

**JEE Main April 2024**  
**Question Paper With Text Solution**  
**05 April | Shift-1**

**CHEMISTRY**



**JEE Main & Advanced | XI-XII Foundation | VI-X Pre-Foundation**

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61. The reaction at cathode in the cells commonly used in clocks involves.

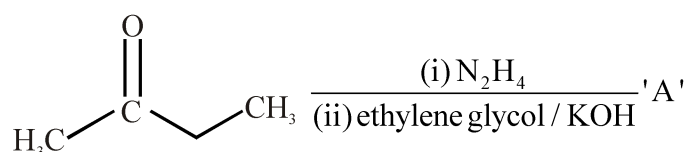
- (1) reduction of Mn from +7 to +2                      (2) reduction of Mn from +4 to +3  
(3) oxidation of Mn from +3 to +4                      (4) oxidation of Mn from +2 to +7

Question ID: 87827055671

Ans. Official Answer by NTA(2)

Sol.

62. Identify 'A' in the following reaction :



- (1)  $\text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_3$                       (2)  $\text{H}_3\text{C}-\overset{\text{H}_3\text{C}}{\text{C}}=\text{N}-\text{NH}_2$   
(3)  $\text{H}_3\text{C}-\overset{\text{H}_3\text{C}_2}{\text{C}}=\text{N}-\text{NH}_2$                       (4)  $\text{H}_3\text{C}-\overset{\text{OH}}{\text{C}}-\text{CH}_2-\text{CH}_3$

Question ID: 87827055686

Ans. Official Answer by NTA(1)

Sol.

63. The number of neutrons present in the more abundant isotope of boron is 'x'. Amorphous boron upon heating with air forms a product, in which the oxidation state of boron is 'y'. The value of x + y is \_\_\_\_\_.

- (1) 3                      (2) 9                      (3) 6                      (4) 4

Question ID: 87827055675

Ans. Official Answer by NTA(2)

Sol.

64. Number of  $\sigma$  and  $\pi$  bonds present in ethylene molecule is respectively :

- (1) 5 and 1                      (2) 5 and 2                      (3) 3 and 1                      (4) 4 and 1

Question ID: 87827055669

Ans. Official Answer by NTA(1)

Sol.

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65. Which one of the following complexes will exhibit the least paramagnetic behaviour ?

[Atomic number, Cr = 24, Mn = 25, Fe = 26, Co = 27]

- (1)  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$       (2)  $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$       (3)  $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$       (4)  $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$

Question ID: 87827055678

Ans. Official Answer by NTA(3)

Sol.

66. Given below are two statements :

**Statement I :** In group 13, the stability of +1 oxidation state increases down the group.

**Statement II :** The atomic size of gallium is greater than that of aluminium.

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

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

Question ID: 87827055674

Ans. Official Answer by NTA(4)

Sol.

67. An organic compound has 42.1% carbon, 6.4% hydrogen and remainder is oxygen. If its molecular weight is 342, then its molecular formula is :

- (1)  $\text{C}_{11}\text{H}_{18}\text{O}_{12}$       (2)  $\text{C}_{14}\text{H}_{20}\text{O}_{10}$       (3)  $\text{C}_{12}\text{H}_{20}\text{O}_{12}$       (4)  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$

Question ID: 87827055680

Ans. Official Answer by NTA(4)

Sol.

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

**Assertion (A) :** Cis form of alkene is found to be more polar than the trans form.

**Reason (R) :** Dipole moment of trans isomer of 2-butene is zero.

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

- (1) (A) is true but (R) is false



(2) Both (A) and (R) are true and (R) is the correct explanation of (A)

(3) (A) is false but (R) is true

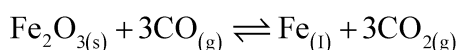
(4) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)

Question ID: 87827055683

Ans. Official Answer by NTA (2)

Sol.

69. The following reaction occurs in the blast furnace where iron ore is reduced to iron metal



Using the Le-chatelier's principle, predict which one of the following will not disturb the equilibrium.

(1) Addition of  $\text{Fe}_2\text{O}_3$

(2) Removal of  $\text{CO}_2$

(3) Addition of  $\text{CO}_2$

(4) Removal of CO

Question ID: 87827055670

Ans. Official Answer by NTA (1)

Sol.

70. Given below are two statements : One is labelled as Assertion (A) and the other is labelled as Reason (R)

**Assertion (A) :** Enthalpy of neutralisation of strong monobasic acid with strong monoacidic base is always –  $57 \text{ kJ mol}^{-1}$

**Reason (R) :** Enthalpy of neutralisation is the amount of heat liberated when one mole of  $\text{H}^+$  ions furnished by acid combine with one mole of  $\text{OH}^-$  ions furnished by base to form one mole of water.

