TOP 500

JEE MAIN PYQS

CHEMISTRY

mathongo

Chapter: Some Basic Concepts of Chemistry

Q1. JEE Main 2025 (8 April Shift 2)

On combustion 0.210 g of an orgainc compound containing C, H and O gave 0.127 gH_2O and 0.307 gCO_2. The percentages of hydrogen and oxygen in the given organic compound respectively are:

(1) 53.41, 39.6
(2) 6.72, 53.41
(3) 7.55, 43.85
(4) 6.72, 39.87

Q2. JEE Main 2025 (7 April Shift 1)

An organic compound weighing 500 mg , produced 220 mg of CO_2. on complete combustion. The percentage composition of carbon in the compound is _____ \%. (nearest integer)

(Given molar mass in gmol^{-1} of C : 12, O : 16)

Q3. JEE Main 2025 (3 April Shift 2)

Mass of magnesium required to produce 220 mL of hydrogen gas at STP on reaction with excess of dil. HCl is

Given : Molar mass of Mg is 24 g mol^{-1}.

(1) 235.7 g
(2) 0.24 mg
(3) 236 mg
(4) 2.444 g

Q4. JEE Main 2025 (3 April Shift 1)

Among 10^{-9} g (each) of the following elements, which one will have the highest number of atoms? Element : Pb, Po, Pr and Pt

(1) Po (2) Pr (3) Pb (4) Pt

Q5. JEE Main 2025 (28 Jan Shift 2)

Concentrated nitric acid is labelled as 75% by mass. The volume in mL of the solution which contains 30 g of nitric acid is ____.

Given : Density of nitric acid solution is 1.25 g/mL.

(1) 40
(2) 32
(3) 45
(4) 55

Q6. JEE Main 2025 (28 Jan Shift 1)

Quantitative analysis of an organic compound (X) shows following \% composition.

C : 14.5%

Cl : 64.46 %

H: 1.8 %

(Empirical formula mass of the compound (X) is _____ $\times 10^{-1}$

(Given molar mass in gmol^{-1} of C : 12, H : 1, O : 16, Cl : 35.5)

Q7. JEE Main 2025 (28 Jan Shift 1)

The molarity of a 70% (mass / mass) aqueous solution of a monobasic acid (X) is _____ $\times 10^{-1}$ M(Nearest integer)

[Given: Density of aqueous solution of (X) is 1.25 g mL^{-1}

Molar mass of the acid is 70 g mol^{-1}]

Q8. JEE Main 2025 (23 Jan Shift 2)

When 81.0 g of aluminium is allowed to react with 128.0 g of oxygen gas, the mass of aluminium oxide produced in grams is_____ - (Nearest integer)

Given :

Molar mass of Al is 27.0 g mol^{-1}

Molar mass of O is 16.0 g mol^{-1}

Q9. JEE Main 2025 (23 Jan Shift 1)

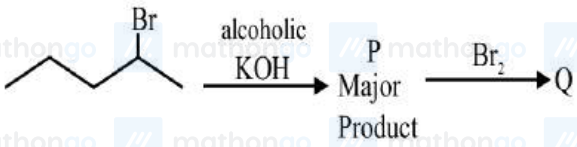
2.8×10^{-3} mol of CO_2 is left after removing 10^{21} molecules from its ' x ' mg sample. The mass of CO_2 taken initially is

Given: $N_A = 6.02 \times 10^{23}$ mol^{-1}

(1) 98.3 mg (2) 48.2 mg

(3) 196.2 mg (4) 150.4 mg

Q10. JEE Main 2025 (2 April Shift 2)



Consider the above sequence of reactions. 151 g of 2-bromopentane is made to react. Yield of major product P is 80% whereas Q is 100%.

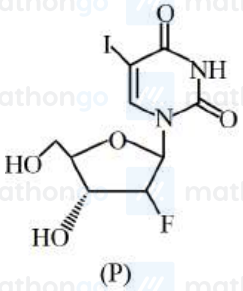
Mass of product Q obtained is ____ g.

(Given molar mass in gmol^{-1}H : 1, C : 12, O : 16, Br : 80)

Q11. JEE Main 2025 (2 April Shift 1)

0.1 mol of the following given antiviral compound

(P) will weigh _____ $\times 10^{-1}$ g



(P)

(Given : molar mass in gmol^{-1}H : 1, C : 12, N : 14, O : 16, F : 19, I : 127)

Q12. JEE Main 2024 (31 Jan Shift 2)

The molarity of 1L orthophosphoric acid (H_3PO_4) having 70% purity by weight (specific gravity 1 .54 g cm^{-3}) is _____ M. (Molar mass of $H_3PO_4 = 98$ g mol^{-1})

Q13. JEE Main 2024 (09 Apr Shift 1)

Molarity (M) of an aqueous solution containing x g of anhyd. $CuSO_4$ in 500 mL solution at 32°C is 2×10^{-1}M. Its molality will be _____ $\times 10^{-3}$ m. (nearest integer). [Given density of the solution = 1.25 g/mL]

Q14. JEE Main 2024 (06 Apr Shift 1)

The density of ' x ' M solution (' X ' molar) of NaOH is 1.12 g mL^{-1}, while in molality, the concentration of the solution is 3 m(3molal). Then x is (Given : Molar mass of NaOH is 40 g/mol)

(1) 3.5 (2) 3.8 (3) 2.8 (4) 3.0

Q15. JEE Main 2024 (01 Feb Shift 2)

10 mL of gaseous hydrocarbon on combustion gives 40 mL of $CO_2(g)$ and 50 mL of water vapour. Total number of carbon and hydrogen atoms in the hydrocarbon is _____.

Q16. JEE Main 2022 (29 Jun Shift 1)

Production of iron in blast furnace follows the following equation

$Fe_3O_4(s) + 4CO(g) \rightarrow 3Fe(l) + 4CO_2(g)$

when 4.640 kg of Fe_3O_4 and 2.520 kg of CO are allowed to react then the amount of iron (in g) produced is:

[Given: Molar Atomic mass $(gmol^{-1})$: Fe = 56, Molar Atomic mass $(gmolm^{-1})$: O = 16

Molar Atomic mass $(gmolm^{-1})$: C = 12]

(1) 1400 (2) 2200

(3) 3360 (4) 4200

Q17. JEE Main 2022 (29 Jul Shift 2)

$C(s) + O_2(g) \rightarrow CO_2(g) + 400$ kJ, $C(s) + \frac{1}{2}O_2(g) \rightarrow CO(g) + 100$ kJ

When coal of purity 60% is allowed to burn in presence of insufficient oxygen, 60% of carbon is converted into ' CO' and the remaining is converted into 'CO_2'.

The heat generated when 0.6 kg of coal is burnt is

(1) 1600 kJ (2) 3200 kJ

(3) 4400 kJ (4) 6600 kJ

Q18. JEE Main 2022 (28 Jul Shift 1)

In the given reaction,

$X + Y + 3Z \rightleftarrows XYZ_3$

if one mole of each of X and Y with 0.05 mol of Z gives compound XYZ_3. (Given : Atomic masses of X, Y and Z are 10,20 and 30 amu, respectively). The yield of XYZ_3 is____g.

Q19. JEE Main 2022 (26 Jun Shift 1)

A commercially sold conc. HCl is 35% HCl by mass. If the density of this commercial acid is $1.46\ \mathrm{g/mL}$, the molarity of this solution is : (Atomic mass : $\mathrm{Cl} = 35.5\ \mathrm{amu}, \mathrm{H} = 1\ \mathrm{amu}$)

(1) $10.2\ \mathrm{M}$ (2) $14.0\ \mathrm{M}$

(3) $12.5\ \mathrm{M}$ (4) $18.2\ \mathrm{M}$

Q20. JEE Main 2022 (26 Jul Shift 2)

Hemoglobin contains 0.34% of iron by mass. The number of Fe atoms in 3.3 g of hemoglobin is (Given : Atomic mass of Fe is $56\mathrm{u}, \mathrm{N_A}$ in$6.022 \times 10^{23}\ \mathrm{mol^{-1}}$)

(1) 1.21×10^{5} (2) 12.0×10^{16}

(3) 1.21×10^{20} (4) 3.4×10^{22}

Q21. JEE Main 2020 (03 Sep Shift 2)

6.023×10^{22} molecules are present in 10gof a substance 'x'. The molarity of a solution containing 5g of substance 'x' in 2 L solution is _____ $\times 10^{-3}$

Chapter: Structure of Atom

Q22. JEE Main 2025 (8 April Shift 2)

Correct statements for an element with atomic number 9 are

A. There can be 5 electrons for which $\mathrm{m_s} = +\frac{1}{2}$ and 4 electrons for which $\mathrm{m_s} = -\frac{1}{2}$

B. There is only one electron in p_z orbital

C. The last electron goes to orbital with $\mathrm{n} = 2$ and $l = 1$

4. The sum of angular nodes of all the atomic orbitals is 1.

Choose the correct answer from the options given below:

(1) C and D Only (2) A and C Only

(3) A, C and D Only (4) A and B Only

Q23. JEE Main 2025 (7 April Shift 2)

The extra stability of half-filled subshell is due to

(A) Symmetrical distribution of electrons

(B) Smaller coulombic repulsion energy

(C) The presence of electrons with the same spin in non-degenerate orbitals

(D) Larger exchange energy

(E) Relatively smaller shielding of electrons by one another

Identify the correct statements

(1) (B), (D) and (E) only (2) (A), (B), (D) and (E) only

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

Q24. JEE Main 2025 (4 April Shift 1)

Which one of the following about an electron occupying the 1 s orbital in a hydrogen atom is incorrect ? (Bohr's radius is represented by a a_0)

(1) The probability density of finding the electron is maximum at the nucleus

(2) The electron can be found at a distance $2a_0$ from the nucleus

(3) The 1 s orbital is spherically symmetrical

(4) The total energy of the electron is maximum when it is at a distance a_0 from the nucleus

Q25. JEE Main 2025 (3 April Shift 1)

Which of the following postulate of Bohr's model of hydrogen atom in not in agreement with quantum mechanical model of an atom ?

(1) An atom in a stationary state does not emit electromagnetic radiation as long as it stays in the same state

(2) An atom can take only certain distinct energies E_1, E_2, E_3, etc. These allowed states of constant energy are called the stationary states of atom

(3) When an electron makes a transition from a higher energy stationary state to a lower energy stationary state, then it emits a photon of light

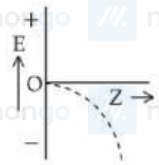
(4) The electron in a H atom's stationary state moves in a circle around the nucleus

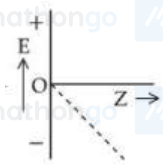
Q26. JEE Main 2025 (29 Jan Shift 2)

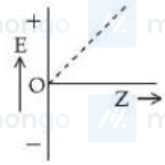
For hydrogen like species, which of the following graphs provides the most appropriate representation of E vs Z plot for a constant n ?

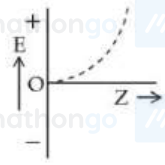
[E: Energy of the stationary state,

Z : atomic number, n = principal quantum number]

(1) 

(2) 

(3) 

(4) 

Q27. JEE Main 2025 (29 Jan Shift 2)

Given below are two statements :

Statement (I) : It is impossible to specify simultaneously with arbitrary precision, both the linear momentum and the position of a particle.

Statement (II) : If the uncertainty in the measurement of position and uncertainty in measurement of momentum are equal for an electron, then the uncertainty in the measurement of velocity is $\geqslant \sqrt{\frac{h}{\pi}} \times \frac{1}{2m}$.

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

(1) Statement I is false but Statement II is true

(2) Both Statement I and Statement II are false

(3) Both Statement I and Statement II are true

(4) Statement I is true but Statement II is false

Q28. JEE Main 2025 (29 Jan Shift 1)

If a_0 is denoted as the Bohr radius of hydrogen atom, then what is the de-Broglie wavelength (λ) of the electron present in the second orbit of hydrogen atom? [n : any integer]

(1) $\frac{8\pi a_0}{n}$
(2) $\frac{2a_0}{n\pi}$
(3) $\frac{4n}{\pi a_0}$
(4) $\frac{4\pi a_0}{n}$

Q29. JEE Main 2025 (28 Jan Shift 2)

Which of the following is/are not correct with respect to energy of atomic orbitals of hydrogen atom?

(A) $1\,s < 2p < 3\,d < 4\,s$

(B) $1\,s < 2\,s = 2p < 3\,s = 3p$

(C) $1\,s < 2\,s < 2p < 3\,s < 3p$

(D) $1\,s < 2\,s < 4\,s < 3\,d$

Choose the correct answer from the options given below :

(1) (A) and (C) only
(2) (B) and (D) only
(3) (C) and (D) only
(4) (A) and (B) only

Q30. JEE Main 2025 (28 Jan Shift 1)

In a multielectron atom, which of the following orbitals described by three quantum numbers will have same energy in absence of electric and magnetic fields?

A. $n = 1, l = 0,\ m_l = 0$

B. $n = 2, l = 0,\ m_l = 0$

C. $n = 2, l = 1,\ m_l = 1$

D. $n = 3, l = 2,\ m_l = 1$

E. $n = 3, l = 2,\ m_l = 0$

Choose the correct answer from the options given below:

(1) B and C Only
(2) A and B Only
(3) C and D Only
(4) D and E Only

Q31. JEE Main 2025 (24 Jan Shift 2)

For hydrogen atom, the orbital/s with lowest energy is/are:

(A) 4 s

(B) $3p_x$

(C) $3\,d_{x^2-y^2}$

(D) $3\,d_{z^2}$

(E) $4p_z$

Choose the correct answer from the options given below :

(1) (B), (C) and (D) only
(2) (A) and (E) only
(3) (A) only
(4) (B) only

Q32. JEE Main 2025 (23 Jan Shift 2)

Given below are two statements about X-ray spectra of elements :

Statement (I) : A plot of $\sqrt{v}$ (v = frequency of X-rays emitted) vs atomic mass is a straight line.

Statement (II) : A plot of v(v = frequency of X-rays emitted) vs atomic number is a straight line.

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

(1) Both Statement I and Statement II are true

(2) Statement I is false but Statement II is true

(3) Both Statement I and Statement II are false

(4) Statement I is true but Statement II is false

Q33. JEE Main 2025 (22 Jan Shift 1)

Radius of the first excited state of Helium ion is given as :

$a_0 \rightarrow$ radius of first stationary state of hydrogen atom.

(1) $r = 4a_0$ (2) $r = 2a_0$

(3) $r = \frac{a_0}{2}$ (4) $r = \frac{a_0}{4}$

Q34. JEE Main 2024 (31 Jan Shift 2)

The four quantum numbers for the electron in the outer most orbital of potassium (atomic no. 19) are

(1) $n = 4, l = 2, m = -1, s = +\frac{1}{2}$ (2) $n = 4, l = 0, m = 0, s = +\frac{1}{2}$

(3) $n = 3, l = 0, m = -1, s = +\frac{1}{2}$ (4) $n = 2, l = 0, m = 0, s = +\frac{1}{2}$-

Q35. JEE Main 2024 (29 Jan Shift 1)

The correct set of four quantum numbers for the valence electron of rubidium atom $(Z = 37)$ is:

(1) $5, 0, 0, +\frac{1}{2}$ (2) $5, 0, 1, +\frac{1}{2}$

(3) $5, 1, 0, +\frac{1}{2}$ (4) $5, 1, 1, +\frac{1}{2}$

Q36. JEE Main 2024 (09 Apr Shift 2)

Match List I with List II

	List - I (Element)		List - II (Electronic configuration)
A.	N	I.	$[Ar]3\,d^{10}4\,s^2 4p^5 AR$
B.	S	II.	$[Ne]3\,s^2 3p^4$
C.	Br	III.	$[He]2\,s^2 2p^3$
D.	Kr	IV.	$[Ar]3\,d^{10}4\,s^2 4p^6$

Choose the correct answer from the options given below:

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

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

Q37. JEE Main 2024 (09 Apr Shift 2)

The electronic configuration of Einsteinium is :

(Given atomic number of Einsteinium = 99)

(1) $[Rn]5f^{10}6\,d^{\circ}7\,s^2$ (2) $[Rn]5f^{13}6\,d^{\circ}7\,s^2$

(3) $[Rn]5f^{11}6\,d^{\circ}7\,s^2$ (4) $[Rn]5f^{12}6\,d^{\circ}7\,s^2$

Q38. JEE Main 2024 (01 Feb Shift 2)

The number of radial node/s for 3p orbital is:

(1) 1 (2) 4 (3) 2 (4) 3

Q39. JEE Main 2022 (29 Jul Shift 1)

The minimum uncertainty in the speed of an electron in one dimensional region of length $2a_o$ (Where a_o = Bohr radius 52.9 pm) is____kms^{-1} (Nearest integer) (Given : Mass of electron $= 9.1 \times 10^{-31}$ kg, Planck's constant $h = 6.63 \times 10^{-34}$ Js)

Q40. JEE Main 2021 (25 Jul Shift 1)

A source of monochromatic radiation wavelength 400 nm provides 1000 J of energy in 10 seconds. When this radiation falls on the surface of sodium, $x \times 10^{20}$ electrons are ejected per second. Assume that wavelength 400 nm is sufficient for ejection of electron from the surface of sodium metal. The value of x is _____. (Nearest integer) $\left(h = 6.626 \times 10^{-34}\ Js\right)$

Q41. JEE Main 2021 (24 Feb Shift 2)

According to Bohr's atomic theory:

(A) Kinetic energy of electron is $\propto \frac{Z^2}{n^2}$.

