FINAL JEE–MAIN EXAMINATION – JANUARY, 2023

(Held On Tuesday 31st January, 2023) **TIME : 9 : 00 AM to 12 : 00 NOON**

CHEMISTRY

TEST PAPER WITH ANSWER

SECTION-A

31. Nd^{2+} = _____

(1) $4f^2 6s^2$

(2) $4f^4$

(3) $4f^3$

(4) $4f^4 6s^2$

Official Ans. by NTA (2)

Allen Ans. (2)

32. The methods NOT involved in concentration of ore are

(A) Liquation

(B) Leaching

(C) Electrolysis

(D) Hydraulic washing

(E) Froth floatation

Choose the correct answer from the options given below :

(1) B, D and C only

(2) C, D and E only

(3) A and C only

(4) B, D and E only

Official Ans. by NTA (3)

Allen Ans. (3)

33. Consider the following reaction

$$\text{Propanal} + \text{Methanal} = \xrightarrow[\substack{\text{(ii)}\Delta \\ \text{(iii)NaCN} \\ \text{(iv)}H_3O^+}]{\text{(i)dil.NaOH}} \text{Product B } (C_5H_8O_3)$$

The correct statement for product B is. It is

(1) optically active and adds one mole of bromine

(2) racemic mixture and is neutral

(3) racemic mixture and gives a gas with saturated $NaHCO_3$ solution

(4) optically active alcohol and is neutrall

Official Ans. by NTA (3)

Allen Ans. (3)

34. The correct order of basicity of oxides of vanadium is

(1) $V_2O_3 > V_2O_4 > V_2O_5$

(2) $V_2O_3 > V_2O_5 > V_2O_4$

(3) $V_2O_5 > V_2O_4 > V_2O_3$

(4) $V_2O_4 > V_2O_3 > V_2O_5$

Official Ans. by NTA (1)

Allen Ans. (1)

35. When Cu^{2+} ion is treated with KI, a white precipitate, X appears in solution. The solution is titrated with sodium thiosulphate, the compound Y is formed. X and Y respectively are

(1) $X = Cu_2I_2$ $Y=Na_2S_4O_5$

(2) $X=Cu_2I_2$ $Y=Na_2S_4O_6$

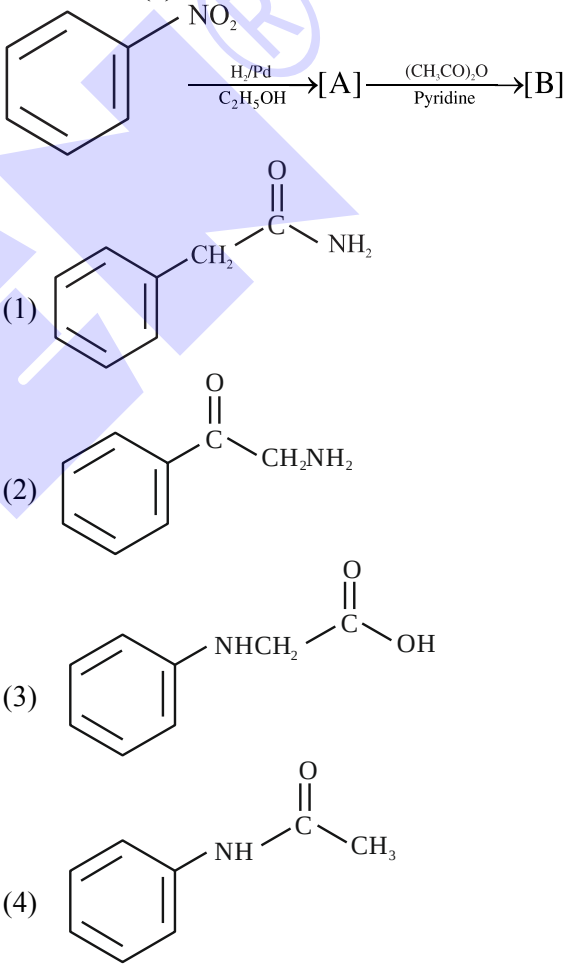
(3) $X=CuI_2$ $Y=Na_2S_4O_3$

(4) $X=CuI_2$ $Y=Na_2S_4O_6$

Official Ans. by NTA (2)

Allen Ans. (2)

36.



