Chemistry

TARGET : JEE 2013

SCORE

JEE (Advanced)

Home Assignment # 05

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KOTA (RAJASTHAN)
Path to Success

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PHYSICAL CHEMISTRY

HOME ASSIGNMENT # 05

Topic : Liquid Solution , Atomic Structure & Surface Chemistry

Only one correct ::

1. Which of the following is the correct order of boiling points of the following solutions?

(I) 0.15 M HCl (II) 0.4 M glucose solution

(III) 0.15 M $CaCl_2$ solution (IV) 0.15 M urea solution

(A) IV < I < III < II (B) IV < II < I < III

(C) IV < I < II < III (D) IV < III < II < I

2. 0.1 M NaCl and 0.1 M glucose would exert :-

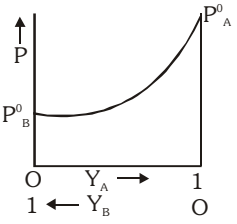
(A) same osmotic pressure

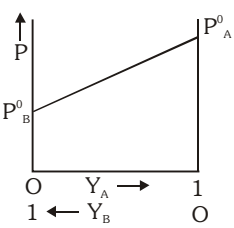
(B) osmotic pressure in the ratio of 1 : 3

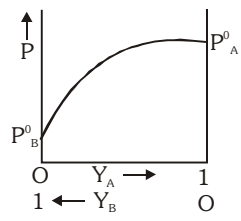
(C) osmotic pressure in the ratio of 2 : 1

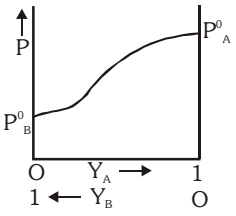
(D) osmotic pressure in the ratio of 1 : 2

3. An ideal solution is formed by mixing two liquids'A and 'B' X_A and X_B are the mole fractions of A and B respectively in the solution and Y_A and Y_B are the mole fractions of A and B respectively in the vapour phase. The plot of total pressure (P) verses the mole fraction of A at constant temperature in the vapoure phase is : **(assume $P^\circ_A > P^\circ_B$)**

(A) 

(B) 

(C) 

(D) 

4. An ideal mixture of liquids A and B with 2 moles of A and 2 moles of B has a total vapour pressure of 1 atm at a certain temperature. Another mixture with 1 mole of A and 3 moles of B has a vapour pressure greater than 1 atm. But if 4 moles of C are added to the second mixture, the vapour pressure comes down to 1 atm. Vapour pressure of C in pure state is 0.8 atm. Calculate the vapour pressure of pure A and pure B :-

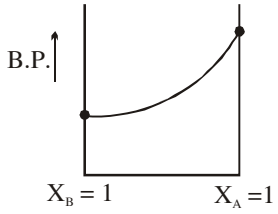
(A) P°_A = 1.4 atm, P°_B = 0.7 atm (B) P°_A = 1.2 atm, P°_B = 0.6 atm

(C) P°_A = 1.4 atm, P°_B =0.6 atm (D) P°_A = 0.6 atm, P°_B =1.4 atm

5. In a binary solution, the degree of dissociation (α) of a weak electrolyte A_xB_y is related to van't Hoff factor (i) by the expression :

(A) $\alpha = \frac{(i-1)}{(x+y+1)}$ (B) $\alpha = \frac{(x+y-1)}{(i-1)}$ (C) $\alpha = \frac{i-1}{x+y-1}$ (D) $\alpha = \frac{x+y+1}{(i-1)}$

6. Based on below graph plotted between boiling point and mole fraction in liquid phase for the liquid binary mixture. Comment on the liquid mixture.



(A) Ideal solution
(B) Showing negative deviation from Raoult's law
(C) Showing positive deviation from Raoult's law
(D) Mixture of two immiscible volatile liquids

7. For a liquid normal boiling point is –173ºC then at 2 atm pressure it's boiling point should be nearly **(ΔH_{vap} = 200cal/mole, R = 2 cal/mol-K, *l*n2 = 0.7)**

(A) –73ºC (B) 333ºC (C) 60ºC (D) 103ºC

8. Vapour pressure of an aqueous solution of a non-volatile and non electrolyte solute at certain temperature T was found to be 39.964 torr. If the vapour pressure of pure solvent at same temperature is 40 torr, find the molality of aqueous solution :

(A) 0.1 m (B) 0.005 m (C) 0.05 m (D) 0.04 m

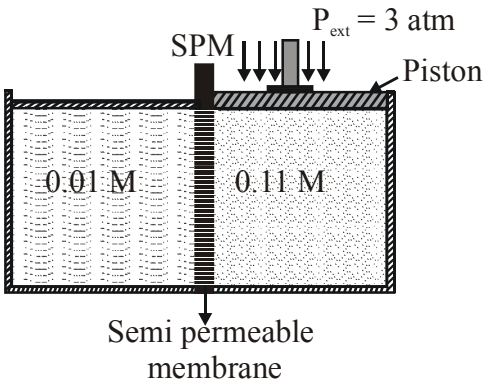
9. When 20 g naphthoic acid ($C_{11}H_8O_2$) is dissolved in 50 g of benzene [$K_f = 1.72$ K kg mol^{-1}] freezing point depression of 2 K is observed. The Van't Hoff factor (i) is :

(A) 0.5 (B) 1 (C) 2 (D) 3

10. pH of a 0.1 M monobasic acid is measured to be 2. Its osmotic pressure at a given temperature TK is :

(A) 0.1 RT (B) 0.11 RT (C) 1.1 RT (D) 0.01 RT

11. A total pressure of 3 atm when applied on the surface of solution of concentration 0.11 M prevent flow of solvent across semipermeable membrane from other side of solution of concentration of 0.01 M. What is the temperature of experiment. **(Take : R = 0.08 L-atm/K-mole)**



(A) 375 K (B) 250 K (C) 125 K (D) 225 K

12. Two completely miscible liquids A & B form an ideal solution. What is the vapour pressure of solution containing 2 moles of A and 3 moles of B at 300K?
[Given: At 300 K, Vapour pr. of pure liquid A(P_A^o) = 100 torr
Vapour pr. of pure liquid B (P_B^o) = 300 torr]
(A) 200 torr (B) 140 torr (C) 180 torr (D) None of these

13. The ratio of difference in wavelengths of 1st and 2nd lines of Lyman series in H-like atom to difference in wavelength for 2nd and 3rd lines of same series is :-
(A) 2.5 : 1 (B) 3.5 : 1 (C) 4.5 : 1 (D) 5.5 : 1

14. Choose the correct relation on the basis of Bohr's theory -
(A) velocity of electron $\propto \frac{1}{n}$ (B) time period of revolution $\propto \frac{Z^2}{n^3}$
(C) radius of orbit $\propto n^2/Z$ (D) force on electron $\propto \frac{Z^3}{n^4}$

15. In an excited state, a calcium atom has the electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 4d^1$. What is the orbital angular momentum for d electron :-
(A) $\sqrt{4}\hbar$ (B) $\sqrt{16}\hbar$ (C) $\sqrt{6}\hbar$ (D) $\sqrt{10}\hbar$

16. Give the correct order of initials T(True) or F(False) for following statements :
(i) If electron has zero magnetic quntum number, then it may be present in s-orbital.
(ii) Bohr's model can explain spectrum of the hydrogen atom.
(iii) A d-subshell can accommodate maximum 10 electrons only.
(A) TTF (B) FFT (C) TTT (D) TFT

17. The value of $(n_2 - n_1)$ and $\left(n_2^2 - n_1^2\right)$ for N^{6+} ion in atomic spectrum are 6 and 48 respectively. The wavelength of emitted photon when electron jump from n_2 to n_1 is : (n_2 = Higher energy level, n_1 = Lower energy level)
(A) $\frac{5}{R_H}$ (B) $\frac{1}{20R_H}$ (C) 48 R_H (D) None of these

18. 200 units of energy is required to take away an electron from the lowest energy level to infinite, energy released when electron falls from infinite to second energy level, will be :
(A) 100 units (B) 400 units (C) 50 units (D) 25 units

19. Arrange the wavelengths (λ) of the following emission lines of H-atom in an increasing order :
(1) $n = 3 \xrightarrow{\lambda_1} n = 1$ (2) $n = 5 \xrightarrow{\lambda_2} n = 3$
(3) $n = 12 \xrightarrow{\lambda_3} n = 10$ (4) $n = 22 \xrightarrow{\lambda_4} n = 20$
(A) $\lambda_4 < \lambda_3 < \lambda_2 < \lambda_1$ (B) $\lambda_1 < \lambda_2 < \lambda_3 < \lambda_4$
(C) $\lambda_1 < \lambda_2 < \lambda_4 < \lambda_4$ (D) $\lambda_1 < \lambda_3 < \lambda_4 < \lambda_4$

20. A light source of wavelength λ illuminates a metal and ejects photo-electrons with $(KE)_{max} = 1$ eV. Another light source of wavelength $\frac{\lambda}{3}$, ejects photo-electrons from same metal with $(KE)_{max} = 4$ eV. Find the value of work function ?
(A) 1 eV (B) 2 eV (C) 0.51 eV (D) None of these

21. A mono electronic species in energy level with energy 'X' was provided with excess of energy so that it jumps to higher energy level with energy 'Y'. If it can emit 6 wavelengths originated from all possible transition between these group levels, then which of the following relation is correct ?