(B) The product of velocity (v) of electron and principal quantum number (n), $/vn/ \propto Z^2$.

(C) Frequency of revolution of electron in an orbit is $\propto \frac{Z^3}{n^3}$.

(D) Coulombic force of attraction on the electron is $\propto \frac{Z^3}{n^4}$.

Choose the most appropriate answer from the options given below:

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

(3) (C) only (4) (A) only

Q42. JEE Main 2021 (20 Jul Shift 2)

Outermost electronic configuration of a group 13 element, E, is $4s^2, 4p^1$. The electronic configuration of an element of p-block period-five placed diagonally to element, E is:

(1) $[Kr]3d^{10}4s^24p^2$ (2) $[Ar]3d^{10}4s^24p^2$

(3) $[Xe]5d^{10}6s^26p^2$ (4) $[Kr]4d^{10}5s^25p^2$

Q43. JEE Main 2021 (01 Sep Shift 2)

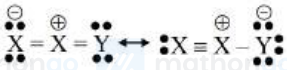
A 50 watt bulb emits monochromatic red light of wavelength of 795 nm. The number of photons emitted per second by the bulb is $x \times 10^{20}$. The value of x is _____. (Nearest integer)

$[\text{Given : } h = 6.63 \times 10^{-34}\ Js \text{ and } c = 3.0 \times 10^8\ ms^{-1}]$

Chapter: Thermodynamics (C)

Q44. JEE Main 2025 (8 April Shift 2)

Resonance in X_2Y can be represented as



The enthalpy of formation of

$X_2Y\left(X \equiv X(g) + \frac{1}{2}Y = Y(g) \rightarrow X_2Y(g)\right)$ is 80 kJ mol^{-1}.

The magnitude of resonance energy of X_2Y is _____ kJ mol^{-1} (nearest integer value)

Given : Bond energies of X ≡ X, X = X, Y = Y and X – Y are 940, 410, 500 and 602 kJ mol^{-1} respectively.

valence X : 3, Y : 2

Q45. JEE Main 2025 (7 April Shift 2)

The hydration energies of $K^+$and $Cl^-$are -x and -y kJ/mol respectively. If lattice energy of KCl is -z kJ/mol, then the heat of solution of KCl is :

(1) $+x - y - z$ (2) $x + y + z$

(3) $z - (x + y)$ (4) $-z - (x + y)$

Q46. JEE Main 2025 (4 April Shift 1)

One mole of an ideal gas expands isothermally and reversibly from $10dm^3$ to $20dm^3$ at 300 K. ΔU, q and work done in the process respectively are :

Given : $R = 8.3JK^{-1}$ and mol^{-1}

$\ln 10 = 2.3$

$\log 2 = 0.30$

$\log 3 = 0.48$

(1) $0, 21.84$ kJ, -1.26 kJ (2) $0, -17.18$ kJ, 1.718 J

(3) $0, 21.84$ kJ, $21, 84$ kJ (4) $0, 178$ kJ, -1.718 kJ

Q47. JEE Main 2025 (4 April Shift 1)

Let us consider a reversible reaction at temperature, T.

In this reaction, both ΔH and ΔS were observed to have positive values. If the equilibrium temperature is Te , then the reaction becomes spontaneous at :

(1) $T = Te$ (2) $Te > T$

(3) $T > Te$ (4) $Te = 5\ T$

Q48. JEE Main 2025 (3 April Shift 2)

Given below are two statements :

Statement I : When a system containing ice in equilibrium with water (liquid) is heated, heat is absorbed by the system and there is no change in the temperature of the system until whole ice gets melted.

Statement II : At melting point of ice, there is absorption of heat in order to overcome intermolecular forces of attraction within the molecules of water in ice and kinetic energy of molecules is not increased at melting point.

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

(1) Statement I is true but Statement II is false

(2) Both Statement I and Statement II are false

(3) Both Statement I and Statement II are true

(4) Statement I is false but Statement II is true

Q49. JEE Main 2025 (29 Jan Shift 2)

If $C \text{ (diamond)} \rightarrow C \text{ (graphite)} + \text{XkJmol}^{-1}$

$\text{C(diamond)} + \text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + \text{YkJmol}^{-1}$

$\text{C (graphite)} + \text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + \text{ZkJmol}^{-1}$

at constant temperature. Then

(1) X=-Y+Z

(2) -X=Y+Z

(3) X=Y+Z

(4) X=Y-Z

Q50. JEE Main 2025 (29 Jan Shift 1)

500 J of energy is transferred as heat to 0.5 mol of Argon gas at 298 K and 1.00 atm. The final temperature and the change in internal energy respectively are:

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

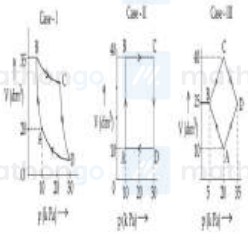
(1) 378 K and 500 J

(2) 368 K and 500 J

(3) 348 K and 300 J

(4) 378 K and 300 J

Q51. JEE Main 2025 (28 Jan Shift 2)



An ideal gas undergoes a cyclic transformation starting from the point A and coming back to the same point by tracing the path $\text{A} \rightarrow \text{B} \rightarrow \text{C} \rightarrow \text{D} \rightarrow \text{A}$ as shown in the three cases above.

Choose the correct option regarding ΔU :

(1) $\Delta\text{U (Case-I)} = \Delta\text{U (Case-II)} = \Delta\text{U (Case-III)}$

(2) $\Delta\text{U (Case-I)} > \Delta\text{U (Case-III)} > \Delta\text{U (Case-II)}$

(3) $\Delta\text{U (Case-III)} > \Delta\text{U (Case-II)} > \Delta\text{U (Case-I)}$

(4) $\Delta\text{U (Case-I)} > \Delta\text{U (Case-II)} > \Delta\text{U (Case-III)}$

Q52. JEE Main 2025 (24 Jan Shift 2)

Which of the following mixing of 1 M base and 1 M acid leads to the largest increase in temperature?

(1) 30 mL CH_3COOH and 30 mL NaOH

(2) 45 mL CH_3COOH and 25 mL NaOH

(3) 30 mL HCl and 30 mL NaOH

(4) 50 mL HCl and 20 mL NaOH

Q53. JEE Main 2025 (24 Jan Shift 1)

Let us consider an endothermic reaction which is non-spontaneous at the freezing point of water. However, the reaction is spontaneous at boiling point of water. Choose the correct option.

(1) Both ΔH and ΔS are (-ve)

(2) ΔH is (-ve) but ΔS is (+ve)

(3) ΔH is $(+ve)$ but ΔS is $(-ve)$

(4) Both ΔH and ΔS are (+ve)

Q54. JEE Main 2025 (23 Jan Shift 2)

The effect of temperature on spontaneity of reactions are represented as :

	ΔH	ΔS	Temperature	Spontaneity
(A)	+	−	any T	Non spontaneous
(B)	+	+	low T	spontaneous
(C)	−	−	low T	Non spontaneous
(D)	−	+	any T	spontaneous

The incorrect combinations are :

(1) (B) and (C) only

(2) (B) and (D) only

(3) (A) and (D) only

(4) (A) and (C) only

Q55. JEE Main 2025 (23 Jan Shift 1)

The standard enthalpy and standard entropy of decomposition of N_2O_4 to NO_2 are 55.0 kJ mol^{-1} and 175.0 J/K/mol respectively. The standard free energy change for this reaction at 25°C in J mol^{-1} is _____ (Nearest integer)

Q56. JEE Main 2025 (22 Jan Shift 2)

Match List - I with List - II.

List - I (Partial Derivatives)		List - II (Thermodynamic Quantity)	
(A)	$\left(\frac{\partial G}{\partial T}\right)_P$	(I)	Cp
(B)	$\left(\frac{\partial H}{\partial T}\right)_P$	(II)	$-S$
(C)	$\left(\frac{\partial G}{\partial P}\right)_T$	(III)	Cv
(D)	$\left(\frac{\partial U}{\partial T}\right)_V$	(IV)	V

Choose the correct answer from the options given below :

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

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

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

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

Q57. JEE Main 2025 (2 April Shift 2)

Arrange the following in order of magnitude of work done by the system / on the system at constant temperature :

(a) $|w_{reversible}|$ for expansion in infinite stage.

(b) $|w_{irreversible}|$ for expansion in single stage.

(c) $|w_{reversible}|$ for compression in infinite stage.

(d) $|w_{irreversible}|$ for compression in single stage.

Choose the correct answer from the options given below:

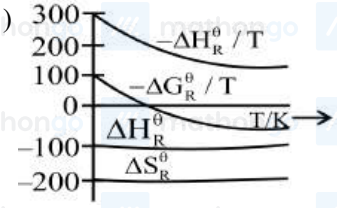
(1) $a > b > c > d$ (2) $d > c = a > b$

(3) $c = a > d > b$ (4) $a > c > b > d$

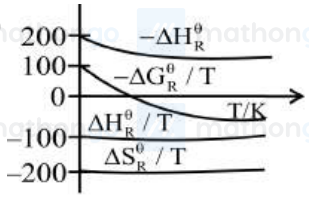
Q58. JEE Main 2025 (2 April Shift 2)

Which of the following graphs correctly represents the variation of thermodynamic properties of Haber's process?

(1)



(2)



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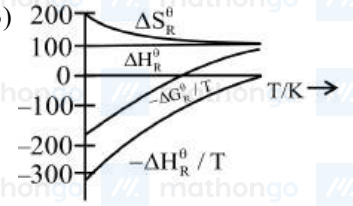

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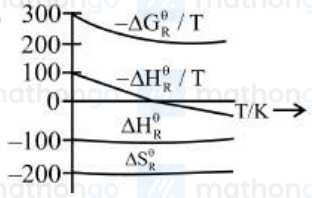


Q59. JEE Main 2024 (27 Jan Shift 1)

If three moles of an ideal gas at 300 K expand isothermally from 30 dm^3 to 45 dm^3 against a constant opposing pressure of 80 kPa, then the amount of heat transferred is _____ J.

Q60. JEE Main 2024 (06 Apr Shift 1)

An ideal gas, $\overline{C}_v = \frac{5}{2}R$, is expanded adiabatically against a constant pressure of 1 atm until it doubles in volume. If the initial temperature and pressure is 298 K and 5 atm, respectively then the final temperature is _____ K (nearest integer).

[$\overline{C}_v$ is the molar heat capacity at constant volume]

Q61. JEE Main 2024 (04 Apr Shift 1)

The enthalpy of formation of ethane (C_2H_6) from ethylene by addition of hydrogen where the bond-energies of $C-H, C-C, C=C, H-H$ are 414 kJ, 347 kJ, 615 kJ and 435 kJ respectively is _____ kJ

Q62. JEE Main 2023 (25 Jan Shift 2)

28.0 L of CO_2 is produced on complete combustion of 16.8 L gaseous mixture of ethene and methane at 25°C and 1 atm. Heat evolved during the combustion process is kJ

Given: $\Delta H_C(CH_4) = -900 \text{ kJ mol}^{-1}$, $\Delta H_C(C_2H_4) = -1400 \text{ kJ mol}^{-1}$.

Q63. JEE Main 2023 (13 Apr Shift 2)

What happens when methane undergoes combustion in systems A and B respectively?

(1)

System A	System B
Temperature rises	Temperature remains same

(2)

System A	System B
Temperature remains same	Temperature rises

(3)

System A	System B
Temperature falls	Temperature remains same

(4)

System A	System B
Temperature falls	Temperature rises

Q64. JEE Main 2022 (29 Jul Shift 1)

When 600 mL of 0.2M HNO_3 is mixed with 400 mL of 0.1M NaOH solution in a flask, the rise in temperature of the flask is_____$\times 10^{-2}$ °C. (Enthalpy of neutralisation = 57 kJ mol^{-1} and Specific heat of water = 4.2 JK^{-1} g^{-1}) (Neglect heat capacity of flask)

Q65. JEE Main 2022 (27 Jun Shift 2)

When 5 moles of He gas expand isothermally and reversibly at 300 K from 10 litre to 20 litre, the magnitude of the maximum work obtained in J is _____. [nearest integer] (Given : R = 8.3 J K^{-1} mol^{-1} and log 2 = 0.3010)

Q66. JEE Main 2022 (27 Jun Shift 1)

Match List - I with List - II.

List-I	List-II
(A) Spontaneous process	(I) $\Delta H < 0$
(B) Process with $\Delta P = 0, \Delta T = 0$	(II) $\Delta G_{T,P} < 0$
(C) $\Delta H_{reaction}$	(III) Isothermal and isobaric process
(D) Exothermic Process	(IV) [Bond energies of molecules in reactants] - [Bond energies of product molecules]

Choose the correct answer from the options given below

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

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

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

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

Q67. JEE Main 2022 (26 Jul Shift 1)

2.4 g coal is burnt in a bomb calorimeter in excess of oxygen at 298 K and 1 atm pressure. The temperature of the calorimeter rises from 298 K to 300 K. The enthalpy change during the combustion of coal is $-x$ kJ mol^{-1}. The value of x is_____ (Given : Heat capacity of bomb calorimeter 20.0 kJK^{-1}. Assume coal to be pure carbon)

Q68. JEE Main 2022 (25 Jul Shift 1)

The enthalpy of combustion of propane, graphite and dihydrogen at 298 K are: -2220.0 kJ mol^{-1}, -393.5 kJ mol^{-1} and -285.8 kJ mol^{-1} respectively. The magnitude enthalpy of formation of propane (C_3H_8) is _____ $kJmol^{-1}$. (Nearest integer)

Q69. JEE Main 2022 (24 Jun Shift 2)

At 25 °C and 1 atm pressure, the enthalpies of combustion are as given below:

Substance	H_2	C (graphite)	$C_2H_6(g)$
$\frac{\Delta_c H^\ominus}{kJmol^{-1}}$	-286.0	-394.0	-1560.0

The enthalpy of formation of ethane is

(1) $+54.0$ kJ mol^{-1} (2) -68.0 kJ mol^{-1}

(3) -86.0 kJ mol^{-1} (4) $+97.0$ kJ mol^{-1}

Q70. JEE Main 2021 (26 Aug Shift 2)

The equilibrium constant K_c at 298 K for the reaction $A + B \rightleftharpoons C + D$ is 100 . Starting with an equimolar solution with concentrations of A, B, C and D all equal to 1M, the equilibrium concentration of D is _____$\times 10^{-2}$M. (Nearest integer)

Q71. JEE Main 2021 (25 Feb Shift 2)

Five moles of an ideal gas at 293 K is expanded isothermally from an initial pressure of 2.1 MPa to 1.3 MPa against at constant external pressure 4.3 MPa. The heat transferred in this process is ___ $kJmol^{-1}$. (Rounded-off to the nearest integer) [Use $R = 8.314$ J mol^{-1} K^{-1}]

Q72. JEE Main 2021 (18 Mar Shift 1)

For the reaction $C_2H_6 \rightarrow C_2H_4 + H_2$ the reaction enthalpy $\Delta_r H$ in $kJmol^{-1}$ is ___ (Round off to the Nearest Integer). [Given : Bond enthalpies in $kJmol^{-1}$: $C-C : 347, C=C : 611; C-H : 414, H-H : 436$]

