

FINAL JEE-MAIN EXAMINATION – JANUARY, 2023

(Held On Wednesday 01st February, 2023)

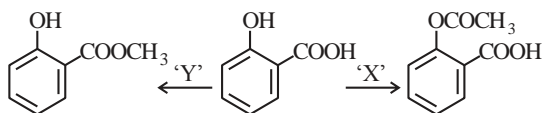
TIME : 3 : 00 PM to 6 : 00 PM

CHEMISTRY

TEST PAPER WITH ANSWER

SECTION-A

31. In a reaction,



reagents 'X' and 'Y' respectively are :

- (1) $(\text{CH}_3\text{CO})_2\text{O}/\text{H}^+$ and $\text{CH}_3\text{OH}/\text{H}^+$, Δ
- (2) $(\text{CH}_3\text{CO})_2\text{O}/\text{H}^+$ and $(\text{CH}_3\text{CO})_2\text{O}/\text{H}^+$
- (3) $\text{CH}_3\text{OH}/\text{H}^+$, Δ and $\text{CH}_3\text{OH}/\text{H}^+$, Δ
- (4) $\text{CH}_3\text{OH}/\text{H}^+$, Δ and $(\text{CH}_3\text{CO})_2\text{O}/\text{H}^+$

Official Ans. by NTA (1)

Ans. (1)

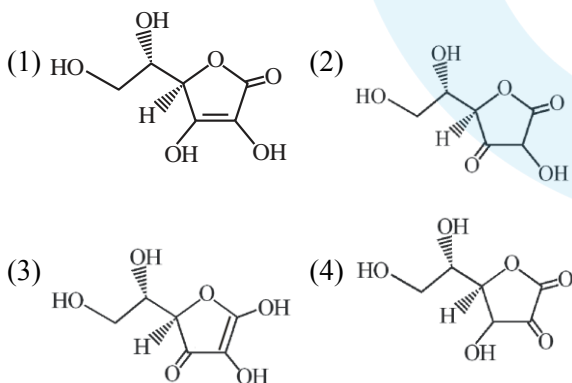
32. The correct order of bond enthalpy (kJ mol^{-1}) is :

- (1) $\text{Si} - \text{Si} > \text{C} - \text{C} > \text{Sn} - \text{Sn} > \text{Ge} - \text{Ge}$
- (2) $\text{Si} - \text{Si} > \text{C} - \text{C} > \text{Ge} - \text{Ge} > \text{Sn} - \text{Sn}$
- (3) $\text{C} - \text{C} > \text{Si} - \text{Si} > \text{Sn} - \text{Sn} > \text{Ge} - \text{Ge}$
- (4) $\text{C} - \text{C} > \text{Si} - \text{Si} > \text{Ge} - \text{Ge} > \text{Sn} - \text{Sn}$

Official Ans. by NTA (4)

Ans. (4)

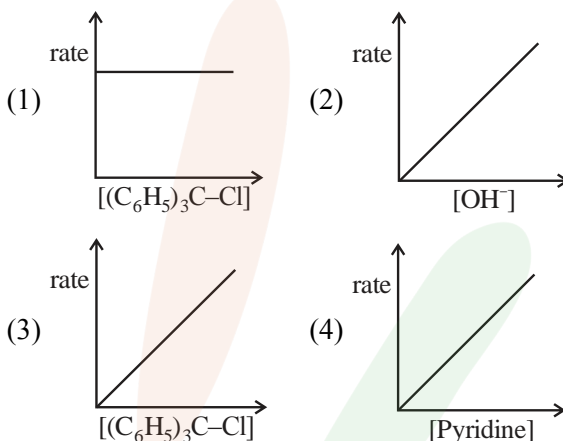
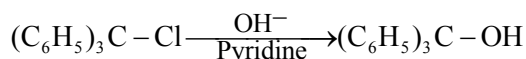
33. All structures given below are of vitamin C. Most stable of them is :



Official Ans. by NTA (1)

Ans. (1)

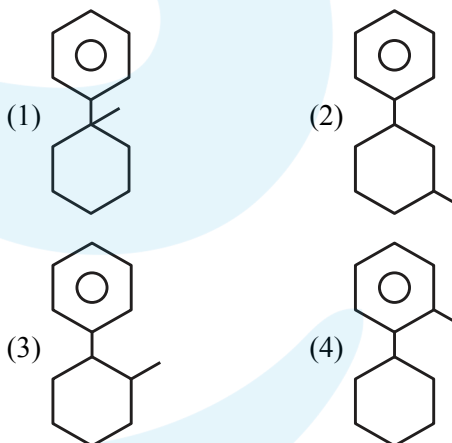
34. The graph which represents the following reaction is :