(A) $X/Y = (n-1)^2$ (B) $X/Y = 1 + 3/n$

(C) $\sqrt{}(X/Y = 1 + 3/n$ (D) $X/Y = n/6$

(Here n is the principal quantum number of energy level X)

22. A photon of wavelength 155 nm is fallen on the metal surface (work function = 64×10^{-20}J). The electron ejected from the metal surface with maximum kinetic energy is absorbed by Hg vapours and emitted radiation by loosing its kinetic energy.The wavelengthof emitted radiation is:

(A) 155 nm (B) 165 nm (C) 310 nm (D) 620 nm

23. For an orbital in B^{+4} radial function is

$$R(r) = \frac{1}{9\sqrt{6}}\left[\frac{Z}{a_0}\right]^{3/2}[4-\sigma]e^{-\sigma/2}$$

where $\sigma = \frac{Zr}{a_0}$, Z = Atomic number, r = radial distance.

The radial node is at distance from nucleus.

(A) 0.529 Å (B) 2.12 Å (C) 1.06 Å (D) 0.423 Å

24. Which equation represents Freundlich adsorption isotherm (physical adsorption is basis of this theory) :

(A) $\frac{x}{m} = K(P)^{1/n}$; where x is amount of gas adsorbed on mass 'm' at pressure P.

(B) $\log\frac{x}{m} = \log K + \frac{1}{n}\log P$

(C) $\frac{x}{m}$ = KP at low pressure and $\frac{x}{m}$ = K at high pressure.

(D) All of the above

25. Which of the following relation is true in respect of adsorption :-

(A) $\Delta G < 0, \Delta S > 0, \Delta H < 0$ (B) $\Delta G < 0, \Delta S < 0, \Delta H < 0$

(C) $\Delta G > 0, \Delta S > 0, \Delta H > 0$ (D) $\Delta G > 0, \Delta S > 0, \Delta H < 0$

26. Arrange the following electrolytes in the increasing order of coagulation power for the coagulation of As_2S_3 solution

(I) Na_3PO_4 (II) $MgCl_2$ (III) $AlCl_3$

(A) I > II > III (B) I < II < III (C) I = III < II (D) III < I < II

27. Which one of the following statements is false for hydrophilic sols ?

(A) They do not require electrolytes for stability

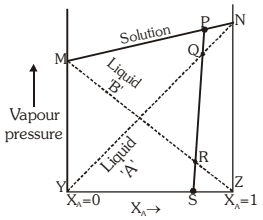
(B) Their coagulation is reversible

(C) Their viscosity is of the order of that of water

(D) Their surface tension is usually lower than that of dispersion medium

One or more than may be correct ::

28. Consider the following vapour-pressure composition graph for a binary solution of two volatile liquids A & B. The correct option(s) is/are : (X_A = mole fraction of A in solution)



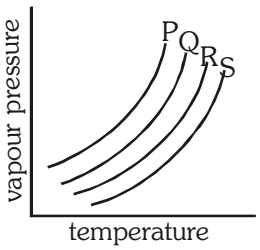
(A) boiling point of A is more than that of B

(B) SP = QS + RS

(C) SP = PR + PQ

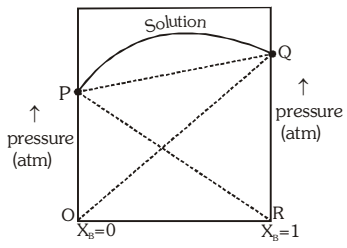
(D) boiling point of this binary solution will lie in between boiling point of pure A and pure B for all compositions.

29. The graphs of vapour pressure of substances P, Q, R, S are given below :
Identify the substance if the different substances for which the graphs are drawn are $C_6H_5NH_2$, CS_2, CH_3OH, H_2O



(A) P = CS_2 (B) Q = CH_3OH (C) R = $C_6H_5NH_2$ (D) S = H_2O

30. For a binary solution of two volatile liquid A and B vapour pressure vs. composition plot is shown as : The incorrect option(s) is/are :



(A) boiling point of solution will always be more than that of pure A or pure B.

(B) OP gives Henry's constant of A

(C) QR gives Henry's constant of B

(D) at a unique composition of A & B between O and R azeotrope is formed.

31. Consider 0.1 M solutions of two solutes X and Y. The solute X behaves as univalent electrolyte, while the solute Y dimerises in solution. Select correct statement(s) regarding these solutions :-

(A) the boiling point of solution of 'X' will be higher than that of 'Y'

(B) the osmotic pressure of solution of 'Y' will be lower than that of 'X'

(C) the freezing point of solution of 'X' will be lower than that of 'Y'

(D) the relative lowering of vapour pressure of both the solution will be the same

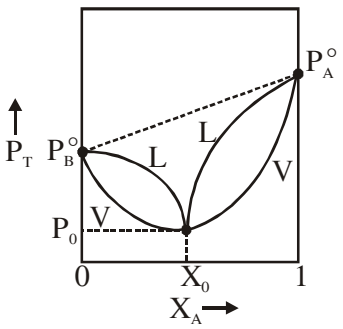
32. The following plot is obtained for a binary solution of two volatile liquids A and B. Pick out the correct statements :

P_T = total vapour pressure of liquid A and B.

X_A = mole fraction of A in solution

P_A° = vapour pressure of pure A

P_B° = vapour pressure of pure B



(A) Solution with composition 'X_0' is a minimum boiling azeotrope.

(B) Intermolecular interaction among A and B is lowest at X_0.

(C) Given solution is a non-ideal solution with negative deviation.

(D) A-B interactions are stronger than pure A-A or B-B interactions

33. In a binary liquid solution of A and B in which vapour pressure of pure component A and B are 600 and 400 torr respectively at temperature 'T'. Pick the correct statement :

(A) mole fraction of A in vapour phase is always greater than mole fraction of B in vapour phase.

(B) mole fraction of A in vapour phase is always greater than mole fraction of A in liquid phase.

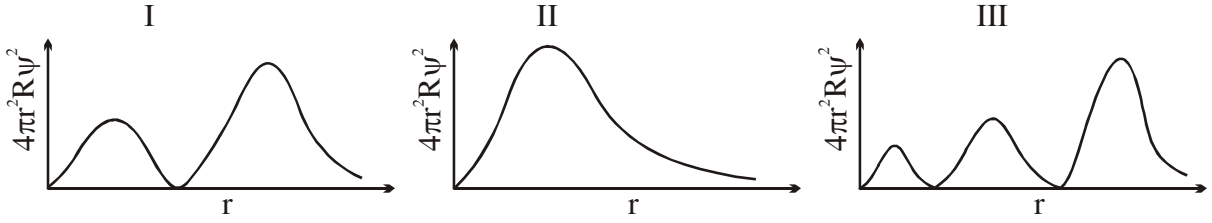
(C) vapour pressure of solution can not exceed 600 torr at temperature T.

(D) mole fraction of B in vapour phase is always greater than mole fraction of B in liquid phase.

34. Which of the following is correct for a non-ideal solution of liquids A and B, showing negative deviation?

(A) ΔH_{mix} = –ve (B) ΔV_{mix} = –ve (C) ΔS_{mix} = +ve (D) ΔG_{mix} = –ve

35. Which of following has correct matching of curve and orbital



(A) I(2p) II(1s) III(4p)

(B) I(3p) II(3d) III(3s)

(C) I(4d) II(2p) III(5d)

(D) I(2s) II(4f) III(3d)

36. Choose the correct statements from among the following.

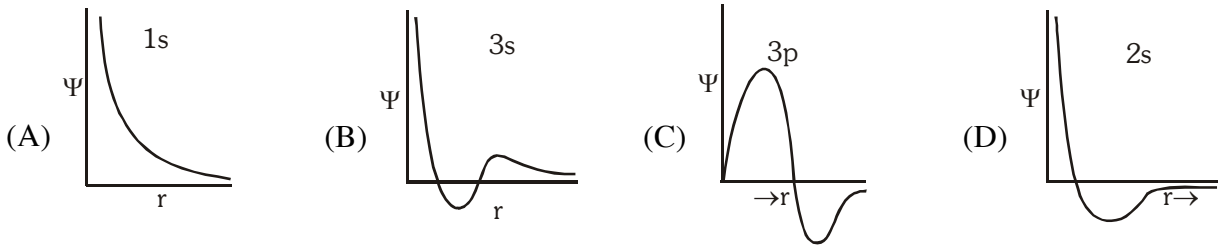
(A) a node is a point in space where the wave function (Ψ) has zero amplitude

(B) the number of peacks in radial distribution is n – l

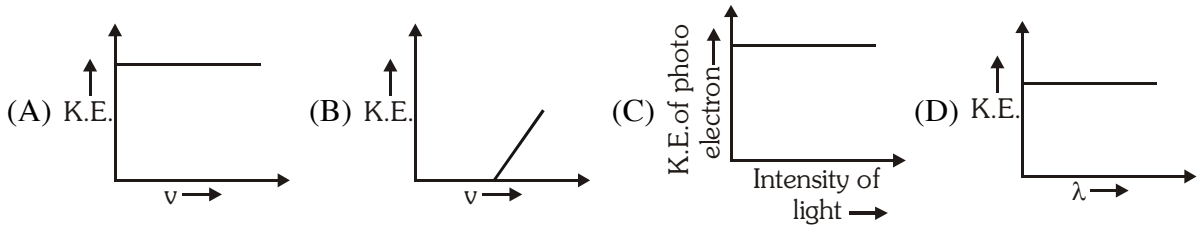
(C) radial probability density $\rho_{n,l}(r) = 4\pi r^2 R^2_{n,l}(r)$

(D) Ψ^2 represents the atomic orbital

37. Which of the following graphs of radial part of wave function (Ψ) v/s distance from nucleus is/are correctly labelled ?