Chapter: Chemical Equilibrium

Q73. JEE Main 2025 (3 April Shift 1)

In the following system, $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ at equilibrium, upon addition of xenon gas at constant T&p, the concentration of

(1) PCl_5 will increase
(2) Cl_2 will decrease
(3) $PCl_5, PCl_3 \& Cl_2$ remain constant
(4) PCl_3 will increase

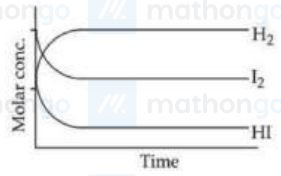
Q74. JEE Main 2025 (29 Jan Shift 1)

At temperature T, compound $AB_{2(g)}$ dissociates as $AB_{2(g)} \rightleftharpoons AB_{(g)} + \frac{1}{2} B_{2(g)}$ having degree of dissociation x (small compared to unity). The correct expression for x in terms of K_p and p is

(1) $\sqrt[4]{\frac{2K_p}{p}}$
(2) $\sqrt[3]{\frac{2K_p}{p}}$
(3) $\sqrt[3]{\frac{2K_p^2}{p}}$
(4) $\sqrt{K_p}$

Q75. JEE Main 2025 (24 Jan Shift 2)

For the reaction,
$H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$
Attainment of equillibrium is predicted correctly by :

(1)


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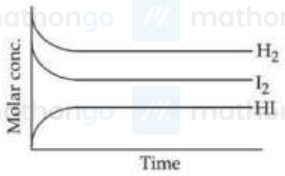

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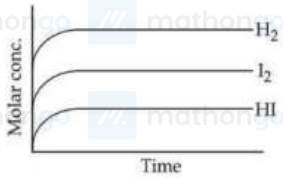
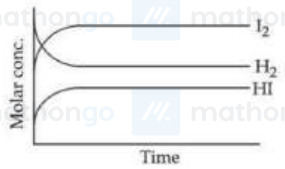


(4)


Q76. JEE Main 2025 (22 Jan Shift 1)

A vessel at 1000 K contains CO_2 with a pressure of 0.5 atm. Some of CO_2 is converted into CO on addition of graphite. If total pressure at equilibrium is 0.8 atm , then Kp is :

(1) 1.8 atm
(2) 0.3 atm
(3) 3 atm
(4) 0.18 atm

Q77. JEE Main 2025 (2 April Shift 1)

Consider the following equilibrium,

$CO(g) + 2H_2(g) \rightleftharpoons CH_3OH(g)$

0.1 mol of CO along with a catalyst is present in a $2dm^3$ flask maintained at 500 K. Hydrogen is introduced into the flask until the pressure is 5 bar and 0.04 mol of CH_3OH is formed. The K_p^0 is _____ $\times 10^{-3}$ (nearest integer).

Given : $R = 0.08 dm^3$ bar K^{-1} mol^{-1}

Assume only methanol is formed as the product and the system follows ideal gas behaviour.

Q78. JEE Main 2024 (31 Jan Shift 2)

$A_{(g)} \rightleftharpoons B_{(g)} + \frac{C}{2_{(g)}}$. The correct relationship between K_P, α and equilibrium pressure P is

(1) $K_P = \frac{\alpha^{\frac{1}{2}} P^{\frac{1}{2}}}{(2+\alpha)^{\frac{1}{2}}}$

(2) $K_P = \frac{\alpha^{\frac{3}{2}} P^{\frac{1}{2}}}{(2+\alpha)^{\frac{1}{2}}(1-\alpha)}$

(3) $K_P = \frac{\alpha^{\frac{1}{2}} P^{\frac{3}{2}}}{(2+\alpha)^{\frac{3}{2}}}$

(4) $K_P = \frac{\alpha^{\frac{1}{2}} P^{\frac{1}{2}}}{(2+\alpha)^{\frac{3}{2}}}$

Q79. JEE Main 2024 (29 Jan Shift 1)

For the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$, $K_p = 0.492$ atm at 300 K. K_c for the reaction at same temperature is $\_\_\_\_\_ \times 10^{-2}$. (Given :$R = 0.082$ L atm mol^{-1} K^{-1})

Q80. JEE Main 2024 (06 Apr Shift 1)

At $-20^\circ C$ and 1 atm pressure, a cylinder is filled with equal number of H_2, I_2 and HI molecules for the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$, the K_p for the process is $x \times 10^{-1}$.

x = _____ [Given : $R = 0.082$ L atm K^{-1} mol^{-1}]

(1) 0.01 (2) 10 (3) 2 (4) 1

Q81. JEE Main 2024 (04 Apr Shift 2)

The equilibrium constant for the reaction $SO_3(g) \rightleftharpoons SO_2(g) + \frac{1}{2}O_2(g)$ is $K_c = 4.9 \times 10^{-2}$. The value of K_c for the reaction given below is $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ is :

(1) 4.9 (2) 49

(3) 41.6 (4) 416

Q82. JEE Main 2022 (25 Jun Shift 1)

The standard free energy change (ΔG°) for 50% dissociation of N_2O_4 into NO_2 at 27 $^\circ$C and 1 atm pressure is $-x$ J mol^{-1}. The value of x is $-\ldots\ldots$ J.

[Given : $R = 8.31$ J K^{-1} mol^{-1}, $\log 1.33 = 0.1239$ $\ln 10 = 2.3$]

Q83. JEE Main 2022 (24 Jun Shift 1)

For a reaction at equilibrium $A(g) \rightleftharpoons B(g) + \frac{1}{2}C(g)$ the relation between dissociation constant (K), degree of dissociation (α) and equilibrium pressure (p) is given by :

(1) $K = \frac{\alpha^{\frac{3}{2}} p^{\frac{1}{2}}}{(2+\alpha)^{\frac{1}{2}}(1-\alpha)}$

(2) $K = \frac{\alpha^{\frac{1}{2}} p^{\frac{3}{2}}}{(1+\frac{3}{2}\alpha)^{\frac{1}{2}}(1-\alpha)}$

(3) $K = \frac{(\alpha p)^{\frac{3}{2}}}{(1+\frac{3}{2}\alpha)^{\frac{1}{2}}(1-\alpha)}$

(4) $K = \frac{(\alpha p)^{\frac{3}{2}}}{(1+\alpha)(1-\alpha)^{\frac{1}{2}}}$

Q84. JEE Main 2021 (24 Feb Shift 1)

The stepwise formation of $[Cu(NH_3)_4]^{2+}$ is given below:

$Cu^{2+} + NH_3 \overset{K_1}{\rightleftharpoons} [Cu(NH_3)]^{2+}$; $[Cu(NH_3)]^{2+} + NH_3 \overset{K_2}{\rightleftharpoons} [Cu(NH_3)_2]^{2+}$

$[Cu(NH_3)_2]^{2+} + NH_3 \overset{K_3}{\rightleftharpoons} [Cu(NH_3)_3]^{2+}$; $[Cu(NH_3)_3]^{2+} + NH_3 \overset{K_4}{\rightleftharpoons} [Cu(NH_3)_4]^{2+}$

The value of stability constants K_1, K_2, K_3 and K_4 are 10^4, 1.58×10^3, 5×10^2 and 10^2 respectively. The overall equilibrium constants for dissociation of $[Cu(NH_3)_4]^{2+}$ is $x \times 10^{-12}$. The value of x is _____ (Rounded off to the nearest integer)

Q85. JEE Main 2021 (17 Mar Shift 2)

Consider the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ The temperature at which $K_C = 20.4$ and $K_P = 600.1$, is _____ K. (Round off to the Nearest Integer). [Assume all gases are ideal and $R = 0.0831$ L bar K^{-1} mol^{-1}]

Chapter: Ionic Equilibrium

Q86. JEE Main 2025 (7 April Shift 2)

Only litre buffer solution was prepared by adding 0.10 mol each of NH_3 and NH_4Cl in deionised water. The change in pH on addition of 0.05 mol of HCl to the above solution is _____ $\times 10^{-2}$, (Nearest integer) (Given : pK_b of $NH_3 = 4.745$ and $\log_{10} 3 = 0.477$)

Q87. JEE Main 2025 (7 April Shift 1)

An aqueous solution of HCl with pH 1.0 is diluted by adding equal volume of water (ignoring dissociation of water). The pH of HCl solution would

(Given $\log 2 = 0.30$)

(1) reduce to 0.5

(2) increase to 1.3

(3) remain same

(4) increase to 2

Q88. JEE Main 2025 (4 April Shift 2)

x mg of $Mg(OH)_2$ (molar mass = 58) is required to be dissolved in 1.0 L of water to produce a pH of 10.0 at 298 K. The value of x is _____ mg. (Nearest integer)

(Given : $Mg(OH)_2$ is assumed to dissociate completely in H_2O)

Q89. JEE Main 2025 (3 April Shift 2)

10 mL of 2 M NaOH solution is added to 20 mL of 1 M HCl solution kept in a beaker. Now, 10 mL of this mixture is poured into a volumetric flask of 100 mL containing 2 moles of HCl and made the volume upto the mark with distilled water. The solution in this flask is :

(1) 0.2 M NaCl solution

(2) 20 M HCl solution

(3) 10 M HCl solution

(4) Neutral solution

Q90. JEE Main 2025 (28 Jan Shift 2)

Arrange the following in increasing order of solubility product :

$Ca(OH)_2, AgBr, PbS, HgS$

(1) $HgS < AgBr < PbS < Ca(OH)_2$

(2) $Ca(OH)_2 < AgBr < HgS < PbS$

(3) $PbS < HgS < Ca(OH)_2 < AgBr$

(4) $HgS < PbS < AgBr < Ca(OH)_2$

Q91. JEE Main 2025 (28 Jan Shift 1)

A weak acid HA has degree of dissociation x. Which option gives the correct expression of (pH-pK_a)?

(1) 0
(2) $\log(1+2x)$
(3) $\log\left(\frac{1-x}{x}\right)$
(4) $\log\left(\frac{x}{1-x}\right)$

Q92. JEE Main 2025 (24 Jan Shift 1)

K_{sp} for $Cr(OH)_3$ is 1.6×10^{-30}. What is the molar solubility of this salt in water?

(1) $\frac{1.8\times10^{-30}}{27}$
(2) $\sqrt[5]{1.8\times10^{-30}}$
(3) $\sqrt[4]{\frac{1.6\times10^{-30}}{27}}$
(4) $\sqrt[2]{1.6\times10^{-30}}$

Q93. JEE Main 2025 (23 Jan Shift 1)

Which of the following happens when NH_4OH is added gradually to the solution containing 1 M A^{2+} and 1MB^{3+} ions?

Given : $K_{sp}[A(OH)_2]=9\times10^{-10}$ and $K_{sp}[B(OH)_3]=27\times10^{-18}$ at 298 K.

(1) Both $A(OH)_2$ and $B(OH)_3$ do not show precipitation with NH_4OH
(2) $A(OH)_2$ will precipitate before $B(OH)_3$
(3) $B(OH)_3$ will precipitate before $A(OH)_2$
(4) $A(OH)_2$ and $B(OH)_3$ will precipitate together

Q94. JEE Main 2025 (23 Jan Shift 1)

If 1 mM solution of ethylamine produces pH = 9, then the ionization constant (K_b) of ethylamine is 10^{-x}. The value of x is _____ (nearest integer).

[The degree of ionization of ethylamine can be neglected with respect to unity.]

Q95. JEE Main 2025 (2 April Shift 1)

If equal volumes of AB_2 and XY (both are salts) aqueous solutions are mixed, which of the following combination will give a precipitate of AY_2 at 300 K ?

(Given K_{sp} (at 300 K) for $AY_2=5.2\times10^{-7}$)

(1) 3.6×10^{-3}M $AB_2, 5.0\times10^{-4}$M XY
(2) 2.0×10^{-4}M $AB_2, 0.8\times10^{-3}$M XY
(3) 2.0×10^{-2}M $AB_2, 2.0\times10^{-2}$M XY
(4) 1.5×10^{-4}M $AB_2, 1.5\times10^{-3}$M XY

Q96. JEE Main 2023 (24 Jan Shift 1)

The dissociation constant of acetic acid is $x\times10^{-5}$. When 25 mL of 0.2 M CH_3COONa solution is mixed with 25 mL of 0.02 M CH_3COOH solution, the pH of the resultant solution is found to be equal to 5. The value of x is _____.

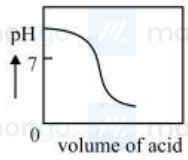
Q97. JEE Main 2022 (29 Jul Shift 2)

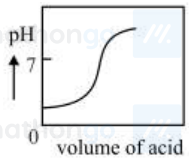
200 mL of 0.01M HCl is mixed with 400 mL of 0.01M H_2SO_4. The pH of the mixture is

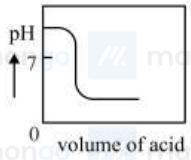
(1) 1.14
(2) 1.78
(3) 2.34
(4) 3.02

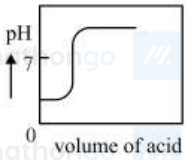
Q98. JEE Main 2022 (27 Jul Shift 2)

The Plot of pH-metric titration of weak base NH_4OH vs strong acid HCl looks like

(1) 

(2) 

(3) 

(4) 

Q99. JEE Main 2022 (27 Jul Shift 1)

At 310 K, the solubility of CaF_2 in water is 2.34×10^{-3} g/100 mL. The solubility product of CaF_2 is ---- $\times 10^{-8}(\text{mol/L})^3$(nearest integer). (Given molar mass : $CaF_2 = 78$ g mol^{-1})

Q100. JEE Main 2022 (26 Jun Shift 1)

50 mL of 0.1 M CH_3COOH is being titrated against 0.1 M NaOH. When 25 mL of NaOH has been added, the pH of the solution will be____$\times 10^{-2}$. (Nearest integer)

(Given : $pK_a(CH_3COOH) = 4.76$)

$\log 2 = 0.30$,

$\log 3 = 0.48$,

$\log 5 = 0.69$,

$\log 7 = 0.84$,

$\log 11 = 1.04$

Q101. JEE Main 2022 (25 Jul Shift 2)

Ka_1, Ka_2 and Ka_3 are the respective ionization constants for the following reactions (a), (b) and (c).

(a) $H_2C_2O_4 \rightleftharpoons H^+ + HC_2O_4^-$

(b) $HC_2O_4^- \rightleftharpoons H^+ + HC_2O_4^{2-}$

(c) $H_2C_2O_4 \rightleftharpoons 2H^+ + C_2O_4^{2-}$

The relationship between K_{a_1}, K_{a_2} and K_{a_3} is given as

(1) $K_{a3} = K_{a1} + K_{a2}$

(2) $K_{a3} = \frac{K_{a1}}{K_{a2}}$

(3) $K_{a3} = K_{a1} - K_{a2}$

(4) $K_{a3} = K_{a1} \times K_{a2}$

Q102. JEE Main 2022 (25 Jul Shift 1)

20 mL of 0.1M NH_4OH is mixed with 40 mL of 0.05 M HCl. The pH of the mixture is nearest to:

(Given: $K_b(NH_4OH) = 1 \times 10^{-5}$, $\log 2 = 0.30$, $\log 3 = 0.48$, $\log 5 = 0.69$, $\log 7 = 0.84$, $\log 11 = 1.04$)

(1) 3.2

(2) 4.2

(3) 5.2

(4) 6.2

Q103. JEE Main 2021 (20 Jul Shift 2)

A solution is 0.1M in Cl^- and 0.001M in CrO_4^{2-}.

Solid AgNO_3 is gradually added to it Assuming that the addition does not change in volume and $\text{K}_{\text{sp}}(\text{AgCl}) = 1.7 \times 10^{-10}\text{M}^2$ and $\text{K}_{\text{sp}}(\text{Ag}_2\text{CrO}_4) = 1.9 \times 10^{-12}\text{M}^3$.

Select correct statement from the following:

(1) AgCl precipitates first because its K_{sp} is high.

(2) Ag_2CrO_4 precipitates first as its K_{sp} is low.

(3) Ag_2CrO_4 precipitates first because the amount of Ag^+ needed is low.

(4) AgCl will precipitate first as the amount of Ag^+ needed to precipitate is low.