Official Ans. by NTA (4)

Allen Ans. (4)

37. Cobalt chloride when dissolved in water forms pink colored complex X which has octahedral geometry. This solution on treating with cone HCl forms deep blue complex, Y which has a Z geometry. X, Y and Z, respectively, are

(1) $X=[Co(H_2O)_6]^{2+}$, $Y=[CoCl_4]^{2-}$, Z=Tetrahedral

(2) $X=[Co(H_2O_6)]^{2+}$, $Y=[CoCl_6]^{3-}$, Z=Octahedral

(3) $X=[Co(H_2O)_6]^{3+}$, $Y=[CoCl_6]^{3-}$, Z=Octahedral

(D) $X=[Co(H_2O)_4Cl_2]^{+}$, $Y=[CoCl_4]^{2-}$, Z=Tetrahedral

Official Ans. by NTA (1)

Allen Ans. (1)

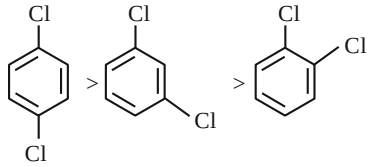
38. Identify X, Y and Z in the following reaction. (Equation not balanced)

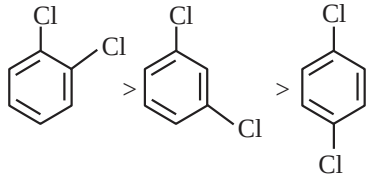
$$Cl\dot{O} + NO_2 \rightarrow \underline{X} \xrightarrow{H_2O} \underline{Y} + \underline{Z}$$

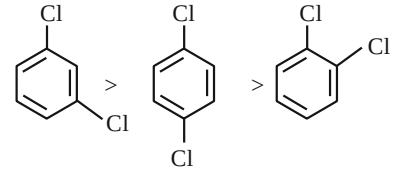
(1) X=$ClONO_2$, Y=HOCl, Z = NO_2
(2) X=$ClNO_2$, Y=HCl, Z=HNO_3
(3) X=$ClONO_2$, Y=HOCl, Z=HNO_3
(4) X=$ClNO_3$, Y=Cl_2, Z=NO_2

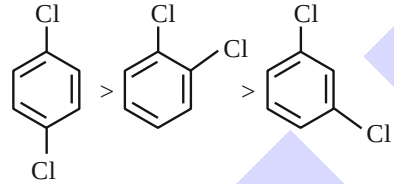
Official Ans. by NTA (3)
Allen Ans. (3)

39. The correct order of melting point of dichlorobenzenes is

(1) 

(2) 

(3) 

(4) 

Official Ans. by NTA (4)
Allen Ans. (4)

40. A protein 'X' with molecular weight of 70,000 u, on hydrolysis gives amino acids. One of these amino acid is

(1) $NH_2-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2CH_2COOH$

(2) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-\underset{\displaystyle NH_2}{\underset{|}{CH}}-COOH$

(3) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-\underset{\displaystyle NH_2}{\underset{|}{CH}}-CH_2COOH$

(4) $CH_3-\underset{\displaystyle NH_2}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-CH_2-CH_2COOH$

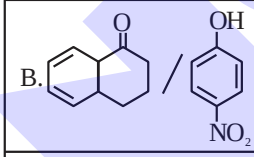
Official Ans. by NTA (2)
Allen Ans. (2)

41. Which transition in the hydrogen spectrum would have the same wavelength as the Balmer type transition from n=4 to n = 2 of He^+ spectrum

(1) n = 2 to n = 1
(2) n = 1 to n = 3
(3) n = 1 to n = 2
(4) n = 3 to n = 4

Official Ans. by NTA (1)
Allen Ans. (1)

42. Match items of column I and II

Column I (Mixture of compounds)	Column II (Separation Technique)
A. H_2O/CH_2Cl_2	i. Crystallization
B. 	ii. Differential solvent extraction
C. Kerosene/Naphthalene	iii. Column chromatography
D. $C_6H_{12}O_6$/NaCl	iv. Fractional Distillation

Correct match is :
(1) A-(iii), B-(iv), C-(ii), D-(i)
(2) A-(i), B-(iii), C-(ii), D-(iv)
(3) A-(ii), B-(iii), C-(iv), D-(i)
(4) A-(ii), B-(iv), C-(i), D-(iii)

Official Ans. by NTA (3)
Allen Ans. (3)