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

(1) (A) is true but (R) is false

(2) Both (A) and (R) are true and (R) is the correct explanation of (A)

(3) Both (A) and (R) are true but (R) is not the correct explanation of (A)

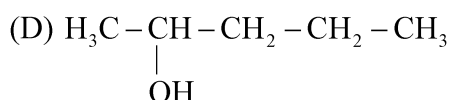
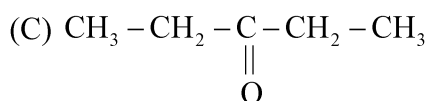
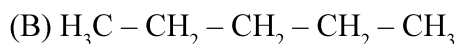
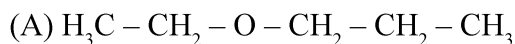
(4) (A) is false but (R) is true

Question ID: 87827055679

Ans. Official Answer by NTA (2)

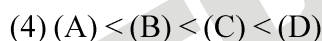
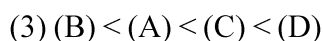
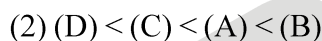
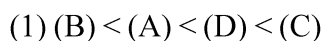
Sol.

71. For the compounds :



The increasing order of boiling point is :

Choose the correct answer from the options given below :

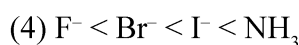
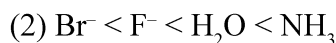


Question ID: 87827055682

Ans. Official Answer by NTA(3)

Sol.

72. The correct order of ligands arranged in increasing field strength.



Question ID: 87827055677

Ans. Official Answer by NTA(2)

Sol.

73. The incorrect postulates of the Dalton's atomic theory are :

(A) Atoms of different elements differ in mass.

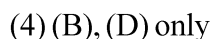
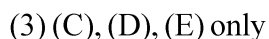
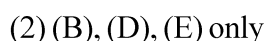
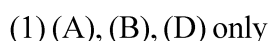
(B) Matter consists of divisible atoms.

(C) Compounds are formed when atoms of different element combine in a fixed ratio.

(D) All the atoms of given element have different properties including mass.

(E) Chemical reactions involve reorganisation of atoms.

Choose the correct answer from the options given below :



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(3) Egg albumin

(4) Starch

Question ID: 87827055687

Ans. Official Answer by NTA (3)

Sol.

77. The statement(s) that are correct about the species  $O^{2-}$ ,  $F^-$ ,  $Na^+$  and  $Mg^{2+}$ .

(A) All are isoelectronic

(B) All have the same nuclear charge

(C)  $O^{2-}$  has the largest ionic radii(D)  $Mg^{2+}$  has the smallest ionic radii

Choose the most appropriate answer from the options given below :

(1) (A), (B), (C) and (D)

(2) (A), (C) and (D) only

(3) (C) and (D) only

(4) (B), (C) and (D) only

Question ID: 87827055673

Ans. Official Answer by NTA (2)

Sol.

78. The metal that shows highest and maximum number of oxidation state is :

(1) Co

(2) Mn

(3) Ti

(4) Fe

Question ID: 87827055676

Ans. Official Answer by NTA (2)

Sol.

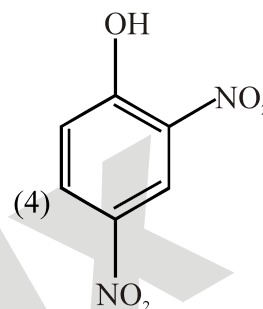
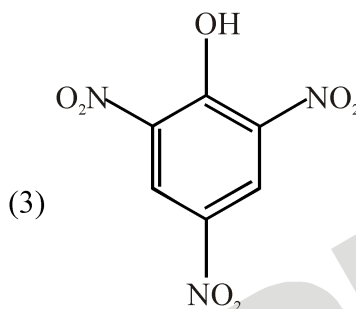
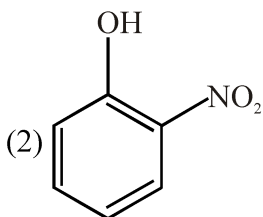
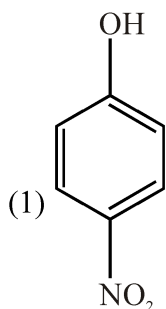
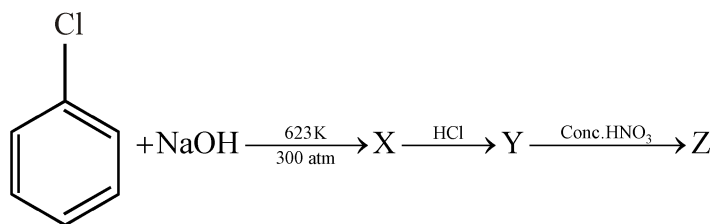
79. Molar ionic conductivities of divalent cation and anion are  $57 \text{ S cm}^2 \text{ mol}^{-1}$  and  $73 \text{ S cm}^2 \text{ mol}^{-1}$  respectively. The molar conductivity of solution of an electrolyte with the above cation and anion will be :(1)  $65 \text{ S cm}^2 \text{ mol}^{-1}$ (2)  $130 \text{ S cm}^2 \text{ mol}^{-1}$ (3)  $187 \text{ S cm}^2 \text{ mol}^{-1}$ (4)  $260 \text{ S cm}^2 \text{ mol}^{-1}$ 

Question ID: 87827055672

Ans. Official Answer by NTA (2)

Sol.