Q104. JEE Main 2021 (17 Mar Shift 1)

0.01 moles of a weak acid HA $\left(\text{K}_a = 2.0 \times 10^{-6}\right)$ is dissolved in 1.0 L of 0.1M HCl solution. The degree of dissociation of HA is _____ $\times 10^{-5}$ (Round off to the Nearest Integer). [Neglect volume change on adding HA and assume degree of dissociation $<< 1$]

Q105. JEE Main 2020 (05 Sep Shift 1)

A soft drink was bottled with a partial pressure of CO_2 of 3 bar over the liquid at room temperature. The partial pressure of CO_2 over the solution approaches a value of 30 bar when 44 g of CO_2 is dissolved in 1 kg of water at room temperature. The approximate pH of the soft drink is _____ $\times 10^{-1}$. (First dissociation constant of $\text{H}_2\text{CO}_3 = 4.0 \times 10^{-7}$; $\log 2 = 0.3$; density of the soft drink $= 1\text{ g mL}^{-1}$)

Chapter: Redox Reactions

Q106. JEE Main 2025 (28 Jan Shift 1)

Given below are two statements:

Statement I: In the oxalic acid vs KMnO_4 (in the presence of dil H_2SO_4) titration the solution needs to be heated initially to 60°C, but no heating is required in Ferrous ammonium sulphate (FAS) vs KMnO_4 titration (in the presence of dil H_2SO_4)

Statement II: In oxalic acid vs KMnO_4 titration, the initial formation of MnSO_4 takes place at high temperature, which then acts as catalyst for further reaction. In the case of FAS vs KMnO_4, heating oxidizes Fe^{2+} into Fe^{3+} by oxygen of air and error may be introduced in the experiment.

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

(1) Both Statement I and Statement II are false

(2) Both Statement I and Statement II are true

(3) Statement I is false but Statement II is true

(4) Statement I is true but Statement II is false

Q107. JEE Main 2025 (22 Jan Shift 2)

The species which does not undergo disproportionation reaction is :

(1) ClO_3^- (2) ClO^-

(3) ClO_2^- (4) ClO_4^-

Q108. JEE Main 2025 (22 Jan Shift 1)

Some CO_2 gas was kept in a sealed container at a pressure of 1 atm and at 273 K. This entire amount of CO_2 gas was later passed through an aqueous solution of $Ca(OH)_2$. The excess unreacted $Ca(OH)_2$ was later neutralized with 0.1 M of 40 mL HCl. If the volume of the sealed container of CO_2 was x, then x is _____ cm^3 (nearest integer).

[Given : The entire amount of CO_2(g) reacted with exactly half the initial amount of $Ca(OH)_2$ present in the aqueous solution.]

Q109. JEE Main 2023 (06 Apr Shift 2)

During the reaction of permanganate with thiosulphate, the change in oxidation of manganese occurs by value of 3. Identify which of the below medium will favour the reaction.

(1) Both aqueous acidic and neutral

(2) Aqueous neutral

(3) Both aqueous acidic and faintly alkaline

(4) Aqueous acidic

Q110. JEE Main 2023 (06 Apr Shift 1)

Strong reducing and oxidizing agents among the following , respectively, are

(1) Ce^{3+} and Ce^{4+}

(2) Ce^{4+} and Tb^{4+}

(3) $Ce^{4+}$and Eu^{2+}

(4) Eu^{2+} and Ce^{4+}

Q111. JEE Main 2022 (28 Jun Shift 1)

A 2.0 g sample containing MnO_2 is treated with HCl liberating Cl_2. The Cl_2 gas is passed into a solution of KI and 60.0 mL of 0.1 MNaS_2O_3 is required to titrate the liberated iodine. The percentage of MnO_2 in the sample is____. Nearest integer)

[Atomic masses (in u) $Mn = 55; Cl = 35.5 : O = 16, I = 127, Na = 23, K = 39, S = 32$]

Q112. JEE Main 2022 (27 Jul Shift 2)

The normality of H_2SO_4 in the solution obtained on mixing 100 mL of 0.1M H_2SO_4 with 50 mL of 0.1M NaOH is____$\times 10^{-1}$ N.

Q113. JEE Main 2022 (26 Jul Shift 2)

20 mL of 0.02 M hypo solution is used for the titration of 10 mL of copper sulphate solution, in the presence of excess of KI using starch as an indicator. The molarity of Cu^{2+} is found to be _____ $\times 10^{-2}$M (nearest integer)

Given : $2Cu^{2+} + 4I^- \rightarrow Cu_2I_2 + I_2I_2 \; + \; 2S_2O_3^{-2} \; \rightarrow \; 2I^- \; + \; S_4O_6^{-2}$

Q114. JEE Main 2021 (27 Aug Shift 1)

In polythionic acid, $H_2S_xO_6 (x = 3$ to $5)$ the oxidation state(s) of sulphur is/are:

(1) $+6$ only

(2) $+5$ only

(3) 0 and $+5$ only

(4) $+3$ and $+5$ only

Q115. JEE Main 2020 (04 Sep Shift 1)

A 20.0 mL solution containing 0.2 g impure H_2O_2 reacts completely with 0.316 g of $KMnO_4$ in acid solution. The purity of H_2O_2 (in %) is_____ (mol. wt. of $H_2O_2 = 34$; mol. wt. of $KMnO_4 = 158$)

Chapter: Solutions

Q116. JEE Main 2025 (8 April Shift 2)

Which of the following binary mixture does not show the behaviour of minimum boiling azeotropes?

(1) $H_2O + CH_3COC_2H_5$ (2) $C_6H_5OH + C_6H_5NH_2$ (3) $CS_2 + CH_3COCH_3$ (4) $CH_3OH + CHCl_3$

Q117. JEE Main 2025 (7 April Shift 2)

Liquid A and B form an ideal solution. The vapour pressure of pure liquids A and B are 350 and 750 mm Hg respectively at the same temperature. If x_A and x_B are the mole fraction of A and B in solution while y_A and y_B are the mole fraction of A and B in vapour phase then :

(1) $\frac{x_A}{x_B} < \frac{y_A}{y_B}$ (2) $\frac{x_A}{x_B} = \frac{y_A}{y_B}$

(3) $\frac{x_A}{x_B} > \frac{y_A}{y_B}$ (4) $(x_A - y_A) < (x_B - y_B)$

Q118. JEE Main 2025 (7 April Shift 1)

The percentage dissociation of a salt (MX_3) solution at given temperature (van't Hoff factor $i = 2$) is _____ % (Nearest integer)

Q119. JEE Main 2025 (4 April Shift 2)

Given below are two statements :

Statement (I) : Molal depression constant K_f is given by $\frac{M_1RT_f}{\Delta S_{fus}}$, where symbols have their usual meaning.

Statement (II) : K_f for benzene is less than the K_f for water.

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

(1) Statement I is incorrect but Statement II is correct

(2) Both Statement I and Statement II are incorrect

(3) Both Statement I and Statement II are correct

(4) Statement I is correct but Statement II is incorrect

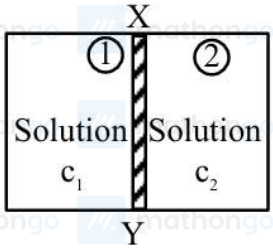
Q120. JEE Main 2025 (4 April Shift 2)

Sea water, which can be considered as a 6 molar (6M) solution of NaCl , has a density of 2 g mL^{-1}. The concentration of dissolved oxygen (O_2) in sea water is 5.8 ppm. Then the concentration of dissolved oxygen (O_2) in sea water, is $x \times 10^{-4}$ m. x = _____. (Nearest integer)

Given: Molar mass of NaCl is 58.5 g mol^{-1} Molar mass of O_2 is 32 g mol^{-1}

Q121. JEE Main 2025 (4 April Shift 1)

XY is the membrane / partition between two chambers 1 and 2 containing sugar solutions of concentration c_1 and c_2 $(c_1 > c_2)$molL^{-1}. For the reverse osmosis to take place identify the correct condition
(Here p_1 and p_2 are pressures applied on chamber 1 and 2)



(A) Membrane/Partition; Cellophane, $p_1 > \pi$
(B) Membrane/Partition ; Porous. $p_2 > \pi$
(C) Membrane/Partition ; Parchment paper, $p_1 > \pi$
(D) Membrane/Partition : Cellophane, $p_2 > \pi$
Choose the correct answer from the option given below :
(1) B and D only
(2) A and D only
(3) A and C only
(4) C only

Q122. JEE Main 2025 (28 Jan Shift 2)

Assume a living cell with $0.9\%(\omega/\omega)$ of glucose solution (aqueous). This cell is immersed in another solution having equal mole fraction of glucose and water.
(Consider the data upto first decimal place only)
The cell will :
(1) shrink since solution is $0.45\%(\omega/\omega)$ as a result of association of glucose molecules (due to hydrogen bonding)
(2) Show no change in volume since solution is $0.9\%(\omega/\omega)$
(3) swell up since solution is $1\%(\omega/\omega)$
(4) shrink since soluton is $0.5\%(\omega/\omega)$

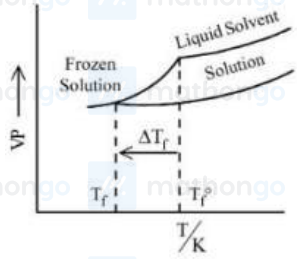
Q123. JEE Main 2025 (28 Jan Shift 1)

What is the freezing point depression constant of a solvent, 50 g of which contain 1 g non volatile solute (molar mass 256 g mol^{-1}) and the decrease in freezing point is 0.40 K ?
(1) 3.72 K kg mol^{-1}
(2) 1.86 K kg mol^{-1}
(3) 4.43 K kg mol^{-1}
(4) 5.12 K kg mol^{-1}

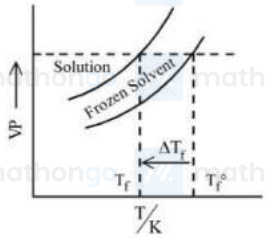
Q124. JEE Main 2025 (24 Jan Shift 1)

Consider the given plots of vapour pressure (VP) vs temperature(T/K). Which amongst the following options is correct graphical representation showing ΔT_f, depression in the freezing point of a solvent in a solution?

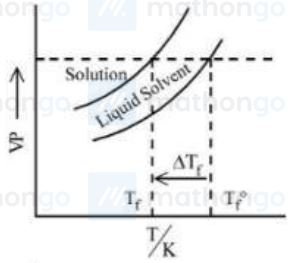
(1)



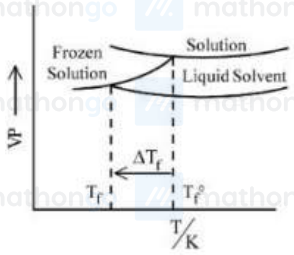
(2)



(3)



(4)



Q125. JEE Main 2025 (22 Jan Shift 1)

Arrange the following solutions in order of their increasing boiling points.

(i) 10^{-4}M NaCl

(ii) 10^{-4}M Urea

(iii) 10^{-3}M NaCl

(iv) 10^{-2}M NaCl

(1) (i) < (ii) < (iii) < (iv)

(2) (iv) < (iii) < (i) < (ii)

(3) (ii) < (i) $\equiv$ (iii) < (iv)

(4) (ii) < (i) < (iii) < (iv)

Q126. JEE Main 2025 (2 April Shift 2)

When 1 g each of compounds AB and AB_2 are dissolved in 15 g of water separately, they increased the boiling point of water by 2.7 K and 1.5 K respectively. The atomic mass of A (in amu) is ____ $\times 10^{-1}$ (Nearest integer)

(Given : Molal boiling point elevation constant is 0.5 K kg mol^{-1})

Q127. JEE Main 2025 (2 April Shift 1)

A solution is made by mixing one mole of volatile liquid A with 3 moles of volatile liquid B. The vapour pressure of pure A is 200 mm Hg and that of the solution is 500 mm Hg. The vapour pressure of pure B and the least volatile component of the solution, respectively, are :

(1) 1400 mmHg, A

(2) 1400 mmHg, B

(3) 600 mmHg, B

(4) 600 mmHg, A

Q128. JEE Main 2024 (31 Jan Shift 1)

Identify the mixture that shows positive deviations from Raoult's Law

(1) $(CH_3)_2CO + C_6H_5NH_2$

(2) $CHCl_3 + C_6H_6$

(3) $CHCl_3 + (CH_3)_2CO$

(4) $(CH_3)_2CO + CS_2$

Q129. JEE Main 2024 (29 Jan Shift 1)

The osmotic pressure of a dilute solution is 7×10^5 Pa at 273 K. Osmotic pressure of the same solution at 283 K is _____ $\times 10^4\ \mathrm{Nm}^{-2}$.(Nearest integer)

Q130. JEE Main 2024 (09 Apr Shift 2)

The vapour pressure of pure benzene and methyl benzene at 27°C is given as 80 Torr and 24 Torr, respectively. The mole fraction of methyl benzene in vapour phase, in equilibrium with an equimolar mixture of those two liquids (ideal solution) at the same temperature is _____ $\times 10^{-2}$ (nearest integer)

Q131. JEE Main 2024 (04 Apr Shift 2)

2.7 kg of each of water and acetic acid are mixed. The freezing point of the solution will be $-x^\circ$C. Consider the acetic acid does not dimerise in water, nor dissociates in water. $x =$ _____ (nearest integer)

[Given: Molar mass of water $= 18\ \mathrm{g\ mol}^{-1}$, acetic acid $= 60\ \mathrm{g\ mol}^{-1}$

$K_f H_2O$: $1.86\ \mathrm{K\ kg\ mol}^{-1}$

K_f acetic acid: $3.90\ \mathrm{K\ kg\ mol}^{-1}$

freezing point: $H_2O = 273$ K, acetic acid $= 290$ K]

Q132. JEE Main 2022 (29 Jul Shift 2)

1.80 g of solute A was dissolved in $62.5\ \mathrm{cm}^3$ of ethanol and freezing point of the solution was found to be 155.1 K. The molar mass of solute A is gmol^{-1}. [Given: Freezing point of ethanol is 156.0 K. Density of ethanol is $0.80\ \mathrm{g\ cm}^{-3}$. Freezing point depression constant of ethanol is $2.00\ \mathrm{K\ kg\ mol}^{-1}$]

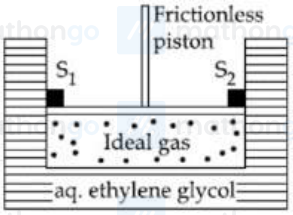
Q133. JEE Main 2021 (25 Jul Shift 1)

CO_2 gas is bubbled through water during a soft drink manufacturing process at 298 K. If CO_2 exerts a partial pressure of 0.835 bar then x m mol of CO_2 would dissolve in 0.9 L of water. The value of x is _____. (Nearest integer)

(Henry's law constant for CO_2 at 298 K is 1.67×10^3 bar)

Q134. JEE Main 2020 (09 Jan Shift 2)

A cylinder containing an ideal gas ($0.1\mathrm{mol}$ of $1.0\mathrm{dm}^3$) is in thermal equilibrium with a large volume of 0.5 molal aqueous solution of ethylene glycol at its freezing point. If the stoppers S_1 and S_2 (as shown in the figure) are suddenly withdrawn, the volume of the gas in litres after equilibrium is achieved will be ____. (Given, $K_f(\mathrm{water}) = 2.0\mathrm{Kkgmol}^{-1}, R = 0.08\mathrm{dm}^3\mathrm{atmK}^{-1}\mathrm{mol}^{-1}$)



Q135. JEE Main 2020 (07 Jan Shift 1)

At 35 °C, the vapour pressure of CS_2, is 512mm Hg and that of acetone is 144 mmHg. A solution of CS_2 in acetone has a total vapour pressure of 600 mmHg. The false statement amongst the following is:

(1) Raoult's law is not obeyed by this system

(2) a mixture of 100mLCS_2 and 100mL acetone has a volume < 200mL

(3) CS_2 and acetone are less attracted to each other than to themselves

(4) heat must be absorbed in order to produce the solution at 35°C

Q136. JEE Main 2020 (06 Sep Shift 1)

The elevation of boiling point of 0.10m aqueous $CrCl_3.xNH_3$ solution is two times that of 0.05 m aqueous $CaCl_2$ solution. The value of x is .....