38. Which is correct graph ?



39. The kinetic energy of photoelectron emitted on irradiating a metal surface with frequency υ is related by KE = hv – ϕ. The plots of KE vs. incidented frequency v shows :

(A) A straight line with slope equal to Planck's constant.

(B) A straight line with intercept on x-axis equal to the product of threshold frequency and Plank's constant.

(C) A straight line with extrapolated intercept on y-axis equal to threshold energy.

(D) A straight line with intercept on x-axis equal to threshold frequency.

40. The radial part of schrodinger wave equation for hydrogen atom is

$$\psi(r) = \frac{1}{16\sqrt{4}\, a_0^{3/2}} (\sigma - 1)(\sigma^2 - 8\sigma + 12)\, e^{-\sigma/2}$$

Where a_0 = constant & $\sigma = 2r/na_0$; n = principle quantum number

Select the correct statements :

(A) Distance of nearest radial node from the nucleus is $2a_0$.

(B) Distance of farthest radial node from the nucleus is $12a_0$.

(C) Number of maxima in the curve $4\pi r^2\psi^2(r)$ vs r are 4.

(D) $\psi(r)$ is for 4p orbital.

41. x is the amount of a gas adsorbed by a fixed amount of a solid. If monolayer adsorption is supposed to occur, then which of the following statements is correct :

(A) At low pressure, x increases more than proportionately to gas pressure

(B) At low pressures, x increases proportionately to gas pressure

(C) At moderate pressures, x increases less than proportionately to gas pressure

(D) At high pressures, x becomes independent of gas pressure

42. Which of the following is/are characteristic of Chemisorption ?

(A) It is irreversible

(B) It is specific

(C) It may occur by the formation of multilayer

(D) It is an exothermic process

43. Which of the following statements are true about AgI sol prepared by peptization of AgI with $AgNO_3$.

(A) In electrophoresis, the dispered phase will move towards cathode.

(B) $AlCl_3$ is more effective than Na_3PO_4 for bringing about coagulation of sol.

(C) Na_3PO_4 is more effective than $AlCl_3$ for bringing about coagulation of sol.

(D) On persistant dialysis of sol, precipitation of coloidal sol take place (coagulation)

44. Which of the following statement(s) is/are true for a colloidal solution of gold in water (Gold sol.) :

(A) The path of light beam is invisible when passed through solution.

(B) The colloidal solution can be stabilised by addition of small amount of NaCl.

(C) The colloidal solution can be preservated for long time if small amount of starch is added to sol.

(D) The colloidal solution can by destroyed by prolonged electrophoresis of solution.

45. x is the amount of a gas adsorbed by a fixed amount of a solid. If monolayer adsorption is supposed to occur, then which of the following statements is correct :

(A) At low pressure, x increases more than proportionately to gas pressure

(B) At low pressures, x increases proportionately to gas pressure

(C) At moderate pressures, x increases less than proportionately to gas pressure

(D) At high pressures, x becomes independent of gas pressure

Paragraph ::

Paragraph for Question 46 to 48

An aq. solution is prepared by dissolving 0.1 mole of a non-volatile weak monobasic acid into 372 mL of water. By using given informations below, answer following questions :

K_f of water = 1.86 K kg mol^{-1} standard freezing point of H_2O = 273 K

K_b of water = 0.51 K kg mol^{-1} standard boiling point of H_2O = 373 K

46. If the solution freezes at –0.51°C, the Vant-Hoff factor for the weak acid will be :-

(A) 1.2 (B) 1.02 (C) 2 (D) 1.5

47. The original solution is diluted to 4 times. Now the solution shows depression in freezing point equal to -

(A) 0.125 K (B) 0.120 K (C) 0.130 K (D) 0.135 K

48. After dilution, the pH of the solution is approximately equal to. (ignore volume of acid) :-

(A) 2.76 (B) 3.56 (C) 3.76 (D) 2.56

Match the column ::

49. Match the solution Column-I with their colligative properties in Column-II :

	Column-I		**Column-II**
(A)	0.1 M $Ca_3(PO_4)_2$	(P)	solution with highest boiling point
(B)	0.1 M NaCl	(Q)	solution with van't Hoff factor greater than 1
(C)	0.1 M glucose	(R)	solution with lowest osmotic pressure
(D)	0.1 M $CaCl_2$	(S)	solution with lowest freezing point.

[Note : Assume that the electrolytes are completely ionised]

Integer ::

50. Find the number of spectral lines in Paschen series emitted by atomic H, when electron is excited from ground state to 7^{th} energy level returns back.

51. Calculate the minimum & maximum kinetic energy in eV of photoelectrons produced in cesium by 400 nm light. The critical (maximum) wavelength for the photoelectric effect in cesium is 660 nm, when the potential difference is 2V.

First multiply your answer with 100 Then fill your answer as sum of digits (excluding decimal places) till you get the single digit answer.

OMR : 2, 7

52. Two bulbs A and B are emitting monochromatic light of wavelength such that A can just ionise H atoms & B can just ionise He^+ ions. If the power of A & B are 30 W & 40 W respectively. Calculate the ratio of number of photons emitted per second by bulb A to bulb B?

53. A collection of H-like atoms has some atoms in the lowest energy level 'A' and some atoms in a particular upper energy level 'B' and there are no atoms in any other energy level. The atoms of gas make transition to a higher energy level by absorbing mono chromatic light of photon of energy 2.55 eV. Subsequent the atoms emit radaition of six different wavelengths. Some of the emitted photons have energy 2.55 eV and some have more and some have less than 2.55 eV.

(i) Find the quantum number of initially excited level.

(ii) Find the atomic number of gas.

(iii) Find the ionisation energy for the gas atoms.

(iv) Find the maximum and minimum energies of the emitted photons.

First multiply your answer with 100 Then fill your answer as sum of digits (excluding decimal places) till you get the single digit answer.

OMR : (i) 2 (ii) 1 (iii) 1 (iv) 6, 3

HOME ASSIGNMENT # 05

ANSWERS KEY-PHYSICAL CHEMISTRY

1.	(C)	2.	(C)	3.	(A)	4.	(D)
5.	(C)	6.	(A)	7.	(C)	8.	(C)
9.	(A)	10.	(B)	11.	(A)	12.	(D)
13.	(B)	14.	(D)	15.	(C)	16.	(C)
17.	(D)	18.	(C)	19.	(B)	20.	(C)
21.	(C)	22.	(C)	23.	(D)	24.	(D)
25.	(B)	26.	(B)	27.	(C)	28.	(B,D)
29.	(A,B)	30.	(A,B,C)	31.	(A,B,C)	32.	(C,D)
33.	(B,C)	34.	(A,B,C,D)	35.	(B,C)	36.	(A,B,C,D)
37.	(A,C,D)	38.	(B,C)	39.	(A,C,D)	40.	(A,B,C)
41.	(B,C,D)	42.	(A,B,D)	43.	(A,C,D)	44.	(C,D)
45.	(B,C,D)	46.	(B)	47.	(C)	48.	(D)

49. (A)→(P,Q,S) ; (B)→(Q) ; (C)→(R) ; (D)→(Q)

50. (4)

51. 2 eV, 3.22 eV

52. 0003

53. (i) n = 2, (ii) z = 1, (iii) 13.6 eV, (iv) 12.75 eV , 0.66 eV

INORGANIC CHEMISTRY

HOME ASSIGNMENT # 05

s-block, Hydrogen & its compound

Only one correct ::

1. Alkali metals dissolve in liquid ammonia and give blue solution which is paramagnetic in nature due to presence of -

(A) Ammoniated electron (B) Ammoniated M^+

(C) Ammoniated M^+ + Ammoniated electron (D) High concentration of NH_3

2. Which of the following statement is incorrect -

(A) Be and Mg are kinetically inert towards oxygen

(B) Mg reacts with air (N_2 + O_2) in presence of heat and gives MgO + Mg_3N_2

(C) BeO, MgO are used as refractory, because these have low melting point

(D) Be is inert towards water

3. Which of the following statement is correct -

(A) Ca^{2+} and Mg^{2+} ions do not form complex with EDTA

(B) $Be(OH)_2$ is acidic in nature

(C) Na_2O_2 is an oxidising agent and it oxidises charcoal , CO, NH_3, SO_2 etc.