Official Ans. by NTA (3)

Ans. (3)

35. 'X' is : Major product



Official Ans. by NTA (1)

Ans. (1)

36. The complex cation which has two isomers is :

- (1) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$
- (2) $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$
- (3) $[\text{Co}(\text{NH}_3)_5\text{NO}_2]^{2+}$
- (4) $[\text{Co}(\text{NH}_3)_5\text{Cl}]^+$

Official Ans. by NTA (3)

Ans. (3)

37. Given below are two statements :

Statement I : Sulphanilic acid gives esterification test for carboxyl group.

Statement II : Sulphanilic acid gives red colour in Lassigne's test for extra element detection.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

- (1) **Statement I** is correct but **Statement II** is incorrect.
- (2) Both **Statement I** and **Statement II** are incorrect.
- (3) Both **Statement I** and **Statement II** are correct.
- (4) **Statement I** is incorrect but **Statement II** is correct.

Official Ans. by NTA (4)

Ans. (4)

38. Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Gypsum is used for making fireproof wall boards.

Reason (R) : Gypsum is unstable at high temperatures.

In the light of the above statements, choose the **correct** answer from the options given below :

- (1) Both **(A)** and **(R)** are correct but **(R)** is not the correct explanation of **(A)**.
- (2) **(A)** is correct but **(R)** is not correct.
- (3) **(A)** is not correct but **(R)** is correct.
- (4) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.

Official Ans. by NTA (1)

Ans. (1)

39. Which element is not present in Nessler's reagent ?

- | | |
|-------------|---------------|
| (1) Mercury | (2) Potassium |
| (3) Iodine | (4) Oxygen |

Official Ans. by NTA (4)

Ans. (4)

40. Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : α -halocarboxylic acid on reaction with dil. NH_3 gives good yield of α -amino carboxylic acid whereas the yield of amines is very low when prepared from alkyl halides.

Reason (R) : Amino acids exist in zwitter ion form in aqueous medium.

In the light of the above statements, choose the **correct** answer from the options given below :

- (1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**.
- (2) Both **(A)** and **(R)** are correct but **(R)** is **not** the correct explanation of **(A)**.
- (3) **(A)** is correct but **(R)** is not correct.
- (4) **(A)** is not correct but **(R)** is correct.

Official Ans. by NTA (1)

Ans. (2)

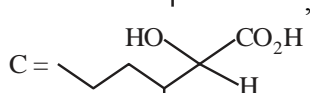
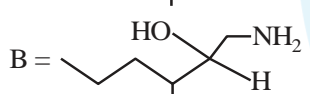
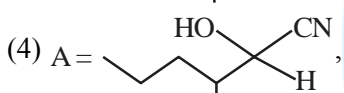
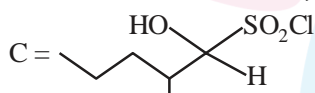
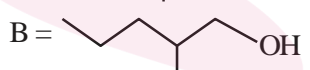
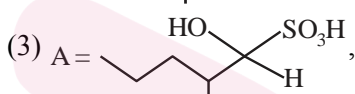
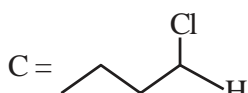
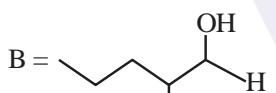
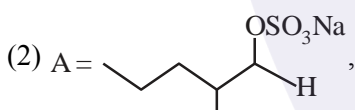
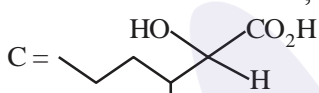
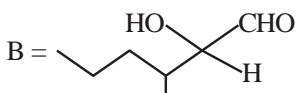
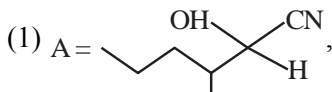
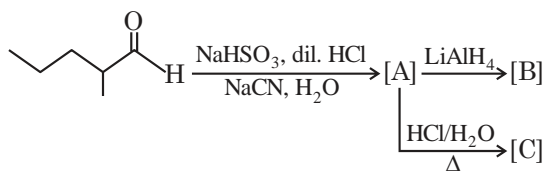
41. The industrial activity held least responsible for global warming is :

- (1) manufacturing of cement
- (2) steel manufacturing
- (3) Electricity generation in thermal power plants.
- (4) Industrial production of urea

Official Ans. by NTA (4)

Ans. (4)

42. The structures of major products A, B and C in the following reaction are sequence.



Official Ans. by NTA (4)

Ans. (4)

43. Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Cu^{2+} in water is more stable than Cu^+ .