[Assume 100% ionisation of the complex and $CaCl_2$, coordination number of Cr as 6, and that all NH_3 molecules are present inside the coordination sphere]

Chapter: Electrochemistry

Q137. JEE Main 2025 (7 April Shift 2)

Given below are two statements :

1 M aqueous solution of each of $Cu(NO_3)_2$, $AgNO_3$, $Hg_2(NO_3)_2$; $Mg(NO_3)_2$ are electrolysed using inert electrodes,

Given : $E^{\theta}_{Ag^+/Ag} = 0.80$ V, $E^{\theta}_{Hg_2^{2+}/Hg} = 0.79$ V,

$E^{\theta}_{Cu^{2+}/Cu} = 0.24$ V and $E^{\theta}_{Mg^{2+}/Mg} = -2.37$ V

Statement (I) : With increasing voltage, the sequence of deposition of metals on the cathode will be Ag, Hg and Cu

Statement (II) : Magnesium will not be deposited at cathode instead oxygen gas will be evolved at the cathode.

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

(1) Both statement I and statement II are incorrect

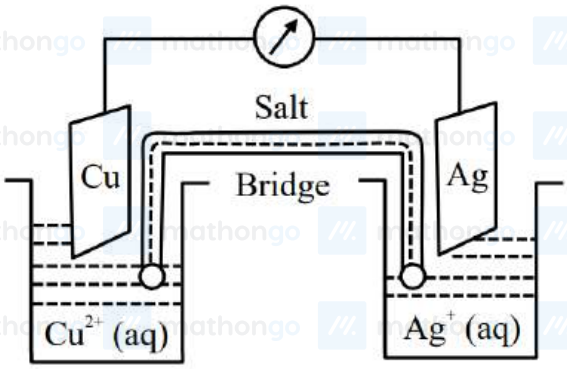
(2) Statement I is correct but statement II is incorrect

(3) Both statement I and statement II are correct

(4) Statement I is incorrect but statement II is correct

Q138. JEE Main 2025 (7 April Shift 1)

1 Faraday electricity was passed through $Cu^{2+}(1.5\ M, 1\ L)/Cu$ and 0.1 Faraday was passed through $Ag^{+}(0.2M, 1\ L)/Ag$ electrolytic cells. After this the two cells were connected as shown below to make an electrochemical cell. The emf of the cell thus formed at 298 K is-



Given: $E^{\circ}_{Cu^{2+}/Cu} = 0.34\ V$

$E^{0}_{Ag^{+}/Ag} = 0.8\ V$

$\frac{2.303RT}{F} = 0.06\ V$

Q139. JEE Main 2025 (7 April Shift 1)

Given below are two statements :

Statement I : Mohr's salt is composed of only three types of ions-ferrous, ammonium and sulphate.

Statement II : If the molar conductance at infinite dilution of ferrous, ammonium and sulphate ions are x_1, x_2 and x_3 S cm^2 mol^{-1}, respectively then the molar conductance for Mohr's salt solution at infinite dilution would be given by $x_1 + x_2 + 2x_3$

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

(1) Both statements I and Statement II are false

(2) Statement I is false but Statement II is true

(3) Statement I is true but Statement II are false

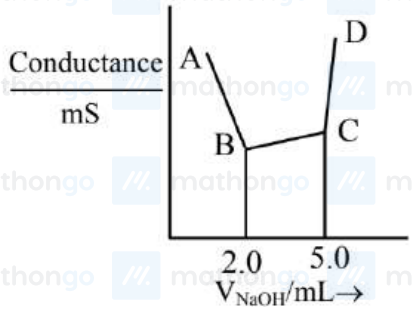
(4) Both statements I and Statement II are true

Q140. JEE Main 2025 (4 April Shift 2)

The molar conductance of an infinitely dilute solution of ammonium chloride was found to be 185 S cm^2 mol^{-1} and the ionic conductance of hydroxyl and chloride ions are 170 and 70 S cm^2 mol^{-1}, respectively. If molar conductance of 0.02 M solution of ammonium hydroxide is 85.5 S cm^2 mol^{-1}, its degree of dissociation is given by $x \times 10^{-1}$. The value of x is _____ (Nearest integer)

Q141. JEE Main 2025 (3 April Shift 2)

40 mL of a mixture of CH_3COOH and HCl (aqueous solution) is titrated against 0.1 M NaOH solution conductometrically. Which of the following statement is correct?



(1) The concentration of CH_3COOH in the original mixture is 0.005 M

(2) The concentration of HCl in the original mixture is 0.005 M

(3) CH_3COOH is neutralised first followed by neutralisation of HCl

(4) Point ' C ' indicates the complete neutralisation HCl

Q142. JEE Main 2025 (3 April Shift 1)

Correct order of limiting molar conductivity for cations in water at 298 K is :

(1) $H^+ > Na^+ > K^+ > Ca^{2+} > Mg^{2+}$

(2) $H^+ > Ca^{2+} > Mg^{2+} > K^+ > Na^+$

(3) $Mg^{2+} > H^+ > Ca^{2+} > K^+ > Na^+$

(4) $H^+ > Na^+ > Ca^{2+} > Mg^{2+} > K^+$

Q143. JEE Main 2025 (29 Jan Shift 2)

O_2 gas will be evolved as a product of electrolysis of :

(A) an aqueous solution of $AgNO_3$ using silver electrodes.

(B) an aqueous solution of $AgNO_3$ using platinum electrodes.

(C) a dilute solution of H_2SO_4 using platinum electrodes.

(D) a high concentration solution of H_2SO_4 using platinum electrodes.

Choose the correct answer from the options given below :

(1) (A) and (C) only (2) (B) and (C) only

(3) (A) and (D) only (4) (B) and (D) only

Q144. JEE Main 2025 (29 Jan Shift 1)

The standard reduction potential values of some of the p-block ions are given below. Predict the one with the strongest oxidising capacity.

(1) $E^{\ominus}_{Pb^{4+}/Pb^{2+}} = +1.67$ V

(2) $E^{\ominus}_{Sn^{4+}/Sn^{2+}} = +1.15$ V

(3) $E^{\ominus}_{Al^{3+}/Al} = -1.66$ V

(4) $E^{o}_{Tl^{3+}/Tl} = +1.26$ V

Q145. JEE Main 2025 (28 Jan Shift 2)

Electrolysis of 600 mL aqueous solution of NaCl for 5 min changes the pH of the solution to 12. The current in Amperes used for the given electrolysis is ____. (Nearest integer).

Q146. JEE Main 2025 (24 Jan Shift 1)

For the given cell

$Fe^{2+}_{(aq)} + Ag^{+}_{(aq)} \rightarrow Fe^{3+}_{(aq)} + Ag_{(s)}$

The standard cell potential of the above reaction is Given:

$Ag^{+} + e^{-} \rightarrow Ag \quad E^{\theta} = xV$

$Fe^{2+} + 2e^{-} \rightarrow Fe \quad E^{\theta} = yV$

$Fe^{3+} + 3e^{-} \rightarrow Fe \quad E^{\theta} = zV$

(1) $x + y - z$

(2) $x + 2y$

(3) $x + 2y - 3z$

(4) $y - 2x$

Q147. JEE Main 2025 (22 Jan Shift 2)

Given below are two statements :

Statement (I) : Corrosion is an electrochemical phenomenon in which pure metal acts as an anode and impure metal as a cathode.

Statement (II) : The rate of corrosion is more in alkaline medium than in acidic medium.

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

(1) Both Statement I and Statement II are true

(2) Statement I is false but Statement II is true

(3) Statement I is true but Statement II is false

(4) Both Statement I and Statement II are false

Q148. JEE Main 2025 (22 Jan Shift 1)

A solution of aluminium chloride is electrolysed for 30 minutes using a current of 2 A. The amount of the aluminium deposited at the cathode is

[Given : molar mass of aluminium and chlorine are 27 g mol^{-1} and 35.5 g mol^{-1} respectively. Faraday constant $= 96500 C mol^{-1}$]

(1) 1.660 g

(2) 0.336 g

(3) 0.441 g

(4) 1.007 g

Q149. JEE Main 2025 (2 April Shift 2)

0.2%(w/v) solution of NaOH is measured to have resistivity 870.0 mΩ m. The molar conductivity of the solution will be _____ $\times 10^{2} mS dm^{2}$ mol^{-1}. (Nearest integer)

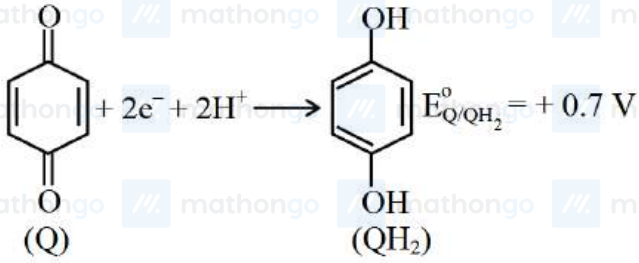
Q150. JEE Main 2025 (2 April Shift 1)

Consider the following electrochemical cell at standard condition.

$Au(s)\,|QH_2, Q|NH_4X(0.01M)||Ag^+(1M)\,|\,Ag(s)$

$E_{cell} = +0.4\ V$

The couple QH_2/Q represents quinhydrone electrode, the half cell reaction is given below



The pK_b value of the ammonium halide salt (NH_4X) used here is _____. (nearest integer)

Q151. JEE Main 2024 (31 Jan Shift 1)

One Faraday of electricity liberates $x \times 10^{-1}$ gram atom of copper from copper sulphate, x is_____.

Q152. JEE Main 2024 (09 Apr Shift 2)

Match List I with List II

	List - I (Cell)		List - II (Use/Property/Reaction)
A.	Leclanche cell	I.	Converts energy of combustion into electrical energy
B.	Ni – Cdcell	II.	Does not involve any ion in solution and is used in hearing aids
C.	Fuel cell	III.	Rechargeable
D.	Mercury cell	IV.	Reaction at anode $Zn \rightarrow Zn^{2+} + 2e^-$

Choose the correct answer from the options given below:

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

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

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

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

Q153. JEE Main 2024 (05 Apr Shift 2)

The quantity of silver deposited when one coulomb charge is passed through $AgNO_3$ solution :

(1) 1 g of silver

(2) 1 electrochemical equivalent of silver

(3) 1 chemical equivalent of silver

(4) 0.1 g atom of silver

Q154. JEE Main 2024 (05 Apr Shift 1)

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

Q155. JEE Main 2024 (01 Feb Shift 1)

The potential for the given half cell at 298K is $(-)$..... $\times 10^{-2}$V.

$2H^{+}_{(aq)} + 2e^{-} \rightarrow H_2\left(g\right)$

$[H^{+}] = 1M, P_{H_2} = 2\ atm$

(Given$2.303\ RT/F = 0.06\ V,\ \log 2 = 0.3$)

Q156. JEE Main 2023 (15 Apr Shift 1)

The number of correct statements from the following is _____

(A) Conductivity always decreases with decrease in concentration for both strong and weak electrolytes.

(B) The number of ions per unit volume that carry current in a solution increases on dilution.

(C) Molar conductivity increases with decrease in concentration.

(D) The variation in molar conductivity is different for strong and weak electrolytes.

(E) For weak electrolytes, the change in molar conductivity with dilution is due to decrease in degree of dissociation.

Q157. JEE Main 2023 (06 Apr Shift 1)

The standard electrode potential of M^{+}/M in aqueous solution does not depend on

(1) Hydration of a gaseous metal ion
(2) Sublimation of a solid metal
(3) Ionisation of a solid metal atom
(4) Ionisation of a gaseous metal atom

Q158. JEE Main 2022 (28 Jun Shift 2)

For the given reactions

$Sn^{2+} + 2e^{-} \rightarrow Sn$

$Sn^{4+} + 4e^{-} \rightarrow Sn$ the electrode potentials are ; $E^{\circ}_{Sn^{2+}/Sn} = -0.140\ V$ and $E^{\circ}_{Sn^{4+}/Sn} = 0.010\ V$. The magnitude of standard electrode potential for Sn^{4+}/Sn^{2+} i.e. $E^{\circ}_{Sn^{4+}/Sn^{2+}}$ is____$\times 10^{-2}$ V(Nearest integer)

Q159. JEE Main 2022 (27 Jun Shift 1)

The limiting molar conductivities of $NaI, NaNO_3$ and $AgNO_3$ are $12.7, 12.0$ and $13.3\ mSm^2\ mol^{-1}$, respectively (all at $25\ ^{\circ}C$). The limiting molar conductivity of AgI at this temperature is____$mSm^2\ mol^{-1}$.

Q160. JEE Main 2022 (25 Jun Shift 1)

In a cell, the following reactions take place

$Fe^{2+} \rightarrow Fe^{3+} + e^{-}\ E^{o}_{Fe^{3+}/Fe^{2+}} = 0.77\ V$

$2I^{-} \rightarrow I_2 + 2e^{-}\ E^{0}_{I_2/I^{-}} = 0.54\ V$

The standard electrode potential for the spontaneous reaction in the cell is $x \times 10^{-2}\ V$ at $298\ K$. The value of x is - (Nearest Integer)

Q161. JEE Main 2022 (24 Jun Shift 2)

The resistance of a conductivity cell containing 0.01 MKCl solution at 298 K is 1750 Ω. If the conductivity of 0.01 MKCl solution at 298 K is 0.152×10^{-3} S cm^{-1}, then the cell constant of the conductivity cell is____$\times 10^{-3}$ cm^{-1}

Q162. JEE Main 2021 (27 Jul Shift 2)

For the cell $Cu(s)\left|Cu^{2+}(aq)(0.1M)\right\|Ag^{+}(aq)(0.01M)\left|Ag(s)\right.$ the cell potential $E_1 = 0.3095$ V. For the cell $Cu(s)\left|Cu^{2+}(aq)(0.01M)\right\|ADO^{\top}(aq)(0.001M)\left|Ag(s)\right.$ the cell potential $= x \times 10^{-2}$ V. Find value of x (Round off the Nearest Integer). [Use : $\frac{2.303RT}{F} = 0.059$ J]

Chapter: Chemical Kinetics

Q163. JEE Main 2025 (7 April Shift 2)

$A(g) \rightarrow B(g) + C(g)$ is a first order reaction.

Time	T	∞
$\mathbf{P}_{system}$	P_t	P_∞

The reaction was started with reactant A only. Which of the following expression is correct for rate constant k ?

(1) $k = \frac{1}{t}\ln\frac{2(p_\infty - P_t)}{P_t}$ (2) $k = \frac{1}{t}\ln\frac{p_\infty}{P_t}$

(3) $k = \frac{1}{t}\ln\frac{p_\infty}{2(p_\infty - P_t)}$ (4) $k = \frac{1}{t}\ln\frac{p_\infty}{(p_\infty - P_t)}$

Q164. JEE Main 2025 (4 April Shift 2)

Half life of zero order reaction A $\rightarrow$ product is 1 hour, when initial concentration of reaction is 2.0 mol L L^{-1}. The time required to decrease concentration of A from 0.50 to 0.25 mol L^{-1} is:

(1) 0.5 hour (2) 4 hour

(3) 15 min (4) 60 min

Q165. JEE Main 2025 (4 April Shift 1)

For $A_2 + B_2 \rightleftharpoons 2AB$

E_a for forward and backward reaction are 180 and 200 kJ mol^{-1} respectively

If catalyst lowers E_a for both reaction by 100 kJ mol^{-1}.

Which of the following statement is correct?

(1) Catalyst does not alter the Gibbs energy change of a reaction.

(2) Catalyst can cause non-spontaneous reactions to occur.

(3) The enthalpy change for the reaction is $+20$ kJ mol^{-1}.

(4) The enthalpy change for the catalysed reaction is different from that of uncatalysed reaction.

Q166. JEE Main 2025 (3 April Shift 1)

In a reaction $A + B \rightarrow C$, initial concentrations of A and B are related as $[A]_0 = 8[B]_0$. The half lives of A and B are 10 min and 40 min. respectively. If they start to disappear at the same time, both following first order kinetics, after how much time will the concentration of both the reactants be same?

(1) 60 min (2) 80 min

(3) 20 min (4) 40 min

Q167. JEE Main 2025 (29 Jan Shift 2)

Drug X becomes ineffective after 50% decomposition. The original concentration of drug in a bottle was $16\mathrm{mg/mL}$ which becomes $4\mathrm{mg/mL}$ in 12 months. The expiry time of the drug in months is _____

Assume that the decomposition of the drug follows first order kinetics.