(D) On heating white colour of K_2O become changed into black.

4. Which of the following process carbon is used as reducing agent-

(A) Le-blanc process (B) Solvey process (C) Haber Process (D) All of these

5. By Le-blanc process potassium carbonate can be prepared but by solvay process it is not possible, why

(A) Due to presence of massive H– bonding in $KHCO_3$

(B) $KHCO_3$ soluble in water

(C) $KHCO_3$ insoluble in water

(D) Thermal stability of $KHCO_3$ is greater than $NaHCO_3$

6. In which of the following oxide is red in colour -

(A) K_2O_2 (B) KO_2 (C) KO_3 (D) K_2O_3

7. The correct order of mobility of M^+ ions of alkali metal is-

(A) $Li^+ < Na^+ < Rb^+ < Cs^+ < K^+$ (B) $Na^+ < K^+ < Li^+ < Rb^+ < Cs^+$

(C) $Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$ (D) $Li^+ > Na^+ > K^+ > Rb^+ > Cs^+$

8. Which of the following oxide gives hydrogen peroxide on reaction with a dilute acid is -

(A) PbO_2 (B) Na_2O_2 (C) MnO_2 (D) TiO_2

9. Molecular formula of glauber's salt is -

(A) $ZnSO_4.7H_2O$ (B) $Na_2SO_4.10H_2O$ (C) $Na_2CO_3.10H_2O$ (D) $Na_2B_4O_7.10H_2O$

10. M + N_2 → Nitride $\xrightarrow{H_2O}$ NH_3 in above reaction metal M may be -

(A) only Li (B) only Mg (C) only Cs (D) Li and Mg both

11. On the electrolysis of HCl, hydrogen gets liberated at -
(A) Anode (B) Cathode (C) In air (D) Cannot be defined

12. Which of the following order is incorrect -
(A) Melting point $\Rightarrow H_2 < D_2 < T_2$ (B) Boiling point $\Rightarrow H_2 < D_2 < T_2$
(C) Bond energy $\Rightarrow H_2 < D_2 < T_2$ (D) None of these

13. Which of the following metals reacts only with steam and gives H_2 but not with H_2O at room temperature-
(A) Li (B) Na (C) Mg (D) Fe

14. Define the order or reactivity of halogen-
(A) $F_2 < Cl_2 < Br_2 < I_2$ (B) $F_2 > Cl_2 > Br_2 > I_2$
(C) $F_2 > Cl_2 > I_2 > Br_2$ (D) $Cl_2 > Br_2 > F_2 > I_2$

15. Permanent hardness of water is due to presence of following ion -
(A) $CaSO_4$ only (B) $MgSO_4$ (C) $Ca(HCO_3)_2$ (D) Both A and B

16. Calcium and magnesium salts are present in hard water when reacts with calgon $[Na_2[Na_4(PO_3)_6]]$ it gives complex salt 'X' and 'Y' . X & Y are -
(A) $Ca[Na_4(PO_3)_6]$, $Mg[Na_4(PO_3)_6]$ (B) $Na_2[Ca_2(PO_3)_6]$, $Na_2[Mg_2(PO_3)_6]$
(C) $Ca[Na_4(PO_3)_6]$, $Na_2[Mg_2(PO_3)_6]$ (D) $Na_2[Ca_2(PO_3)_6]$, $Mg_2[Na_4(PO_3)_6]$

17. Which of the combination is used in liquid form of rocket fuel -
(A) Liquid NH_3 + liquid Cl_2 (B) Liquid He + liquid H_2
(C) Liquid H_2 + liquid O_2 (D) Liquid N_2H_4 + liquid H_2O_2

Paragraph ::

Paragraph for Q.18 to Q.20

The elements Mg, Cr, Sr and Ba are react with hydrogen to form hydrides 'MH_2'. Beryllium hydride is difficult to prepare, and less stable then the others.

18. Hydride, which act as a reducing agent -
(A) CaH_2 (B) SrH_2 (C) BaH_2 (D) All

19. Which of the following hydride is polymeric and covalent in nature in solid-
(A) BeH_2 (B) SrH_2 (C) BaH_2 (D) All

20. On hydrolysis with water and dilute acids, alkaline earth metal hydrides produces -
(A) O_2 gas (B) H_2 gas (C) O_3 gas (D) CO_2 gas

Paragraph for Q.21 to Q.23

The trends in properties of alkaline earth metal salts can be explained by using Fajan's rule. It is associated with incorporation of covalent character in ionic bond. It states that smaller cations form more covalent compound and ionic character explains the solubility, thermal stability hydrolysis and other properties of these salts. Some exceptions are also there and are explained by change in lattice energy.

21. Correct order of increasing thermal stability of alkaline earth metal sulphates is -
(A) $SrSO_4 < CaSO_4 < MgSO_4 < BeSO_4$ (B) $BeSO_4 < MgSO_4 < CaSO_4 < SrSO_4$
(C) $CaSO_4 < BeSO_4 < MgSO_4 < SrSO_4$ (D) $MgSO_4 < BeSO_4 < CaSO_4 < SrSO_4$

22. Which salt does not show hydrolysis at all

(A) $MgCl_2$ (B) $BeCl_2$ (C) $AlCl_3$ (D) $BaCl_2$

23. Which alkaline earth metal forms superoxide -

(A) Be (B) Mg (C) Ca (D) None

Paragraph for Q.24 to Q.26

The hardness of natural water is generally caused by presence of bicarbonates, chlorides and sulphates of calcium and magnesium but infact soluble salts that form a scum with soap cause hardness. Hardness of water is two types : (1) temporary hardness. (2) permanent hardness.

24. Temporary hardness is caused due to the presence of -

(A) CO_3^{2-} (B) SO_4^{2-} (C) PO_4^{3-} (D) None

25. In ion exchange resin, cation of hardness producing salt is removed, now the obtained water is not fit for the drinking purpose due to the -

(A) Acidic impurities (B) Basic impurities

(C) Both type of impurities (D) None

26. Permanent hardness is removed by -

(A) Boiling (B) NaCl (C) $CaCl_2$ (D) Na_2CO_3

Paragraph for Q.27 to Q.29

Based on the nuclear spin, hydrogen shows two types of isomers(i) ortho hydrogen (ii) parahydrogen ortho hydrogen, molecular form of hydrogen has same spin of proton, where as in para hydrogen, the molecular form of hydrogen has opposite spin of proton.

27. Find the correct order of internal energy -

(A) Ortho > para (B) para > ortho (C) para = ortho (D) None

28. At room temperature a mixture of ortho and para hydrogen is taken for experiment now temperature of this mixture is reduced to –253ºC (very low). then final mixture will contain -

(A) Only para hydrogen (B) Only ortho hydrogen

(C) 50% ortho and 50% para (D) 25% para and 75% ortho

29. Para and ortho hydrogen have similarity in

(A) Stability (B) Spin of proton

(C) Chemical properties (D) Both (A) and (B) options are correct

Match the column ::

30. Match the column

Column-I (Compound)		**Column-II (Characteristics)**	
(A)	NaH (*l*)	(P)	Covalent hydride
(B)	$TiH_{1.73}$	(Q)	Ionic hydride
(C)	$CaH_2(s)$	(R)	Metallic hydride
(D)	$H_2S(g)$	(S)	Non-conductor of electricity
		(T)	Conduct electricity

31. Match the column

Column-I (Compound)	**Column-II (Characteristics)**
(A) Heavy water	(P) Free from Mg^{2+} and Ca^{2+}
(B) Permanent hardness	(Q) D_2O
(C) Temporary hardness	(R) Bicarbonates of Ca and Mg
(D) Soft water	(S) Sulphates of Mg and Ca
	(T) $CaCO_3$

32. Match the column

Column-I (Compound)	**Column-II (Uses)**
(A) H_2	(P) As rocket fuel
(B) H_2O	(Q) As moderators in nuclear reactors
(C) D_2O	(R) Bleaching agent
(D) H_2O_2	(S) For drinking purpose
	(T) Fuel cell

33.

Column-I	**Column-II**
(A) MgO	(P) Dissolve both in acid and alkali
(B) BeO	(Q) Ingrediant of sorrel's cement
(C) $MgSO_4.7H_2O$	(R) Epsom salt
(D) $MgCl_2.6H_2O$	(S) It forms double salts with alkali metal sulphates
	(T) Suspension in water is not amphoteric

Match the column :

34.

Column-I	**Column-II**
(A) Peroxides	(P) Diamagnetic
(B) Superoxides	(Q) Paramagnetic
(C) Oxides	(R) Bond order is 1.5
(D) Hydroxides	(S) Number of electrons are 17
	(T) Number of electrons are 18.

35.

Column-I	**Column-II**
(A) CaO	(P) Formed by decomposotion of $CaCO_3$
(B) $Ca(OH)_2$	(Q) Formed by treating quick lime with water
(C) $CaSO_4.2H_2O$	(R) Formed by action of H_2SO_4 or soluble-sulphate on any soluble calcium salt.
(D) $CaSO_4.\frac{1}{2}H_2O$	(S) Formed by heating gypsum at 120ºC
	(T) The colour of compound is white.