Reason (R) : Enthalpy of hydration for Cu^{2+} is much less than that of Cu^+ .

In the light of the above statements, choose the **correct** answer from the options given below :

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A).
 (2) (A) is correct but (R) is not correct.
 (3) (1) is not correct but (R) is correct.
 (4) Both (A) and (R) are correct but (R) is **not** the correct explanation of (A).

Official Ans. by NTA (1)

Ans. (1)

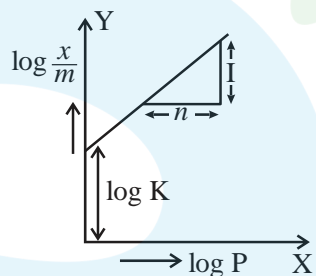
44. The starting material for convenient preparation of deuterated hydrogen peroxide (D_2O_2) in laboratory is:

- (1) $\text{K}_2\text{S}_2\text{O}_8$ (2) 2-ethylanthraquinol
 (3) BaO_2 (4) BaO

Official Ans. by NTA (1)

Ans. (1)

45. In figure, a straight line is given for Freundlich Adsorption ($y = 3x + 2.505$). The value of $\frac{1}{n}$ and $\log K$ are respectively.



- (1) 0.3 and $\log 2.505$ (2) 0.3 and 0.7033
 (3) 3 and 2.505 (4) 3 and 0.7033

Official Ans. by NTA (3)

Ans. (3)

46. Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : An aqueous solution of KOH when for volumetric analysis, its concentration should be checked before the use.

Reason (R) : On aging, KOH solution absorbs atmospheric CO_2 .

In the light of the above statements, choose the correct answer from the options given below.

- (1) (A) is not correct but (R) is correct
 (2) Both (A) and (R) are correct but (R) is **not** the correct explanation of (A)
 (3) Both (A) and (R) are correct and (R) is the correct explanation of (A)
 (4) (A) is correct but (R) is not correct

Official Ans. by NTA (3)

Ans. (3)

47. Which one of the following sets of ions represents a collection of isoelectronic species?

(Given : Atomic Number : F : 9 , Cl : 17, Na = 11, Mg = 12, Al = 13, K = 19, Ca = 20, Sc = 21)

- (1) $(\text{Li}^+, \text{Na}^+, \text{Mg}^{2+}, \text{Ca}^{2+})$
 (2) $(\text{Ba}^{2+}, \text{Sr}^{2+}, \text{K}^+, \text{Ca}^{2+})$
 (3) $(\text{N}^{3-}, \text{O}^{2-}, \text{F}^-, \text{S}^{2-})$
 (4) $(\text{K}^+, \text{Cl}^-, \text{Ca}^{2+}, \text{Sc}^{3+})$

Official Ans. by NTA (4)

Ans. (4)

48. The effect of addition of helium gas to the following reaction in equilibrium state, is :



- (1) the equilibrium will shift in the forward direction and more of Cl_2 and PCl_3 gases will be produced.
 (2) the equilibrium will go backward due to suppression of dissociation of PCl_5 .
 (3) helium will deactivate PCl_5 and reaction will stop.
 (4) addition of helium will not affect the equilibrium.

Official Ans. by NTA (1 & 4)

Ans. (1 & 4)

49. For electron gain enthalpies of the elements denoted as $\Delta_{\text{eg}}H$, the incorrect option is :

- (1) $\Delta_{\text{eg}}H(\text{Cl}) < \Delta_{\text{eg}}H(\text{F})$
 (2) $\Delta_{\text{eg}}H(\text{Se}) < \Delta_{\text{eg}}H(\text{S})$
 (3) $\Delta_{\text{eg}}H(\text{I}) < \Delta_{\text{eg}}H(\text{At})$
 (4) $\Delta_{\text{eg}}H(\text{Te}) < \Delta_{\text{eg}}H(\text{Po})$

Official Ans. by NTA (2)

Ans. (2)

50. O–O bond length in H_2O_2 is X than the O–O bond length in F_2O_2 . The O – H bond length in H_2O_2 is Y than that of the O–F bond in F_2O_2 .