(1) 2 (2) 6

(3) 12 (4) 3

Q168. JEE Main 2025 (29 Jan Shift 1)

The reaction $\mathrm{A_2 + B_2 \rightarrow 2AB}$ follows the mechanism

$A_2 \underset{k_{-1}}{\overset{k_1}{\longrightarrow}} A + A$ (fast)

$A + B_2 \xrightarrow{k_2} AB + B$ (slow)

$A + B \rightarrow AB$ (fast)

The overall order of the reaction is :

(1) 2 (2) 2.5 (3) 3 (4) 1.5

Q169. JEE Main 2025 (28 Jan Shift 2)

Consider an elementary reaction

$\mathrm{A(g) + B(g) \rightarrow C(g) + D(g)}$

If the volume of reaction mixture is suddenly reduced to $\frac{1}{3}$ of its initial volume, the reaction rate will become ' x ' times of the original reaction rate. The value of x is :

(1) 3 (2) $\frac{1}{9}$ (3) 9 (4) $\frac{1}{3}$

Q170. JEE Main 2025 (28 Jan Shift 1)

$[A]_0 / \mathrm{mol\,L^{-1}}$	$t_{1/2}$ / min
0.100	200
0.025	100

For a given reaction $\mathrm{R \rightarrow P}$, $\mathrm{t_{1/2}}$ is related to $[\mathrm{A}]_0$ as given in table.

Given: $\log 2 = 0.30$

Which of the following is true?

A. The order of the reaction is $1/2$.

B. If $[\mathrm{A}]_0$ is 1 M , then $\mathrm{t_{1/2}}$ is $200\sqrt{10}$ min

C. The order of the reaction changes to 1 if the concentration of reactant changes from 0.100 M to 0.500 M.

D. $\mathrm{t_{1/2}}$ is 800 min for $[\mathrm{A}]_0 = 1.6\mathrm{M}$

Choose the correct answer from the options given below:

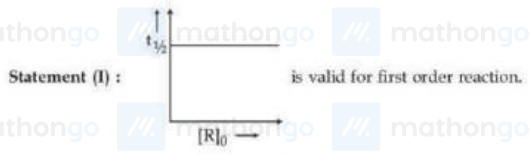
Options

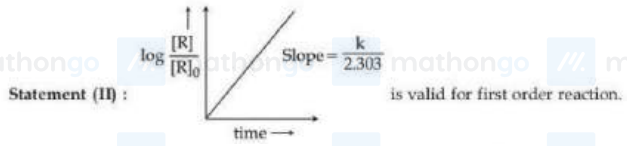
(1) A and C Only (2) A, B and D Only

(3) C and D Only (4) A and B Only

Q171. JEE Main 2025 (24 Jan Shift 2)

Given below are two statements :





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

(1) Both Statement I and Statement II are true

(2) Statement I is false but Statement II is true

(3) Statement I is true but Statement II is false

(4) Both Statement I and Statement II are false

Q172. JEE Main 2025 (24 Jan Shift 2)

Consider a complex reaction taking place in three steps with rate constants k_1, k_2 and k_3 respectively. The overall rate constant k is given by the expression $k = \sqrt{\frac{k_1 k_3}{k_2}}$. If the activation energies of the three steps are 60,30 and 10 kJ mol^{-1} respectively, then the overall energy of activation in kJmol^{-1} is ..... (Nearest integer)

Q173. JEE Main 2025 (23 Jan Shift 1)

For the thermal decomposition of $N_2O_5(g)$ at constant volume, the following table can be formed, for the reaction mentioned below.

$2\,N_2O_5(g) \rightarrow 2\,N_2O_4(g) + O_2(g)$

Sr.No	Time/s	Total pressure/(atm)
1	0	0.6
2	100	'x'

$x = \ldots \times 10^{-3}$ atm [nearest integer]

Given : Rate constant for the reaction is $4.606 \times 10^{-2}\ s^{-1}$.

Q174. JEE Main 2025 (22 Jan Shift 1)

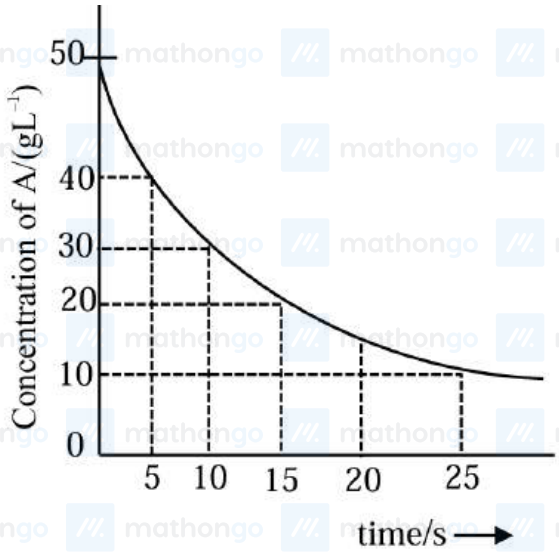
$A \rightarrow B$

The molecule A changes into its isomeric form B by following a first order kinetics at a temperature of 1000 K. If the energy barrier with respect to reactant energy for such isomeric transformation is 191.48 kJ mol^{-1} and the frequency factor is 10^{20}, the time required for 50% molecules of A to become B is _____ picoseconds (nearest integer). $[R = 8.314\ J\ K^{-1}\ mol^{-1}]$

Q175. JEE Main 2025 (2 April Shift 2)

For the reaction $A \rightarrow B$ the following graph was obtained. The time required (in seconds) for the concentration of A to reduce to 2.5 g L^{-1} (if the initial concentration of A was 50 g L^{-1}) is _____ (Nearest integer)

Given : $\log 2 = 0.3010$



Q176. JEE Main 2025 (2 April Shift 2)

Reactant A converts to product D through the given mechanism (with the net evolution of heat) :

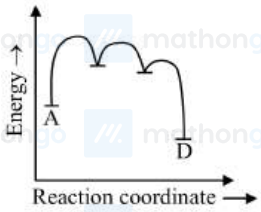
$A \rightarrow B$ slow ; $\Delta H = +ve$

$B \rightarrow C$ fast; $\Delta H = -ve$

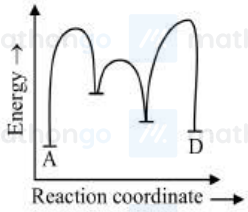
$C \rightarrow D$ fast ; $\Delta H = -ve$

Which of the following represents the above reaction mechanism?

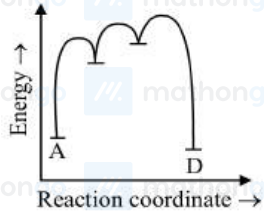
(1)



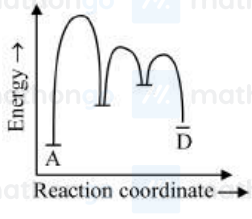
(2)



(3)

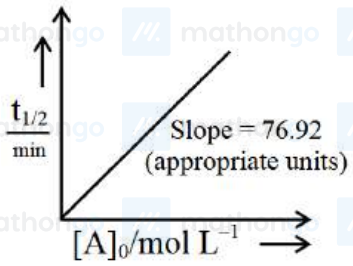


(4)



Q177. JEE Main 2025 (2 April Shift 1)

For the reaction $A \rightarrow$ products.



The concentration of A at 10 minutes is _____ $\times 10^{-3}$ mol L^{-1} (nearest integer).
The reaction was started with 2.5 mol L^{-1} of A.

Q178. JEE Main 2024 (31 Jan Shift 2)

$r = k[A]$ for a reaction, 50% of A is decomposed in 120 minutes. The time taken for 90% decomposition of A is _____ minutes.

Q179. JEE Main 2024 (31 Jan Shift 1)

Integrated rate law equation for a first order gas phase reaction is given by (where P_i is initial pressure and P_t is total pressure at time t)

(1) $k = \frac{2.303}{t} \times \log \frac{P_i}{(2P_i - P_t)}$ (2) $k = \frac{2.303}{t} \times \log \frac{2P_i}{(2P_i - P_t)}$

(3) $k = \frac{2.303}{t} \times \log \frac{(2P_i - P_t)}{P_i}$ (4) $k = \frac{2.303}{t} \times \frac{P_i}{(2P_i - P_t)}$

Q180. JEE Main 2024 (30 Jan Shift 1)

The rate of first order reaction is 0.04 mol L^{-1} s^{-1} at 10 minutes and 0.03 mol L^{-1} s^{-1} at 20 minutes after initiation. Half life of the reaction is _____ minutes. (Given $\log 2 = 0.3010, \log 3 = 0.4771$)
Round off your answer to the nearest integer.

Q181. JEE Main 2024 (08 Apr Shift 1)

Consider the following reaction

$A + B \rightarrow C$

The time taken for A to become $1/4^{th}$ of its initial concentration is twice the time taken to become $1/2$ of the same. Also, when the change of concentration of B is plotted against time, the resulting graph gives a straight line with a negative slope and a positive intercept on the concentration axis.
The overall order of the reaction is _____

Q182. JEE Main 2024 (01 Feb Shift 2)

The following data were obtained during the first order thermal decomposition of a gas A at constant volume:

$A(g) \rightarrow 2B(g) + C(g)$

S. No	Time/s	Total pressure/(atm)
1.	0	0.1
2.	115	0.28

The rate constant of the reaction is _____ $\times 10^{-2} s^{-1}$ (nearest integer)

Q183. JEE Main 2023 (30 Jan Shift 2)

An organic compound undergoes first order decomposition. If the time taken for the 60% decomposition is 540 s, then the time required for 90% decomposition will be is _____ s. (Nearest integer). Given : $\ln 10 = 2.3; \log 2 = 0.3$

Q184. JEE Main 2023 (06 Apr Shift 1)

For the adsorption of hydrogen on platinum, the activation energy is 30 kJ mol^{-1} and for the adsorption of hydrogen on nickel, the activation energy is 41.4 kJ mol^{-1}. The logarithm of the ratio of the rates of chemisorption on equal areas of the metals at 300 K is _____ (Nearest integer) Given: In 10 = 2.3, $R = 8.3\ J\ K^{-1}\ mol^{-1}$

Q185. JEE Main 2022 (29 Jul Shift 1)

The reaction between X and Y is first order with respect to X and zero order with respect to Y.

Experiment	$\frac{[X]}{molL^{-1}}$	$\frac{[Y]}{molL^{-1}}$	$\frac{\text{Initial rate}}{molL^{-1}min^{-1}}$
I	0.1	0.1	2×10^{-3}
II	L	0.2	4×10^{-3}
III	0.4	0.4	$M \times 10^{-3}$
IV	0.1	0.2	2×10^{-3}

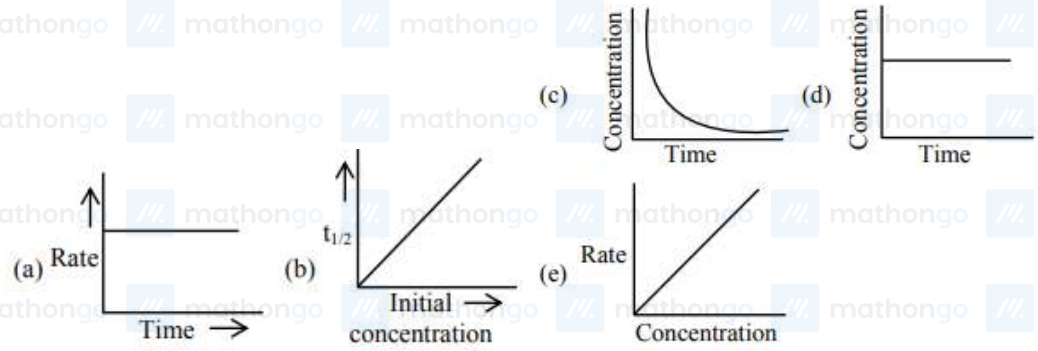
Examine the data of table and calculate ratio of numerical values of M and L.

Q186. JEE Main 2022 (25 Jul Shift 1)

The half life for the decomposition of gaseous compound A is 240 s when the gaseous pressure was 500 Torr initially. When the pressure was 250 Torr, the half life was found to be 4.0 min. The order of the reaction is _____ (Nearest integer)

Q187. JEE Main 2021 (25 Jul Shift 1)

For the following graphs,



Choose from the options given below, the correct one regarding order of reaction is :

(1) (b) zero order (c) and (e) First order

(2) (a) and (b) Zero order (e) First order

(3) (b) and (d) Zero order (e) First order

(4) (a) and (b) Zero order (c) and (e) First order

Q188. JEE Main 2021 (16 Mar Shift 1)

The decomposition of formic acid on gold surface follows first order kinetics. If the rate constant at 300 K is $1.0 \times 10^{-3}\ s^{-1}$ and the activation energy $E_a = 11.488\ kJ\ mol^{-1}$, the rate constant at 200 K is _____ $\times 10^{-5}\ s^{-1}$. (Round of to the Nearest Integer).

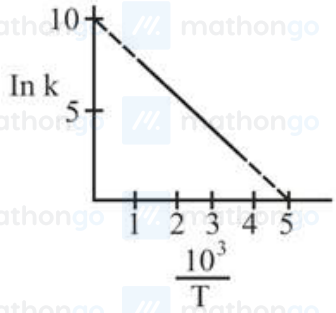
(Given $R = 8.314\ J\ mol^{-1}\ K^{-1}$)

Q189. JEE Main 2020 (06 Sep Shift 2)

The rate of a reaction decreased by 3.555 times when the temperature was changed from 40 °C to 30 °C. the activation energy (in $kJ\ mol^{-1}$) of the reaction is _____.

Q190. JEE Main 2020 (05 Sep Shift 2)

The rate constant (k) of a reaction is measured at different temperature (T), and the data are plotted in the given figure. the activation energy of the reaction in $kJmol^{-1}$ is : (R is gas constant)



(1) $2/R$ (2) $1/R$

(3) R (4) $2R$

Chapter: Classification of Elements and Periodicity in Properties

Q191. JEE Main 2025 (8 April Shift 2)

The atomic number of the element from the following with lowest 1^{st} ionisation enthalpy is :

(1) 32 (2) 35 (3) 87 (4) 19

Q192. JEE Main 2025 (7 April Shift 2)

Choose the incorrect trend in the atomic radii (r) of the elements :

(1) $r_{Br} < r_K$ (2) $r_{Mg} < r_{Al}$

(3) $r_{Rb} < r_{Cs}$ (4) $r_{Rb} < r_{Cs}$

Q193. JEE Main 2025 (3 April Shift 2)

The correct orders among the following are

Atomic radius : B < Al < Ga < In < Tl

Electronegativity : Al < Ga < In < Tl < B

Density : Tl < In < Ga < Al < B

1st Ionisation Energy : In < Al < Ga < Tl < B

Choose the correct answer from the options given below :

(1) B and D Only (2) A and C Only

(3) C and D Only (4) A and B Only

Q194. JEE Main 2025 (3 April Shift 1)

Which of the following statements are correct?

A. The process of the addition an electron to a neutral gaseous atom is always exothermic

B. The process of removing an electron from an isolated gaseous atom is always endothermic

C. The 1^{st} ionization energy of the boron is less than that of the beryllium

D. The electronegativity of C is 2.5 in CH_4 and CCl_4

E. Li is the most electropositive among elements of group I

Choose the correct answer from the options gives below

(1) B & C only

(2) A, C and d only

(3) B and D only

(4) B,C and E only

Q195. JEE Main 2025 (29 Jan Shift 2)

First ionisation enthalpy values of first four group 15 elements are given below. Choose the correct value for the element that is a main component of apatite family :

(1) 1402 kJ mol^{-1}

(2) 834 kJ mol^{-1}

(3) 1012 kJ mol^{-1}

(4) 947 kJ mol^{-1}

Q196. JEE Main 2025 (29 Jan Shift 1)

An element ' E' has the ionisation enthalpy value of 374 kJ mol^{-1}. ' E ' reacts with elements A, B, C and D with electron gain enthalpy values of $-328, -349, -325$ and -295 kJ mol^{-1}, respectively. The correct order of the products EA, EB, EC and ED in terms of ionic character is :

(1) ED > EC > EB > EA

(2) EA > EB > EC > ED

(3) EB > EA > EC > ED

(4) ED > EC > EA > EB

Q197. JEE Main 2025 (28 Jan Shift 2)

Given below are two statements :

Statement (I): According to the Law of Octaves, the elements were arranged in the increasing order of their atomic number. **Statement (II):** Meyer observed a periodically repeated pattern upon plotting physical properties of certain elements against their respective atomic numbers.

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

(1) Both **Statement (I)** and **Statement (II)** are false.

(2) Both **Statement (I)** and **Statement (II)** are true.