80. Identify compound (Z) in the following reaction sequence.



Question ID: 87827055685

Ans. Official Answer by NTA (3)

Sol.

81. In the lewis dot structure for  $\text{NO}_2^-$ , total number of valence electrons around nitrogen is \_\_\_\_\_.

Question ID: 87827055689

Ans. Official Answer by NTA (8)

Sol.

82. An artificial cell is made by encapsulating 0.2 M glucose solution within a semipermeable membrane. The osmotic pressure developed when the artificial cell is placed within a 0.05 M solution of NaCl at 300 K is \_\_\_\_\_  $\times 10^{-1}$  bar. (nearest integer).

[Given :  $R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$ ]

Assume complete dissociation of NaCl

Question ID: 87827055691

Ans. Official Answer by NTA (25)

Sol.

83. During kinetic study of reaction  $2A + B \rightarrow C + D$ , the following results were obtained :

	A [M]	B [M]	initial rate of formation of D
I	0.1	0.1	$6.0 \times 10^{-3}$
II	0.3	0.2	$7.2 \times 10^{-2}$

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III	0.3	0.4	$2.88 \times 10^{-1}$
IV	0.4	0.1	$2.40 \times 10^{-2}$

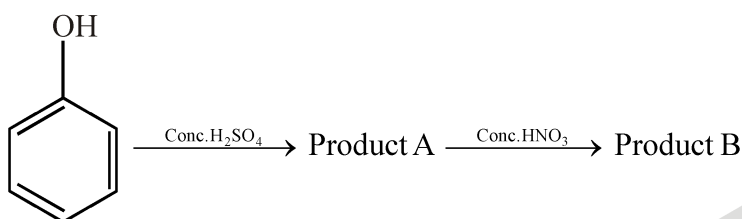
Based on above data, overall order of the reaction is \_\_\_\_\_.

Question ID: 87827055692

Ans. Official Answer by NTA (3)

Sol.

84. Consider the given chemical reaction sequence :



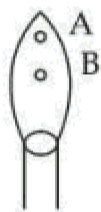
Total sum of oxygen atoms in Product A and Product B are \_\_\_\_\_.

Question ID: 87827055696

Ans. Official Answer by NTA (14)

Sol.

85.



In a borax bead test under hot condition, a metal salt (one from the given) is heated at point B of the flame, resulted in green colour salt bead. The spin-only magnetic moment value of the salt is \_\_\_\_\_ BM (Nearest integer)

[Given atomic number of Cu = 29, Ni = 28, Mn = 25, Fe = 26]

Question ID: 87827055694

Ans. Official Answer by NTA (6)

Sol.

86. The spin-only magnetic moment value of the ion among  $\text{Ti}^{2+}$ ,  $\text{V}^{2+}$ ,  $\text{Co}^{3+}$  and  $\text{Cr}^{2+}$ , that acts as strong oxidising agent in aqueous solution is \_\_\_\_\_ BM (Near integer).

(Given atomic numbers : Ti : 22, V : 23, Cr : 24, Co : 27)



Question ID: 87827055693

Ans. Official Answer by NTA(5)

Sol.

87. The value of Rydberg constant ( $R_H$ ) is  $2.18 \times 10^{-18}$  J. The velocity of electron having mass  $9.1 \times 10^{-31}$  kg in Bohr's first orbit of hydrogen atom = \_\_\_\_\_  $\times 10^5$  ms $^{-1}$  (nearest integer).

Question ID: 87827055688

Ans. Official Answer by NTA(22)

Sol.

88. The heat of combustion of solid benzoic acid at constant volume is  $-321.30$  kJ at  $27^\circ\text{C}$ . The heat of combustion at constant pressure is  $(-321.30 - xR)$  kJ, the value of  $x$  is \_\_\_\_\_.

Question ID: 87827055690

Ans. Official Answer by NTA(150)

Sol.

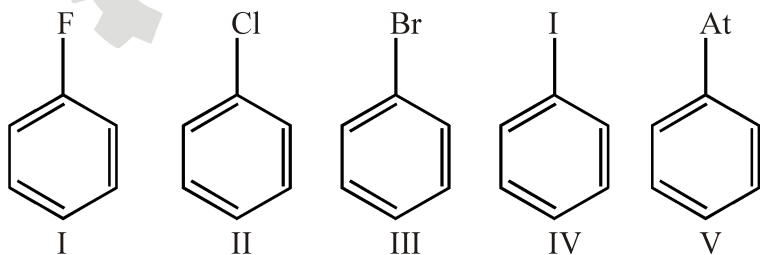
89. 9.3 g of pure aniline is treated with bromine water at room temperature to give a white precipitate of the product 'P'. The mass of product 'P' obtained is 26.4 g. The percentage yield is \_\_\_\_\_%.

Question ID: 87827055697

Ans. Official Answer by NTA(80)

Sol.

90. The number of halobenzenes from the following that can be prepared by Sandmeyer's reaction is \_\_\_\_\_.



Question ID: 87827055695

Ans. Official Answer by NTA(2)

Sol.