Choose the correct option for X and Y from the given below.

- (1) X – shorter, Y – shorter
 (2) X – shorter, Y – longer
 (3) X – longer, Y – longer
 (4) X – longer, Y – shorter

Official Ans. by NTA (4)

Ans. (4)

SECTION-B

51. 0.3 g of ethane undergoes combustion at 27°C in a bomb calorimeter. The temperature of calorimeter system (including the water) is found to rise by 0.5°C . The heat evolved during combustion of ethane at constant pressure is _____ kJ mol^{-1} .

(Nearest integer)

[Given : The heat capacity of the calorimeter system is 20 kJ K^{-1} , $R = 8.3 \text{ JK}^{-1} \text{ mol}^{-1}$.

Assume ideal gas behaviour.

Atomic mass of C and H are 12 and 1 g mol^{-1} respectively]

Official Ans. by NTA (1006)

Ans. (1006)

52. Among following compounds, the number of those present in copper matte is _____.

- A. CuCO_3
 B. Cu_2S
 C. Cu_2O
 D. FeO

Official Ans. by NTA (1)

Ans. (1)

53. Among the following, the number of tranquilizer/s is/are _____.

- A. Chloroliazepoxide
 B. Veronal
 C. Valium
 D. Salvarsan

Official Ans. by NTA (3)

Ans. (3)

54. A \rightarrow B

The above reaction is of zero order. Half life of this reaction is 50 min. The time taken for the concentration of A to reduce to one-fourth of its initial value is _____ min.

(Nearest integer)

Official Ans. by NTA (75)

Ans. (75)

55. 20% of acetic acid is dissociated when its 5 g is added to 500 mL of water. The depression in freezing point of such water is _____ $\times 10^{-3}$ $^{\circ}\text{C}$. Atomic mass of C, H and O are 12, 1 and 16 a.m.u. respectively.

[Given : Molal depression constant and density of water are 1.86 K kg mol⁻¹ and 1 g cm⁻³ respectively.]

Official Ans. by NTA (372)

Ans. (372)

56. The molality of a 10% (v/v) solution of di-bromine solution in CCl₄ (carbon tetrachloride) is 'x'. $x =$ _____ $\times 10^{-2}$ M. (Nearest integer)

[Given : molar mass of Br₂ = 160 g mol⁻¹

atomic mass of C = 12 g mol⁻¹

atomic mass of Cl = 35.5 g mol⁻¹

density of dibromine = 3.2 g cm⁻³

density of CCl₄ = 1.6 g cm⁻³]

Official Ans. by NTA (139)

Ans. (139)

57. 1×10^{-5} M AgNO₃ is added to 1 L of saturated solution of AgBr. The conductivity of this solution at 298 K is _____ $\times 10^{-8}$ S m⁻¹.

[Given : $K_{sp}(\text{AgBr}) = 4.9 \times 10^{-13}$ at 298K

$\lambda_{\text{Ag}^+}^0 = 6 \times 10^{-3}$ S m² mol⁻¹

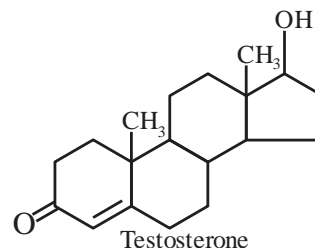
$\lambda_{\text{Br}^-}^0 = 8 \times 10^{-3}$ S m² mol⁻¹

$\lambda_{\text{NO}_3^-}^0 = 7 \times 10^{-3}$ S m² mol⁻¹]

Official Ans. by NTA (14)

Ans. (Bonus)

58. Testosterone, which is a steroidal hormone, has the following structure.



The total number of asymmetric carbon atom/s in testosterone is _____

Official Ans. by NTA (6)

Ans. (6)

59. The spin only magnetic moment of $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ complexes is _____ B.M. (Nearest integer)

(Given : Atomic no. of Mn is 25)

Official Ans. by NTA (6)

Ans. (6)

60. A metal M crystallizes into two lattices :- face centred cubic (fcc) and body centred cubic (bcc) with unit cell edge length of 2.0 and 2.5 Å respectively. The ratio of densities of lattices fcc to bcc for the metal M is _____.

(Nearest integer)

Official Ans. by NTA (4)

Ans. (4)