(3) **Statement (I)** is false but **Statement (II)** is true.

(4) **Statement (I)** is true but **Statement (II)** is false.

Q198. JEE Main 2025 (24 Jan Shift 2)

The successive 5 ionisation energies of an element are $800, 2427, 3658, 25024$ and 32824 kJ/mol, respectively. By using the above values predict the group in which the above element is present :

(1) Group 13

(2) Group 14

(3) Group 2

(4) Group 4

Q199. JEE Main 2025 (24 Jan Shift 1)

Which of the following statements are NOT true about the periodic table?

A. The properties of elements are function of atomic weights.

B. The properties of elements are function of atomic numbers.

C. Elements having similar outer electronic configurations are arranged in same period.

D. An element's location reflects the quantum numbers of the last filled orbital.

E. The number of elements in a period is same as the number of atomic orbitals available in energy level that is being filled.

Choose the correct answer from the options given below:

(1) A, C and E Only

(2) A and E Only

(3) B, C and E Only

(4) D and E Only

Q200. JEE Main 2025 (22 Jan Shift 1)

Which of the following electronegativity order is incorrect?

(1) $Mg < Be < B < N$

(2) $S < Cl < O < F$

(3) $Al < Si < C < N$

(4) $Al < Mg < B < N$

Q201. JEE Main 2025 (2 April Shift 1)

Given below are two statements :

Statement (I): The metallic radius of Al is less than that of Ga.

Statement (II) : The ionic radius of Al^{3+} is less than that of Ga^{3+}.

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 incorrect

(2) Statement I is incorrect but Statement II is correct

(3) Statement I is correct but Statement II is incorrect

(4) Both Statement I and Statement II are correct

Q202. JEE Main 2025 (2 April Shift 1)

The property/properties that show irregularity in first four elements of group-17 is/are :

(A) Covalent radius

(B) Electron affinity

(C) Ionic radius

(D) First ionization energy

Choose the correct answer from the options given below:

(1) B and D only

(2) A and C only

(3) B only

(4) A, B, C and D

Q203. JEE Main 2024 (31 Jan Shift 2)

Consider the following elements.

Group ↓ A'B' → Period
C'D'

Which of the following is/are true about A', B', C' and D' ?

A. Order of atomic radii: $B' < A' < D' < C'$

B. Order of metallic character : $B' < A' < D' < C'$

C. Size of the element : $D' < C' < B' < A'$

D. Order of ionic radii : $B'^{+} < A'^{+} < D'^{+} < C'^{+}$

Choose the correct answer from the options given below:

(1) A only
(2) A, B and D only
(3) A and B only
(4) B, C and D only

Q204. JEE Main 2024 (31 Jan Shift 1)

The correct sequence of electron gain enthalpy of the elements listed below is

A. Ar

B. Br

C. F

D. S

Choose the most appropriate from the options given below:

(1) C > B > D > A
(2) A > D > B > C
(3) A > D > C > B
(4) D > C > B > A

Q205. JEE Main 2024 (09 Apr Shift 2)

Match List I with List II

	List - I		List - II
A.	Melting Point [K]	I.	T1 > In > Ga > A1 > B
B.	Ionic Radius $[M^{+3}/pm]$	II.	B > T1 > A1 ≈ Ga > In
C.	$\Delta_i H_1$ [kJ mol^{-1}]	III.	T1 > In > A1 > Ga > B
D.	Atomic Radius [pm]	IV.	B > A1 > T1 > In > Ga

Choose the correct answer from the options given below:

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

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

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

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

Q206. JEE Main 2024 (04 Apr Shift 2)

The correct order of the first ionization enthalpy is

(1) Al > Ga > Tl
(2) Ga > Al > B
(3) Tl > Ga > Al
(4) B > Al > Ga

Q207. JEE Main 2024 (01 Feb Shift 2)

Given below are two statements :

Statement (I) : Both metal and non-metal exist in p and d-block elements.

Statement (II) : Non-metals have higher ionisation enthalpy and higher electronegativity than the metals.

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

(1) Both Statement I and Statement II are false

(2) Statement I is false but Statement II is true

(3) Statement I is true but Statement II is false

(4) Both Statement I and Statement II are true

Q208. JEE Main 2023 (13 Apr Shift 2)

. Identify the correct order of standard enthalpy of formation of sodium halides.

(1) $\mathrm{NaI} < \mathrm{NaBr} < \mathrm{NaF} < \mathrm{NaCl}$

(2) $\mathrm{NaI} < \mathrm{NaBr} < \mathrm{NaCl} < \mathrm{NaF}$

(3) $\mathrm{NaF} < \mathrm{NaCl} < \mathrm{NaBr} < \mathrm{NaI}$

(4) $\mathrm{NaCl} < \mathrm{NaF} < \mathrm{NaBr} < \mathrm{NaI}$

Q209. JEE Main 2023 (11 Apr Shift 1)

For compound having the formula $\mathrm{GaAlCl_4}$, the correct option from the following is

(1) Ga is coordinated with CI in $\mathrm{GaAlCl_4}$

(2) Ga is more electronegative than AI and is present as a cationic part of the salt $\mathrm{GaAlCl_4}$

(3) CI forms bond with both AI and Ga in $\mathrm{GaAlCl_4}$

(4) Oxidation state of Ga in the salt $\mathrm{GaAlCl_4}$ is $+3$

Q210. JEE Main 2023 (01 Feb Shift 2)

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

(1) $\Delta_{\mathrm{eg}}\mathrm{H(Cl)} < \Delta_{\mathrm{eg}}\mathrm{H(F)}$

(2) $\Delta_{\mathrm{eg}}\mathrm{H(Se)} < \Delta_{\mathrm{eg}}\mathrm{H(S)}$

(3) $\Delta_{\mathrm{eg}}\mathrm{H(I)} < \Delta_{\mathrm{eg}}\mathrm{H(At)}$

(4) $\Delta_{\mathrm{eg}}\mathrm{H(Te)} < \Delta_{\mathrm{eg}}\mathrm{H(Po)}$

Q211. JEE Main 2022 (29 Jul Shift 1)

The first ionization enthalpy of Na, Mg and Si, respectively, are: 496, 737 and 786 $\mathrm{kJ\,mo\,1^{-1}}$. The first ionization enthalpy $\left(\mathrm{kJmol^{-1}}\right)$ of Al is

(1) 487 (2) 768 (3) 577 (4) 856

Q212. JEE Main 2021 (20 Jul Shift 1)

The set in which compounds have different nature is:

(1) $\mathrm{B(OH)_3}$ and $\mathrm{H_3\,PO_3}$

(2) $\mathrm{B(OH)_3}$ and $\mathrm{Al(OH)_3}$

(3) NaOH and $\mathrm{Ca(OH)_2}$

(4) $\mathrm{Be(OH)_2}$ and $\mathrm{Al(OH)_3}$

Chapter: Chemical Bonding and Molecular Structure

Q213. JEE Main 2025 (7 April Shift 2)

In SO_2, NO_2^- and N_3^- the hybridizations at the central atom are respectively :

(1) sp^2, sp^2 and sp

(2) sp^2, sp and sp

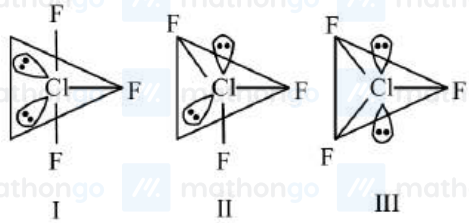
(3) sp^2, sp^2 and sp^2

(4) sp, sp^2 and sp

Q214. JEE Main 2025 (4 April Shift 2)

Given below are two statements:

Statement (I) : for $\bullet\bullet^{\bullet}_{\bullet\bullet\bullet\bullet}$ F_3, all three possible structures may be drawn as follows.



Statement (II) : Structure III is most stable, as the orbitals having the lone pairs are axial, where the $\ell p - bp$ repulsion is minimum.

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

(1) Statement I is incorrect but statement II is correct.

(2) Statement I is correct but statement II is incorrect.

(3) Both Statement I and statement II are correct.

(4) Both Statement I and statement II are incorrect.

Q215. JEE Main 2025 (4 April Shift 2)

A metal complex with a formula $MC\ell_4 \cdot 3NH_3$ is involved in $sp^3\ d^2$ hybridisation. It upon reaction with excess of $AgNO_3$ solution gives ' x ' moles of AgCl. Consider ' x ' is equal to the number of lone pairs of electron present in central atom of BrF_5. Then the number of geometrical isomers exhibited by the complex is _____.

Q216. JEE Main 2025 (4 April Shift 1)

Which of the following molecules(s) show/s paramagnetic behavior?

(A) O_2

(B) N_2

(C) F_2

(D) S_2

(E) Cl_2

Choose the correct answer from the options given below :

(1) B only

(2) A & C only

(3) A & E only

(4) A & D only

Q217. JEE Main 2025 (29 Jan Shift 2)

Total number of sigma (σ) _____ and pi(π) _____ bonds respectively present in hex-1-en-4-yne are :

(1) 3 and 13

(2) 11 and 3

(3) 13 and 3

(4) 14 and 3

Q218. JEE Main 2025 (29 Jan Shift 1)

The sum of sigma (σ) and pi (π) bonds in Hex-1,3-dien-5-yne is _____.

Q219. JEE Main 2025 (28 Jan Shift 2)

Total number of molecules/species from following which will be paramagnetic is _____

$O_2, O_2^+, O_2^-, NO, NO_2, CO, K_2[NiCl_4], [Co(NH_3)_6]Cl_3, K_2[Ni(CN)_4]$

Q220. JEE Main 2025 (28 Jan Shift 1)

The molecules having square pyramidal geometry are

(1) BrF_5 & PCl_5
(2) SbF_5 & PCl_5
(3) SbF_5 & $XeOF_4$
(4) BrF_5 & $XeOF_4$

Q221. JEE Main 2025 (24 Jan Shift 2)

Given below are two statements :

Statement (I) : The first ionization energy of Pb is greater than that of Sn.

Statement (II) : The first ionization energy of Ge is greater than that of Si.

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

(1) Statement I is false but Statement II is true
(2) Statement I is true but Statement II is false
(3) Both Statement I and Statement II are true
(4) Both Statement I and Statement II are false

Q222. JEE Main 2025 (24 Jan Shift 1)

Which of the following linear combination of atomic orbitals will lead to formation of molecular orbitals in homonuclear diatomic molecules [internuclear axis in z-direction] ?

A. $2p_z$ and $2p_x$
B. 2 s and $2p_x$
C. 3 d_{xy} and 3 $d_{x^2-y^2}$
D. 2 s and $2p_z$
E. $2p_z$ and $3d_x{}^2 - y^2$

Choose the correct answer from the options given below:

(1) A and B Only
(2) D Only
(3) E Only
(4) C and D Only

Q223. JEE Main 2025 (23 Jan Shift 1)

Match the LIST-I with LIST-II

LIST-I (Classification of molecules based on octet rule)		LIST-II (Example)	
A.	Molecules obeying octet rule	I.	NO, NO_2
B.	Molecules with incomplete octet	II.	BCl_3, $AlCl_3$
C.	Molecules with incomplete octet with odd electron	III.	H_2SO_4, PCl_5
D.	Molecules with expanded octet	IV.	CCl_4, CO_2

Choose the correct answer from the options given below:

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

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

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

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

Q224. JEE Main 2025 (22 Jan Shift 2)

Arrange the following compounds in increasing order of their dipole moment : HBr, H_2S, NF_3 and $CHCl_3$

(1) $H_2S < HBr < NF_3 < CHCl_3$

(2) $NF_3 < HBr < H_2S < CHCl_3$

(3) $HBr < H_2S < NF_3 < CHCl_3$

(4) $CHCl_3 < NF_3 < HBr < H_2S$

Q225. JEE Main 2025 (2 April Shift 1)

Among $SO_2, NF_3, NH_3, XeF_2, ClF_3$ and SF_4, the hybridization of the molecule with non-zero dipole moment and highest number of lone-pairs of electrons on the central atom is

(1) sp^3

(2) dsp^2

(3) $sp^3 d^2$

(4) $sp^3 d$

Q226. JEE Main 2025 (2 April Shift 1)

A molecule with the formula AX_4Y has all it's elements from p-block. Element A is rarest, monoatomic, non-radioactive from its group and has the lowest ionization enthalpy value among A, X and Y. Elements X and Y have first and second highest electronegativity values respectively among all the known elements. The shape of the molecule is :

(1) Square pyramidal

(2) Octahedral

(3) Pentagonal planar

(4) Trigonal bipyramidal

Q227. JEE Main 2024 (31 Jan Shift 2)

A diatomic molecule has a dipole moment of 1 .2 D. If the bond distance is 1Å, then fractional charge on each atom is _____ $\times 10^{-1}$ esu. (Given $1D = 10^{-18}$ esu cm)

Q228. JEE Main 2024 (08 Apr Shift 2)

The shape of carbocation is :

(1) diagonal pyramidal

(2) trigonal planar

(3) tetrahedral

(4) diagonal

Q229. JEE Main 2024 (06 Apr Shift 1)

Match List I with List II

	List - I (Hybridization)		List - II (Orientation in Space)
A.	sp^3	I.	Trigonal bipyramidal
B.	dsp^2	II.	Octahedral
C.	$sp^3 d$	III.	Tetrahedral
D.	$sp^3 d^2$	IV.	Square planar

Choose the correct answer from the options given below:

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

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

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

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

Q230. JEE Main 2024 (04 Apr Shift 2)

The correct statement/s about Hydrogen bonding is/are

A. Hydrogen bonding exists when H is covalently bonded to the highly electro negative atom.

B. Intermolecular H bonding is present in o-nitro phenol

C. Intramolecular H bonding is present in HF.

D. The magnitude of H bonding depends on the physical state of the compound.

E. H-bonding has powerful effect on the structure and properties of compounds

Choose the correct answer from the options given below:

(1) A, B, D only

(2) A, D, E only

(3) A only

(4) A, B, C only

Q231. JEE Main 2024 (04 Apr Shift 2)

The number of species from the following that have pyramidal geometry around the central atom is _____.

$S_2O_3^{2-}, SO_4^{2-}, SO_3^{2-}, S_2O_7^{2-}$

(1) 4

(2) 3

(3) 2

(4) 1

Q232. JEE Main 2024 (04 Apr Shift 1)

Which one of the following molecules has maximum dipole moment?

(1) NF_3

(2) CH_4

(3) PF_5

(4) NH_3

Q233. JEE Main 2024 (01 Feb Shift 1)

Arrange the bonds in order of increasing ionic character in the molecules. LiF, K_2O, N_2, SO_2 and ClF_3.

(1) $ClF_3 < N_2 < SO_2 < K_2O < LiF$

(2) $LiF < K_2O < ClF_3 < SO_2 < N_2$

(3) $N_2 < SO_2 < ClF_3 < K_2O < LiF$

(4) $N_2 < ClF_3 < SO_2 < K_2O < LiF$

Q234. JEE Main 2024 (01 Feb Shift 1)

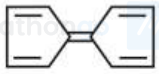
The number of molecules/ion/s having trigonal bipyramidal shape is ……..

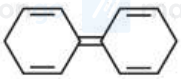
$PF_5, BrF_5, PCl_5, [PtCl_4]^{2-}, BF_3, Fe(CO)_5$

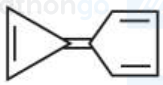
Q235. JEE Main 2023 (13 Apr Shift 1)

Among the following compounds, the one which shows highest dipole moment is

(1) 

(2) 

(3) 

(4) 

Q236. JEE Main 2023 (12 Apr Shift 1)

The bond order and magnetic property of acetylide ion are same as that of

(1) O_2^+

(2) N_2^+

(3) NO^+

(4) O_2^-

Q237. JEE Main 2022 (29 Jul Shift 2)

Consider, $PF_5, BrF_5, PCl_3, SF_6, [ICl_4]^-, ClF_3$ and IF_5

Amongst the above molecule(s) ion(s), the number of molecule(s)/ion(s) having $sp^3 d^2$ hybridisation is

Q238. JEE Main 2022 (27 Jul Shift 2)

Match List-I with List-II

List-I		List-II
(a) $\Psi_{MO} = \Psi_A - \Psi_B$	(I)	Dipole moment
(b) $\mu = Q \times r$	(II)	Bonding molecular orbital
(c) $\frac{N_b - N_a}{2}$	(III)	Anti-bonding molecualr orbital
(d) $\Psi_{MO} = \Psi_A + \Psi_B$	(IV)	Bond order

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

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

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

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

Q239. JEE Main 2022 (27 Jul Shift 1)

Amongst the following the number of oxide(s) which are paramagnetic in nature is

$Na_2O, KO_2, NO_2, N_2O, ClO_2, NO, SO_2, Cl_2O$

Q240. JEE Main 2021 (24 Feb Shift 1)

Which of the following are isostructural pairs?