43. The correct increasing order of the ionic radii is

(1) $Cl^- < Ca^{2+} < K^+ < S^{2-}$
(2) $K^+ < S^{2-} < Ca^{2+} < Cl^-$
(3) $S^{2-} < Cl^- < Ca^{2+} < K^+$
(4) $Ca^{2+} < K^+ < Cl^- < S^{2-}$

Official Ans. by NTA (4)
Allen Ans. (4)

44. H_2O_2 acts as a reducing agent in

(1) $2NaOCl + H_2O_2 \rightarrow 2NaCl + H_2O + O_2$
(2) $2Fe^{2+} + 2H^+ + H_2O_2 \rightarrow 2Fe^{3+} + 2H_2O$
(3) $Mn^{2+} + 2H_2O_2 \rightarrow MnO_2 + 2H_2O$
(4) $Na_2S + 4H_2O_2 \rightarrow Na_2SO_4 + 4H_2O$

Official Ans. by NTA (1)
Allen Ans. (1)

45. Which of the following artificial sweeteners has the highest sweetness value in comparison to cane sugar?

(1) Aspartame

(2) Sucralose

(3) Alitame

(4) Saccharin

Official Ans. by NTA (3)

Allen Ans. (3)

46. Match List I with List II

List I	List II
A. XeF_4	I. See – saw
B. SF_4	II. Square planar
C. NH_4^+	III. Bent T – shaped
D. BrF_3	IV. Tetrahedral

Choose the correct answer from the options given below :

(1) A-IV, B-III, C-II, D-I

(2) A-II, B-I, C-III, D-IV

(3) A-IV, B-I, C-II, D-III

(4) A-II, B-I, C-IV, D-III

Official Ans. by NTA (4)

Allen Ans. (4)

47. Choose the correct set of reagents for the following conversion

trans (Ph-CH=CH–CH_3) $\rightarrow$ cis (Ph-CH=CH–CH_3)

(1) Br_2, alc KOH, $NaNH_2$, Na(Liq NH_3)

(2) Br_2, alc KOH, $NaNH_2$, H_2 Lindlar Catalyst

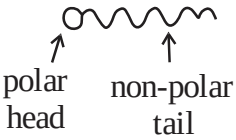
(3) Br_2, aq KOH, $NaNH_2$, H_2 Lindlar Catalyst

(4) Br_2, aq KOH, $NaNH_2$, Na(Liq NH_3)

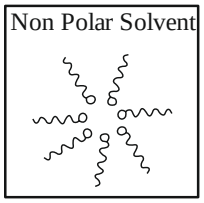
Official Ans. by NTA (2)

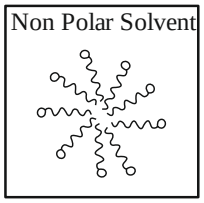
Allen Ans. (2)

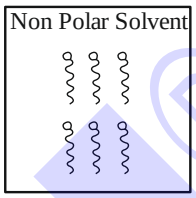
48. Adding surfactants in non polar solvent, the micelles structure will look like

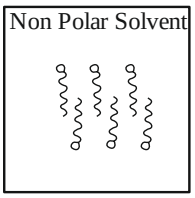


(Surfactant structure)

(a) 

(b) 

(c) 

(d) 

(1) b

(2) c

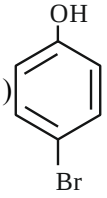
(3) a

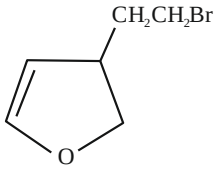
(4) d

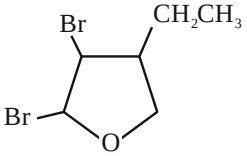
Official Ans. by NTA (3)

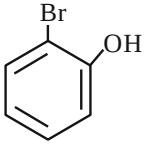
Allen Ans. (3)

49. An organic compound 'A' with empirical formula C_6H_6O gives sooty flame on burning. Its reaction with bromine solution in low polarity solvent results in high yield of B. B is

(1) 

(2) 

(3) 

(4) 

Official Ans. by NTA (1)

Allen Ans. (1)

50. Which one of the following statements is correct for electrolysis of brine solution?

(1) Cl_2 is formed at cathode

(2) O_2 is formed at cathode

(3) H_2 is formed at anode

(4) OH^- is formed at cathode

Official Ans. by NTA (4)

Allen Ans. (4)