36.

Column-I		**Column-II**	
(A)	$CaSO_4.2H_2O$	(P)	Soluble in water
(B)	$Na_2CO_3.10H_2O$	(Q)	Insoluble in water
(C)	NaCl	(R)	Used for preparing freezing mixture
(D)	$CaSO_4$ (anhydride)	(S)	Dead burnt
		(T)	Gypsum

Integer ::

37. How many total lone pairs are present in dimer of $BeCl_2$. (give the answer in sum of the digits)

38. All the alkali and alkaline earth metals dissolved in liquid ammonia, but few of them yields the metal on evaporation of ammonia from solution. Find the total number of such metals.
Na, K , Mg, Sr, Ca , Rb , Cs

39. Find the number of metals which react with cold water
Li, Al, Mn, Co, Na, Cr, Pb, Ba

40. Find the number of saline (ionic) hydrides given below.
LiH, $TiH_{1.8}$, RbH, BeH_2, CsH, CH_4, NH_3

HOME ASSIGNMENT # 05

ANSKEY-INORGANIC CHEMISTRY

1.	(A)	2.	(C)	3.	(C)	4.	(A)
5.	(B)	6.	(D)	7.	(C)	8.	(B)
9.	(B)	10.	(D)	11.	(B)	12.	(C)
13.	(D)	14.	(B)	15.	(D)	16.	(B)
17.	(D)	18.	(D)	19.	(A)	20.	-B)
21.	(B)	22.	(D)	23.	(D)	24.	(D)
25.	(A)	26.	(D)	27.	(A)	28.	(A)

29. (C)

30. (A)-Q,T ; (B) -R,T ; (C) -Q, S ; (D) P, S

31. (A)-Q ; (B) -S ; (C) -R ; (D) P

32. (A)-P,T ; (B) -S ; (C) -Q ; (D) P, R

33. (A) - Q, T; (B) -P ; (C) - R, S; (D) -Q

34. (A) - P, T; (B) - Q, R, S; (C) - P ; (D) - P

35. (A) - P, T ; (B) - Q, T; (C) - R, T ; (D) - S, T

36. (A) -Q, T ; (B) - P; (C) - P, R ; (D) - Q, S

37.	(1)	38.	(4)	39.	(3)	40.	(3)

ORGANIC CHEMISTRY

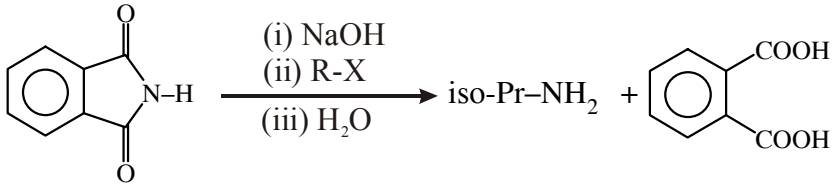
HOME ASSIGNMENT # 05

Topic : Biomolecule, Polymer, Chemistry in Everyday life, Aromatic compound

Only one correct ::

1. Which base is present in RNA but not in DNA

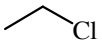
(A) Uracil (B) Cystosine (C) Guanine (D) Thymine

2. 

R – X, is-

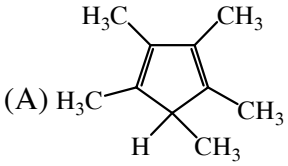
(A)

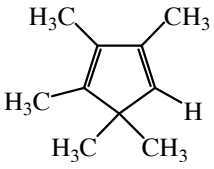
(B) 

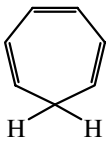
(C) 

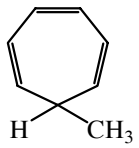
(D) None of these

3. Which one of the hydrocarbon is the most acidic

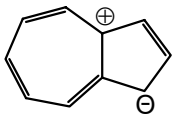
(A) 

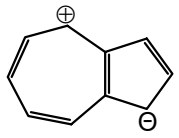
(B) 

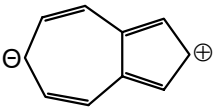
(C) 

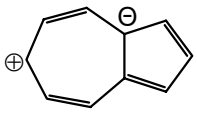
(D) 

4. Among the resonating forms given below, the one which contributes most to be stability of azulene is-

(A) 

(B) 

(C) 

(D) 

5. D-glucose $\xrightarrow[(ii)H_3O^{\oplus}]{(i)\,NaCN/HCN}_{(iii)\,HI/P}$ (A)

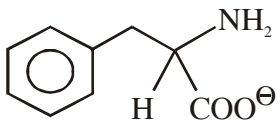
D-fructose $\xrightarrow[(ii)H_3O^{\oplus}]{(i)\,NaCN/HCN}_{(iii)\,HI/P}$ (A')

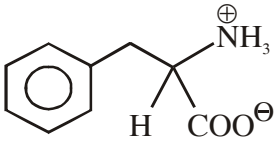
Select the correct statement regarding products A and A'

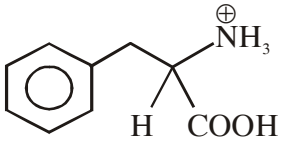
(A) Both are chain isomer (B) Both are position isomer

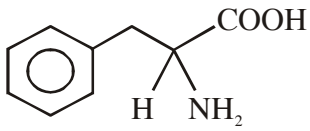
(C) Both are same molecule (D) Both are diastereomer

6. The structure phenyl alanine at 5.5 pH

(A) 

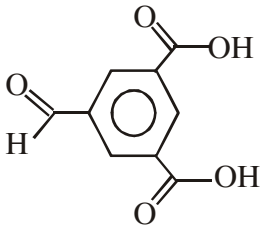
(B) 

(C) 

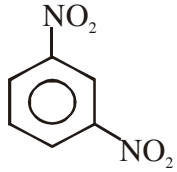
(D) 

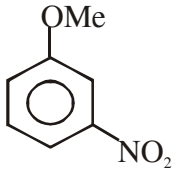
7. The addition polymer which is/are co-polymer

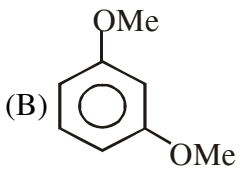
(i) Neoprene
(ii) Buna-N
(iii) Nylon-66
(iv) SBR
(A) only iv
(B) ii & iv
(C) iii & iv
(D) ii, iii & iv

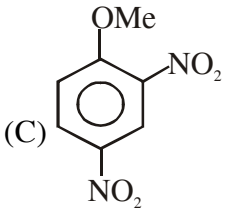
8. IUPAC name of 

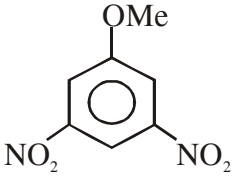
(A) 3,5-dicarboxybenzaldehyde
(B) 3-carboxy-5-formyl benzoic acid
(C) 5-formylbenzene-1,3 -dicarboxylic acid
(D) 3-carboxy-5-formyl benzene carboxylic acid

9.  $\xrightarrow[K_3[Fe(CN)_6]]{\overset{\oplus}{Na}\overset{\ominus}{O}Me}$ (P), the product 'P' of the reaction may be

(A) 

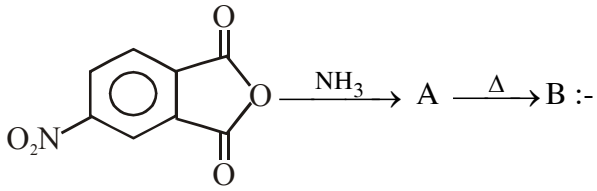
(B) 

(C) 

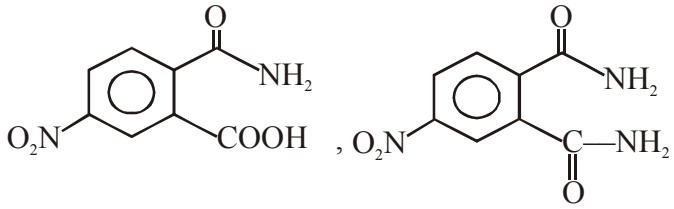
(D) 

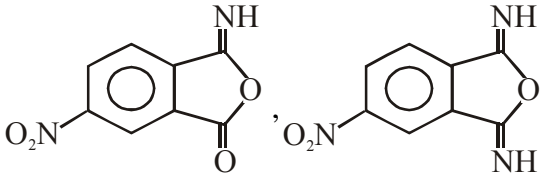
10. What is the correct option regarding maltose?

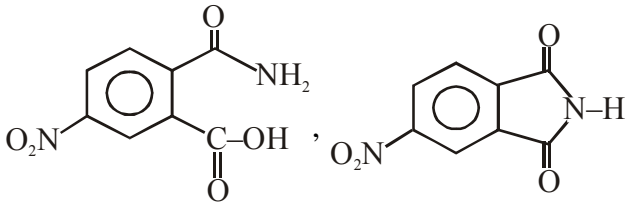
(A) It is example of monosaccharide
(B) On hydrolysis it gives β-D-glucose
(C) No. of chiral centre present in maltose is 9.
(D) It is example of α hydroxy ether.

