QS, C – R, D – RS

D) A – S, B – R, C – Q, D – P