SECTION-B

51. The logarithm of equilibrium constant for the reaction $Pd^{2+} + 4Cl^- \rightleftharpoons PdCl_4^{2-}$ is _____ (Nearest integer)

$$\text{Given}: \frac{2.303RT}{F} = 0.06V$$

$$Pd^{2+}_{(aq)} + 2e^- \rightleftharpoons Pd(s) \quad E^o = 0.83V$$

$$PdCl_4^{2-}(aq) + 2e^- \rightleftharpoons Pd(s) + 4Cl^-(aq)$$

$$E^o = 0.65V$$

Official Ans. by NTA (6)

Allen Ans. (6)

52. $A \rightarrow B$

The rate constants of the above reaction at 200 K and 300K are 0.03 min^{-1} and 0.05 min^{-1} respectively. The activation energy for the reaction is _____ J (Nearest integer)

(Given : In 10 = 2.3

$R = 8.3\ J\ K^{-1}\ mol^{-1}$

log5 = 0.70

log3=0.48

log2 = 0.30

Official Ans. by NTA (2520)

Allen Ans. (2520)

53. The enthalpy change for the conversion of $\frac{1}{2}Cl_2(g)$ to $Cl^-(aq)$ is (-) _____ kJ mol^{-1} (Nearest integer)

Given : $\Delta_{dis}H^o_{Cl_{2(g)}} = 240 kJmol^{-1}$.

$\Delta_{eg}H^o_{Cl_{(g)}} = -350 kJmol^{-1}$,

$\Delta_{hyd}H^o_{Cl^-_{(g)}} = -380 kJmol^{-1}$

Official Ans. by NTA (610)

Allen Ans. (610)

54. On complete combustion, 0.492 g of an organic compound gave 0.792 g of CO_2.

The % of carbon in the organic compound is _____ (Nearest integer)

Official Ans. by NTA (44)

Allen Ans. (44)

55. At 27°C, a solution containing 2.5 g of solute in 250.0 mL of solution exerts an osmotic pressure of 400 Pa. The molar mass of the solute is ____ g mol^{-1} (Nearest integer)

(Given : R = 0.083 L bar K^{-1} mol^{-1})

Official Ans. by NTA (62250)

Allen Ans. (62250)

56. Zinc reacts with hydrochloric acid to give hydrogen and zinc chloride. The volume of hydrogen gas produced at STP from the reaction of 11.5 g of zinc with excess HCl is _____ L (Nearest integer)

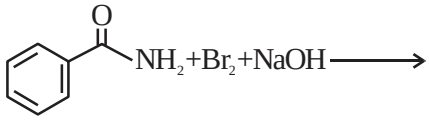
(Given : Molar mass of Zn is 65.4g mol^{-1} and

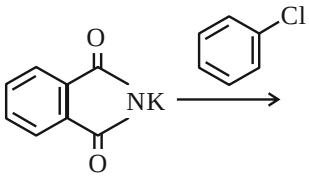
Molar volume of H_2 at STP = 22.7L)

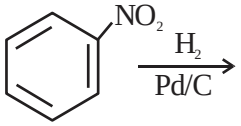
Official Ans. by NTA (4)

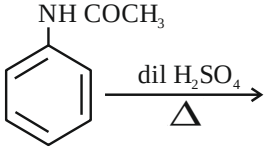
Allen Ans. (4)

57. How many of the transformation given below would result in aromatic amines?

(1) 

(2) 

(3) 

(4) 

Official Ans. by NTA (3)

Allen Ans. (3)

58. For reaction : $SO_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons SO_3(g)$

$K_P = 2 \times 10^{12}$ at 27°C and 1 atm pressure. The K_c for the same reaction is _____ $\times 10^{13}$. (Nearest integer)

(Given R = 0.082 L atm K^{-1} mol^{-1})

Official Ans. by NTA (1)

Allen Ans. (1)

59. The oxidation sate of phosphorus in hypophosphoric acid is + _____ .

Official Ans. by NTA (4)

Allen Ans. (4)

60. The total pressure of a mixture of non-reacting gases X (0.6 g) and Y (0.45 g) in a vessel is 740 mm of Hg. The partial pressure of the gas X is _____ mm of Hg. (Nearest Integer)

(Given : molar mass X = 20 and Y = 45 g mol^{-1})

Official Ans. by NTA (555)

Allen Ans. (555)