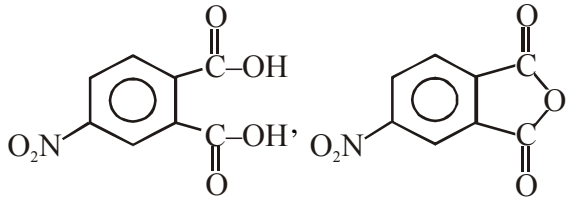
11. 

Products A & B are respectively :-

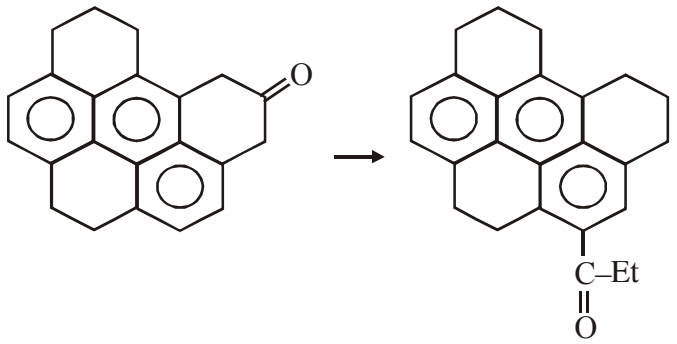
(A) 

(B) 

(C) 

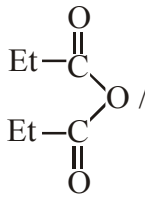
(D) 

12



Best yield for the above conversion can be obtained by:-

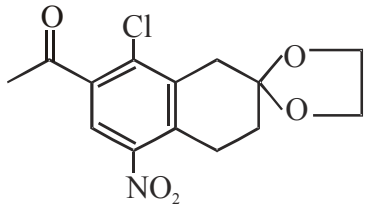
(A) (A) $Et-\overset{O}{\overset{\|}{C}}-Cl / AlCl_3$, (B) NH_2-NH_2 / KOH (B)

(A)  /$AlCl_3$, (B)  (C) H_2/Ni

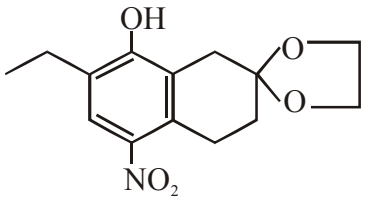
(C) (A) Zn/Hg/HCl, (B) $Et-\overset{O}{\overset{\|}{C}}-Cl / AlCl_3$

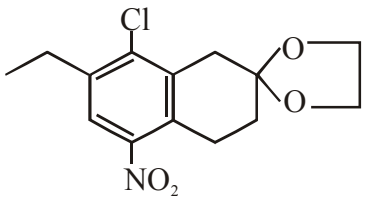
(D) (A)  (B)) $Et-\overset{O}{\overset{\|}{C}}-Cl / AlCl_3$ (C) H_2/Ni

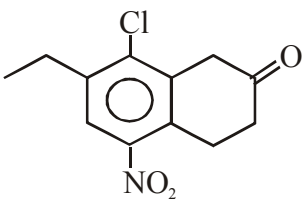
13. Predict the major product of the **given reaction :-**

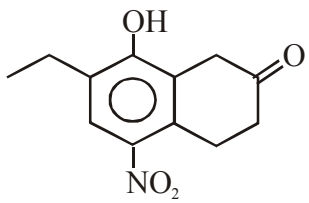


(A) (major)

(A) 

(B) 

(C) 

(D) 

14. Polyvinyl alcohol $\left[-CH_2-\underset{OH}{CH}-CH_2-\underset{OH}{CH}-CH_2-\underset{OH}{CH}-\right]_n$ is a unique polymer, having high affinity for water, which of the following procedures would be most suitable for its preparation ?

(A) Radical chain polymerisation of $CH_2=CH-CH_2-OH$

(B) Radical chain polymerisation of $CH_2 = CH - OH$

(C) Radical chain polymerisation of $CH_2=CH - CO_2CH_3$, following by base catalysed hydrolysis

(D) Radical chain polymerisation of $CH_2 = CH - OCOCH_3$, followed by base catalysed hydrolysis

15. Observe the following two set/s of reactions (I and II) select the true & false statements:-

Set-I

(1) $C_6H_6 \xrightarrow{NO_2^{\oplus}} C_6H_5NO_2 + H^+$

(2) $C_6D_6 \xrightarrow{NO_2^{+}} C_6D_5NO_2 + D^+$

Set-II

(1) $CH_3 - CH_2 - Br \xrightarrow[\Delta]{C_2H_5O^-} CH_2=CH_2$

(2) $CD_3 - CH_2 - Br \xrightarrow[\Delta]{C_2H_5O^-} CD_2=CH_2$

Statement - I

In Set -I $\dfrac{K_{C_6H_6}}{K_{C_6D_6}} = 6.0$

Statement - II

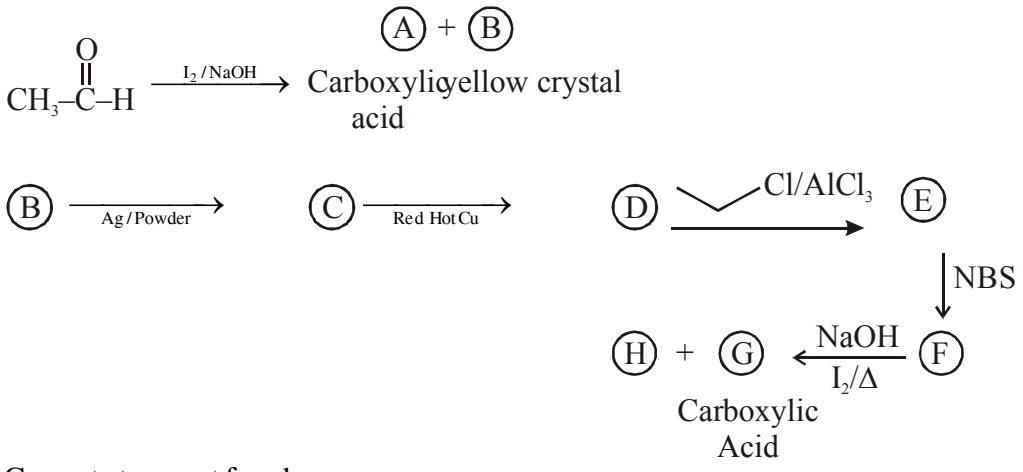
In set-II $\dfrac{K_{CH_3CH_2Br}}{K_{CD_3CH_2Br}} = 1.0$

Statement - III

In both cases the ratio of rate constant is less then one.

(A) FFF (B) TFF (C) FTF (D) FTT

16.



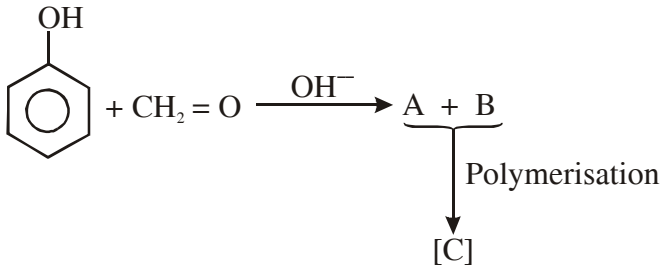
Correct staement for above sequence

(A) (A) & (G) are same (B) (B) & (H) are same

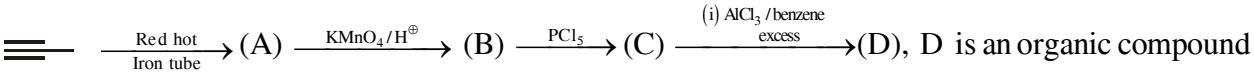
(C) (F) is a Ketone (D) Reaction sequence involve haloform reaction & friedel craft Acylation

One or more than may be correct ::

17. Which of the following exhibit mutarotation -
(A) Glucose (B) Maltose (C) Fructose (D) Galactose

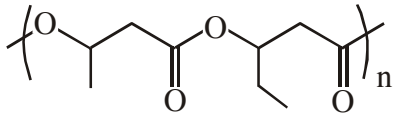
18. 

Which of the following statements is/are correct about the polymer -
(A) It is thermoplastic polymer
(B) It is thermosetting polymer
(C) It is used in the manufacture of adhesive
(D) It is used in the manufacture of switches and plugs

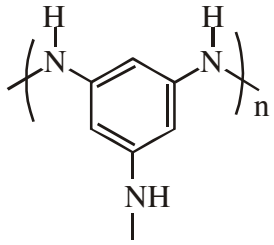
19. 

Select the correct statement regarding final product 'D'
(A) Index of hydrogen deficiency of final product are 19
(B) Characterstics reaction of final product (D) is electrophilic addition reaction
(C) Reactivity of final product with MeMgBr is less than MeCHO
(D) Final product is aromatic in nature

20. The correct statement among following is/are -

(A)  is biodegradable polymer.

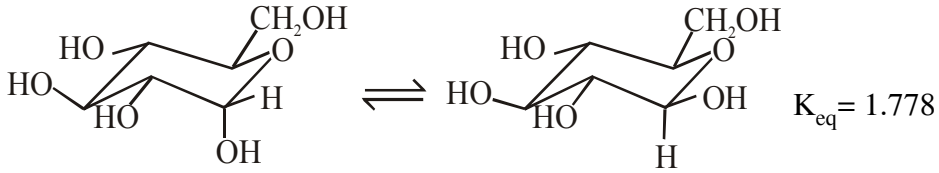
(B) Buna-N can be prepared by copolymerisation of 1,3-butadiene and acrylonitrile

(C)  can be prepared by polymerisation malamine & Acetaldehyde

(D) Melamine polymer are used to form unbreakable crockery.

21. The incorrect statement among following is /are
(A) Cellulose is kind of polysaccharide having 1,4 –α-D-glycosidic linkage
(B) Lactose is a disaccharide madeup of α–D-galactose & α–D-glucose units.
(C) The amino acid which are not synthesised in our body are known as non-essential amino acid because such amino are not necessary for our body growth.
(D) Glycosidic bond is stronger than peplide bonds

22. Which of the following statement(s) is/are true for the given equilibrium ?



(X) (Y)

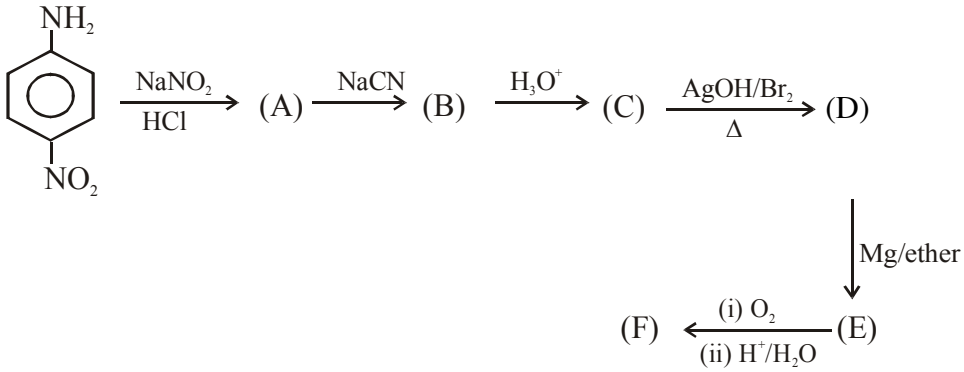
(A) The optical rotation of the solution is a function of time before the attainment of equilibrium

(B) The optical rotation of solution at quilibrium equals to zero due to the formation of racemic mixture

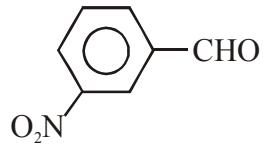
(C) They form mixture of distereomers and during the process of attainment of equilibrium mutarotation takes place

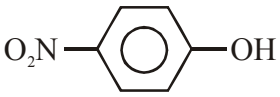
(D) % of Y at equilibrium is 64% and (Y) is more stable than (X)

23.



Which of the following statement(s) is/are correct for above reaction sequence

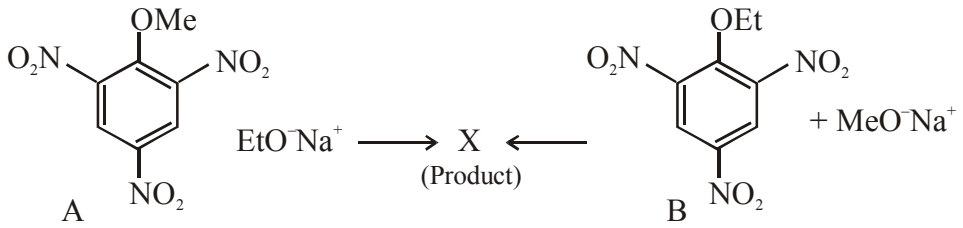
(A) (D) is 

(B) (F) is 

(C) Generation of (A) is diazotisation

(D) (C) is carboxylic acid

24.



Which of the following is correct -

(A) X is called meisenheimer complex

(B) In X, carbanion is stabilized by 3 nitro group present in the ring

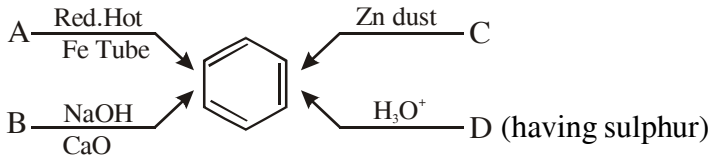
(C) It is example of electrophilic substitution

(D) Product is ionic.

25. Which of the following are condensation copolymer ?
(A) Nylon-6 (B) Nylon-6,6 (C) Dacron (D) Glyptal

Paragraph ::

Paragraph for Q.26 to Q.28

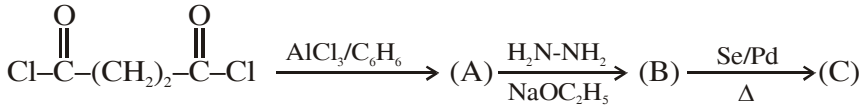


26. Among the following reactants, which one is most acidic -
(A) A (B) B (C) C (D) D

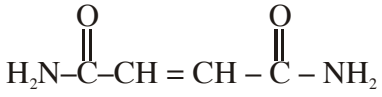
27. Which of the reactant will give violet colour with neutral $FeCl_3$
(A) A (B) B (C) C (D) D

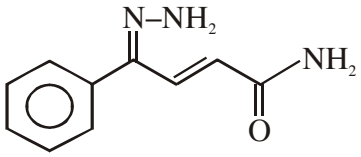
28. Which reactant can evolve effervescence of CO_2 when treated with $NaHCO_3$.
(A) A (B) B (C) D (D) Both (B) & (D)

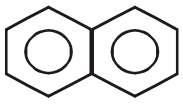
Paragraph for Q.29 to Q.31

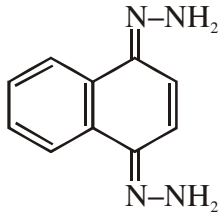


29. Identify compound (C) among following.

(A) 

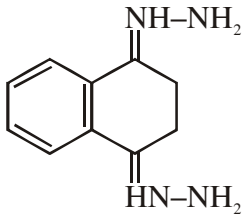
(B) 

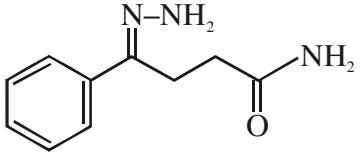
(C) 

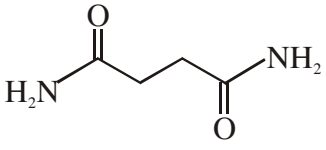
(D) 

30. The attacking species during formation of compound 'A' is
(A) Carbocation (B) Carbanion
(C) Carbene (D) Carbonradical

31. Compound 'B' in above reaction

(A) 

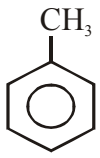
(B) 

(C) 

(D) None of these

Paragraph for Q.32 to Q.34

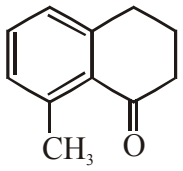
2-methyl napthalene can be synthesised from towere throughthe following sequence of reactions.

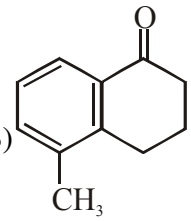

+ succinic anhydride $\xrightarrow{AlCl_3}$ $C_{11}H_{12}O_3$ $\xrightarrow{Zn/Hg/HCl}$ (B) $C_{11}H_{14}O_2$ $\xrightarrow{SOCl_2}$

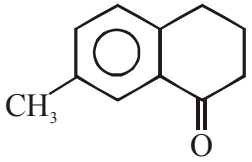
(C) $C_{11}H_{13}ClO$ $\xrightarrow{AlCl_3}$ (D) $C_{11}H_{12}O$ $\xrightarrow{NaBH_4}$ (E) $C_{11}H_{14}O$ $\xrightarrow[\Delta]{H_2SO_4}$ (F) $C_{11}H_{12}$

$\xrightarrow{NBS}$ $C_{11}H_{11}Br$ $\xrightarrow[EtOH/\Delta]{NaOEt}$ 2-methylnapthalene -

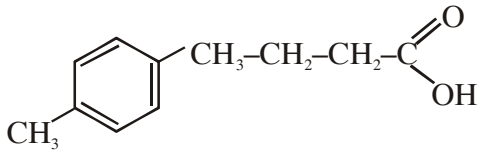
32. (D) is

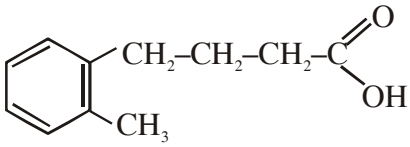
(A) 

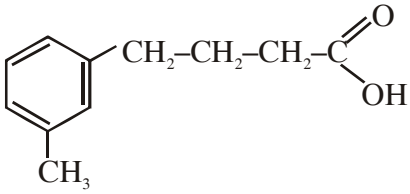
(B) 

(C)  (D) None

33. (B) is

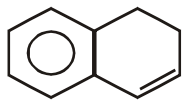
(A) 

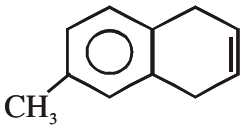
(B) 

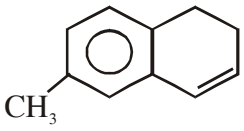
(C) 

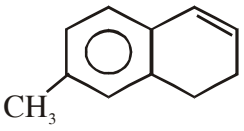
(D) None

34. (F) is

(A) 

(B) 

(C) 

(D) 

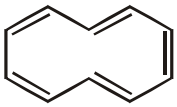
Match the column ::

Match the column :

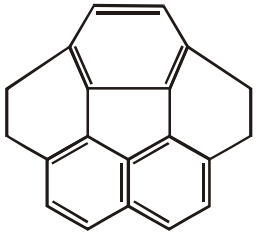
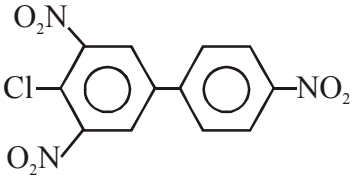
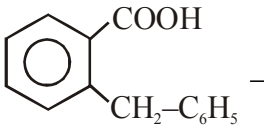
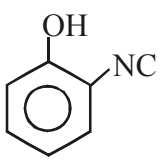
35.

Column-I		Column-II	
(A)	Synthetic polymer	(P)	PVC
(B)	Natural polymer	(Q)	Phenol formaldehyde resin/bakelite
(C)	Thermoplastic polymer	(R)	Terylene
(D)	Thermosetting polymer	(S)	Gutta purcha
		(T)	Proteins

36 Match Column-I with Column-II

Column-I	**Column-II**
(A) 	(P) Aromatic
(B) 	(Q) Anti-aromatic
(C) 	(R) Non-aromatic
(D) 	(S) Dimerise at room temperature
	(T) Planar

37.

Column-I	**Column-II**
(A)  $\xrightarrow[\Delta]{Pd/C}$ Product	(P) Rearrangement of intermediate
(B)  $\xrightarrow{CH_3-NH-CH_3}$ Product	(Q) Electrophilic substitution
(C)  $\xrightarrow[(ii)AlCl_3/H^+ \\ (iii)Zn/Hg/HCl]{(i)\ SOCl_2}$ Product	(R) No of carbon atoms remain same in reactants & products
(D) $C_7H_6O_3 \xrightarrow[(2)NH_3 \\ (3)Br_2/KOH/\Delta \\ (4)CHCl_3/KOH]{(1)SOCl_2}$ 	(S) Aromatic nucleophilic substitution
	(T) Elimination

38.

Column I componds		**Column II** Epimer
(a)	C-2 Epimer of D-glucose	(p) D-Allose
(b)	C-3 Epimer of D-glucose	(q) D-Mannose
(c)	C-4 Epimer of D-glucose	(r) D-Indose
(d)	C-2 Epimer of D-altrose	(s) D-Galactose
(e)	C-2 Epimer of D-gulose	

Integer ::

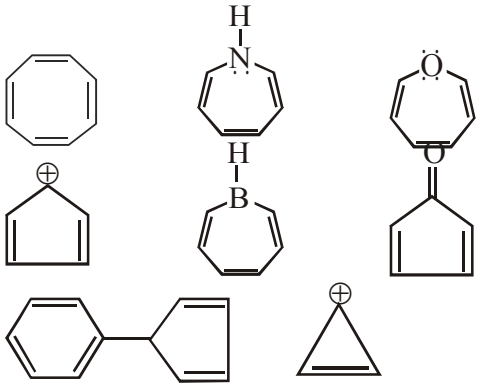
39 The optical rotation for the α-form of a pyranose is 140° , that of the β-form is +53°. In the solution of equilibrium mixture of these anomers has an optical rotation of 80° . The % of β form in the mixture.

40. 

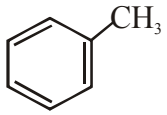
What are the values of X , Y and Z .

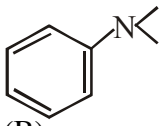
For example if X is 1 , Y is 2 and Z is 3 then write 123 as your answer.

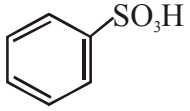
41. How many of the following compounds are antiaromatic.



42.


(A)


(B)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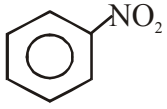
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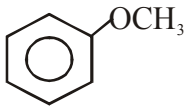
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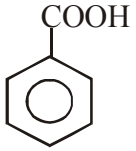
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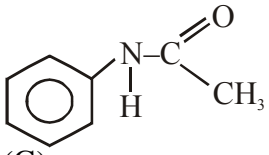
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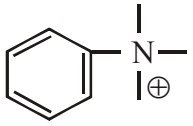
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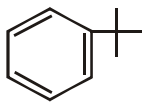
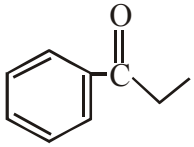

(I)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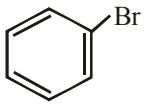
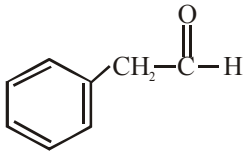
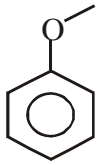
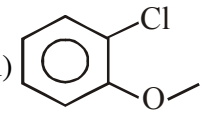
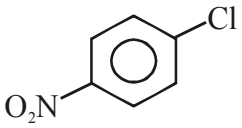
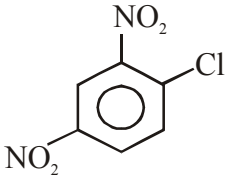
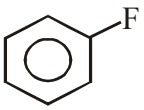
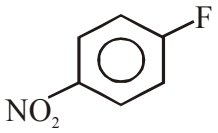
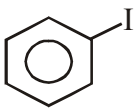
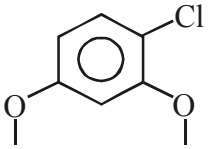
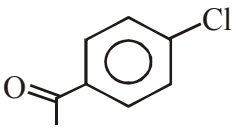

(K)


(L)

No. of compounds from above which undergo electrophilic substitution (nitration) faster than benzene +

No. of compounds which give meta substituted product as major product in electrophilic bromination condition.

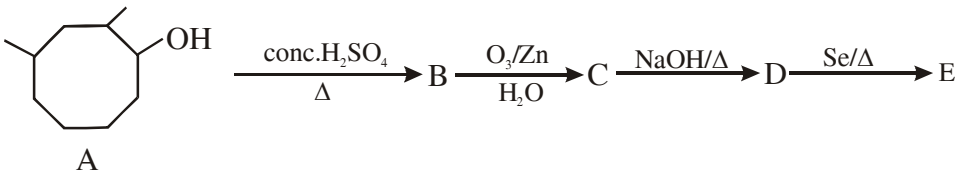
43. The compound which are more reactive than chlorobenzene during reaction with NaOMe

(i) 
(ii) 
(iii) 
(iv) 
(v) 
(vi) 
(vii) 
(viii) 
(ix) 

44. Number of d-isomer of glucose

45. Aromatic compound which are less reactive than benzene towards chlorination by $Cl_2/AlCl_3$

(i) C_6D_6 (ii) C_6T_6 (iii) Phenylbenzoate (iv) Anisol
(v) Phenol (vi) Benzldehyde (vii) Benzamide (viii) N-phenylacetanide



A

46. Find out the degree of unsaturation (DOU) in compoud E

(i) 2 (ii) 3 (iii) 4 (iv) 5

47. How many alcohols are possible which can form B as a major product (excluding stereoisomers)

(i) 4 (ii) 6 (iii) 7 (iv) 5

48. Find out the total possible stereoisomers of compound B

(i) 2 (ii) 3 (iii) 4 (iv) 6

HOME ASSIGNMENT # 05

ANSWERS KEY-ORGANIC CHEMISTRY

1.	(A)	2.	(B)	3.	(A)	4.	(B)
5.	(A)	6.	(B)	7.	(C)	8.	(C)
9.	(C)	10.	(D)	11.	(C)	12	(C)
13.	(A)	14.	(D)	15.	(A)	16.	(B)
17.	(A, B, ,C,D)	18.	(B, D)	19.	(A,C,D)	20.	(A, B, D)
21.	(A,B,C,D)	22.	(A,C,D)	23.	(B,C,D)	24.	(A,B,D)
25.	(A,B,C,D)	26.	(D)	27.	(C)	28.	(D)
29.	(C)	30.	(A)	31.	(D)	32.	(C)
33.	(A)	34.	(C)				

35. (A) - P, R; (B) - S, T ; (C) - P ; (D)- Q

36 (A)-P, T, (B)-R, (C)-Q,S,T (D)-P,T

37. (A) -(R), (T) ; (B) - (S) ; (C) - (R), (Q) ; (D)-(R),(P)

38. (a)→q, (b)→p, (c)→s, (d)→p, (e)→r

39	(69)	40.	X = 5 , Y = 5, Z = 1			41.	(2)
42.	(11)	43.	(5)	44.	(8)	45.	(2)
46.	(5)	47.	(4)	48.	(4)		