A. SO_4^{2-} and $CrO_4{}^{2-}$

B. $SiCl_4$ and $TiCl_4$

C. NH_3 and NO_3^-

D. BCl_3 and $BrCl_3$

(1) A and C only

(2) B and C only

(3) A and B only

(4) C and D only

Q241. JEE Main 2021 (18 Mar Shift 2)

The number of species below that have two lone pairs of electrons in their central atom is ___ (Round off to the Nearest integer) $SF_4, BF_4^-, ClF_3, AsF_3, PCl_5, BrF_5, XeF_4, SF_6$

Q242. JEE Main 2020 (09 Jan Shift 1)

If the magnetic moment of a di-oxygen species is 1.73 B. M., it may be

(1) O_2^- or O_2^+.

(2) O_2 or O_2^+.

(3) O_2 or O_2^-.

(4) O_2, O_2^- or O_2^+.

Q243. JEE Main 2020 (03 Sep Shift 1)

Of the species, NO, NO^+, NO^{2+} and NO^-, the one with minimum bond strength is :

(1) NO^+ (2) NO (3) NO^{2+} (4) NO^-

Q244. JEE Main 2020 (02 Sep Shift 2)

Match the type of interaction in column A with the distance dependence of their interaction energy in column B :

A	B
(i) ion - ion	(a) $\frac{1}{r}$
(ii) Dipole - dipole	(b) $\frac{1}{r^2}$
(iii) London dispersion	(c) $\frac{1}{r^3}$
	(iv) $\frac{1}{r^6}$

(1) (i) – (b); (ii) – (d); (iii) – (c)

(2) (i) – (a); (ii) – (b); (iii) – (d)

(3) (i) – (a); (ii) – (b); (iii) – (c)

(4) (i) – (a); (ii) – (c); (iii) – (d)

Chapter: p Block Elements (Group 13 & 14)

Q245. JEE Main 2025 (7 April Shift 1)

The group 14 elements A and B have the first ionisation enthalpy values of 708 and 715 kJ mol^{-1} respectively. The above values are lowest among their group members. The nature of their ions A^{2+} B^{4+} respectively is

(1) both reducing

(2) both oxidising

(3) reducing and oxidising

(4) oxidising and reducing

Q246. JEE Main 2025 (28 Jan Shift 1)

Consider the following elements In, Tl, Al, Pb, Sn and Ge.

The most stable oxidation states of elements with highest and lowest first ionisation enthalpies, respectively, are

(1) +4 and +1
(2) +1 and +4
(3) +4 and +3
(4) +2 and +3

Q247. JEE Main 2024 (31 Jan Shift 2)

Given below are two statements :

Statement I: Group 13 trivalent halides get easily hydrolysed by water due to their covalent nature.

Statement II: $AlCl_3$ upon hydrolysis in acidified aqueous solution forms octahedral $[Al(H_2O)_6]^{3+}$ ion.

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

(1) Statement I is true but statement II is false
(2) Statement I is false but statement II is true
(3) Both statement I and statement II are false
(4) Both statement I and statement II are true

Q248. JEE Main 2024 (27 Jan Shift 1)

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

Assertion (A) : Melting point of Boron (2453 K) is unusually high in group 13 elements.

Reason (R) : Solid Boron has very strong crystalline lattice.

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

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

Q249. JEE Main 2024 (06 Apr Shift 2)

The number of ions from the following that are expected to behave as oxidising agent is :

$Sn^{4+}, Sn^{2+}, Pb^{2+}, Tl^{3+}, Pb^{4+}, Tl^{+}$

(1) 3 (2) 2 (3) 1 (4) 4

Q250. JEE Main 2024 (05 Apr Shift 2)

The correct statements from the following are :

(A) The decreasing order of atomic radii of group 13 elements is Tl > In > Ga > Al > B.

(B) Down the group 13 electronegativity decreases from top to bottom.

(C) Al dissolves in dil. HCl and liberates H_2 but conc. HNO_3 renders Al passive by forming a protective oxide layer on the surface.

(D) All elements of group 13 exhibits highly stable +1 oxidation state.

(E) Hybridisation of Al in $[Al(H_2O)_6]^{3+}$ ion is $sp^3\ d^2$.

Choose the correct answer from the options given below :

(1) (A), (C) and (E) only
(2) (A) and (C) only
(3) (C) and (E) only
(4) (A), (B), (C) and (E) only

Q251. JEE Main 2024 (01 Feb Shift 2)

Match List - I with List - II.

List - I Compound	List-II Use
(a) Carbon tetrachloride	(I) Paint remover
(b) Methylene chloride	(II) Refrigerators and air conditioners
(c) DDT	(III) Fire extinguisher
(d) Freons	(IV) Non Biodegradable insecticide

Choose the correct answer from the options given below:

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

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

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

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

Q252. JEE Main 2023 (31 Jan Shift 2)

The Lewis acid character of boron tri halides follows the order:

(1) $BCl_3 > BF_3 > BBr_3 > Bl_3$

(2) $Bl_3 > BBr_3 > BCl_3 > BF_3$

(3) $BBr_3 > Bl_3 > BCl_3 > BF_3$

(4) $BF_3 > BCl_3 > BBr_3 > Bl_3$

Q253. JEE Main 2023 (06 Apr Shift 2)

Structures of $BeCl_2$ in solid state, vapour phase and at very high temperature respectively are:

(1) Monomeric, Dimeric, Polymeric

(2) Dimeric, Polymeric, Monomeric

(3) Polymeric, Monomeric, Dimeric

(4) Polymeric, Dimeric, Monomeric

Chapter: p Block Elements (Group 15, 16, 17 & 18)

Q254. JEE Main 2025 (28 Jan Shift 2)

A group 15 element forms $d\pi - d\pi$ bond with transition metals. It also forms hydride, which is a strongest base among the hydrides of other group members that form $d\pi - d\pi$ bond. The atomic number of the element is ____.

Q255. JEE Main 2025 (24 Jan Shift 1)

The large difference between the melting and boiling points of oxygen and sulphur may be explained on the basis of

(1) Atomicity

(2) Electron gain enthalpy

(3) Electronegativity

(4) Atomic size

Q256. JEE Main 2025 (23 Jan Shift 1)

The incorrect statement among the following is

(1) PH_3 shows lower proton affinity than NH_3.

(2) SO_2 can act as an oxidizing agent, but not as a reducing agent.

(3) PF_3 exists but NF_5 does not.

(4) NO_2 can dimerise easily.

Q257. JEE Main 2025 (22 Jan Shift 1)

Which of the following electrolyte can be used to obtain $H_2\ S_2O_8$ by the process of electrolysis?

(1) Dilute solution of sodium sulphate.

(2) Acidified dilute solution of sodium sulphate.

(3) Dilute solution of sulphuric acid

(4) Concentrated solution of sulphuric acid

Q258. JEE Main 2025 (2 April Shift 2)

The nature of oxide (TeO_2) and hydride (TeH_2) formed by Te , respectively are :

(1) Oxidising and acidic (2) Reducing and basic

(3) Reducing and acidic (4) Oxidising and basic

Q259. JEE Main 2024 (29 Jan Shift 2)

Anomalous behaviour of oxygen is due to its

(1) Large size and high electronegativity (2) Small size and low electronegativity

(3) Small size and high electronegativity (4) Large size and low electronegativity

Q260. JEE Main 2024 (01 Feb Shift 2)

The strongest reducing agent amont the following is:

(1) NH_3 (2) SbH_3

(3) BiH_3 (4) PH_3

Q261. JEE Main 2020 (06 Sep Shift 1)

The correct statement with respect to dinitrogen is:

(1) N_2 is paramagnetic in nature.

(2) it can combine with dioxygen at $25^{\circ}C$

(3) liquid dinitrogen is not used in cryosurgery.

(4) it can be used as an inert diluent for reactive chemicals

Chapter: d and f Block Elements

Q262. JEE Main 2025 (7 April Shift 2)

' X ' is the number of acidic oxides among $VO_2, V_2O_3, CrO_3,\ V_2O_5$ and Mn_2O_7. The primary valency of cobalt in $[Co(H_2NCH_2CH_2NH_2)_3]_2(SO_4)_3$ is Y. The value of $X + Y$ is :

(1) 5 (2) 4 (3) 2 (4) 3

Q263. JEE Main 2025 (7 April Shift 1)

The number of valence electrons present in the metal among Cr, Co, Fe and Ni which has the lowest enthalpy of atomisation is

(1) 8 (2) 9 (3) 6 (4) 10

Q264. JEE Main 2025 (7 April Shift 1)

The first transition series metal ' M ' has the highest enthalpy of atomisation in its series. One of its aquated ion $\left(M^{n\dagger}\right)$ exists in green colour. The nature of the oxide formed by the above M^{n-} ion is :

(1) neutral
(2) acidic
(3) basic
(4) amphoteric

Q265. JEE Main 2025 (3 April Shift 2)

Given below are two statements :

Statement I : CrO_3 is a stronger oxidizing agent than MoO_3

Statement II : Cr(VI) is more stable than Mo(VI)

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

(1) Statement I is false but Statement II is true
(2) Statement I is true but Statement II is false
(3) Both Statement I and Statement II are true
(4) Both Statement I and Statement II are false

Q266. JEE Main 2025 (3 April Shift 1)

The metal ions that have the calculated spin only magnetic moment value of 4.9 B.M. are

A. Cr^{2+}
B. Fe^{2+}
C. Fe^{3+}
D. Co^{2+}
E. Mn^{3+}

Choose the correct answer from the options given below

(1) A, C and E only
(2) A, D and E only
(3) B and E only
(4) A, B and E only

Q267. JEE Main 2025 (3 April Shift 1)

Consider the following reactions

$$\underset{\text{Little amount}}{A} + NaCl + H_2SO_4 \rightarrow CrO_2Cl_2 + \text{Side Products}$$

$$CrO_2Cl_{2(\text{Vapour})} + NaOH \rightarrow B + NaCl + H_2O$$

$$B + H^+ \rightarrow C + H_2O$$

The number of terminal ' O ' present in the compound ' C ' is _____.

Q268. JEE Main 2025 (29 Jan Shift 1)

The molar mass of the water insoluble product formed from the fusion of chromite ore $(FeCr_2O_4)$ with Na_2CO_3 in presence of O_2 is _____ $gmol^{-1}$.

Q269. JEE Main 2025 (28 Jan Shift 2)

The amphoteric oxide among V_2O_3, V_2O_4 and V_2O_5, upon reaction with alkali leads to formation of an oxide anion. The oxidation state of V in the oxide anion is :

(1) $+3$
(2) $+4$
(3) $+7$
(4) $+5$

Q270. JEE Main 2025 (28 Jan Shift 2)

Identify the inorganic sulphides that are yellow in colour :

(A) $(NH_4)_2\ S$
(B) Pbs
(C) Cus
(D) $As_2\ S_3$
(E) $As_2\ S_5$

Choose the correct answer from the options given below :

(1) (A), (D) and (E) only
(2) (D) and (E) only
(3) (A) and (B) only
(4) (A) and (C) only

Q271. JEE Main 2025 (23 Jan Shift 2)

Consider the following reactions

$$K_2Cr_2O_7 \xrightarrow[-H_2O]{KOH} [A] \xrightarrow[-H_2O]{H_2SO_4} [B] + K_2SO_4$$

The products $[A]$ and $[B]$, respectively are :

(1) K_2CrO_4 and CrO
(2) K_2CrO_4 and Cr_2O_3
(3) K_2CrO_4 and $K_2Cr_2O_7$
(4) $K_2Cr(OH)_6$ and Cr_2O_3

Q272. JEE Main 2025 (22 Jan Shift 2)

Niobium (Nb) and ruthenium (Ru) have " x " and " y " number of electrons in their respective 4 d orbitals. The value of $x + y$ is _____.

Q273. JEE Main 2025 (22 Jan Shift 1)

Lanthanoid ions with $4f^7$ configuration are :

(A) Eu^{2+}
(B) Gd^{3+}
(C) Eu^{3+}
(D) Tb^{3+}
(E) Sm^{2+}

Choose the correct answer from the options given below :

(1) (A) and (D) only
(2) (B) and (C) only
(3) (A) and (B) only
(4) (B) and (E) only

Q274. JEE Main 2024 (31 Jan Shift 2)

Choose the correct statements from the following

A. Mn_2O_7 is an oil at room temperature

B. V_2O_4 reacts with acid to give VO_2^{2+}

C. CrO is a basic oxide

D. V_2O_5 does not react with acid

Choose the correct answer from the options given below:

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

(3) A, B and C only (4) B and C only

Q275. JEE Main 2024 (30 Jan Shift 1)

Match List-I with List-II

	List I (Species)		List II (Electronic distribution)
A.	Cr^{+2}	i.	$3d^8$
B.	Mn^{+}	ii.	$3d^34s^1$
C.	Ni^{+2}	iii.	$.3d^4$
D.	V^{+}	iv.	$3d^54s^1$

Choose the correct answer from the options given below:

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

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

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

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

Q276. JEE Main 2024 (29 Jan Shift 2)

Which of the following acts as a strong reducing agent? (Atomic number : $Ce = 58, Eu = 63, Gd = 64, Lu = 71$)

(1) Lu^{3+} (2) Gd^{3+}

(3) Eu^{2+} (4) Ce^{4+}

Q277. JEE Main 2024 (29 Jan Shift 1)

In alkaline medium. MnO_4^- oxidises I^- to

(1) IO_4^- (2) IO^-

(3) I_2 (4) IO_3^-

Q278. JEE Main 2024 (09 Apr Shift 1)

Number of colourless lanthanoid ions among the following is _____

$Eu^{3+}, Lu^{3+}, Nd^{3+}, La^{3+}, Sm^{3+}$

Q279. JEE Main 2024 (08 Apr Shift 1)

The 'spin only' magnetic moment value of MO_4^{2-} is _____ BM. (Where M is a metal having least metallic radii. among Sc, Ti, V, Cr, Mn and Zn).

(Given atomic number: $Sc = 21, Ti = 22, V = 23, Cr = 24, Mn = 25$ and $Zn = 30$)

Q280. JEE Main 2024 (05 Apr Shift 1)

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

(1) Fe (2) Mn

(3) Co (4) Ti

Q281. JEE Main 2024 (05 Apr Shift 1)

The spin-only magnetic moment value of the ion among Ti^{2+}, V^{2+}, Co^{3+} and 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)

Q282. JEE Main 2024 (04 Apr Shift 2)

When MnO_2 and H_2SO_4 is added to a salt (A), the greenish yellow gas liberated as salt (A) is :

(1) CaI_2 (2) NaBr

(3) KNO_3 (4) NH_4Cl

Q283. JEE Main 2024 (01 Feb Shift 2)

Which of the following compounds show colour due to d − d transition?

(1) $CuSO_4 \cdot 5H_2O$ (2) $K_2Cr_2O_7$

(3) K_2CrO_4 (4) $KMnO_4$

Q284. JEE Main 2023 (29 Jan Shift 2)

A solution of CrO_5 in amyl alcohol has a....colour

(1) Green (2) Orange-Red

(3) Yellow (4) Blue

Q285. JEE Main 2023 (11 Apr Shift 1)

When a solution of mixture having two inorganic salts was treated with freshly prepared ferrous sulphate in acidic medium, a dark brown ring was formed whereas on treatment with neutral $FeCl_3$, it gave deep red colour which disappeared on boiling and a brown red ppt was formed. The mixture contains

(1) SO_3^{2-} & CH_3COO^- (2) CH_3COO^- & NO_3^-

(3) SO_3^{2-} & $C_2O_4^{2-}$ (4) $C_2O_4^{2-}$ & NO_3^-

Q286. JEE Main 2023 (10 Apr Shift 1)

Given below aretwo statements:

Statement I : Aqueous solution of $K_2Cr_2O_7$ is preferred as a primary standard in volumetric analysis over $Na_2Cr_2O_7$ aqueous solution.

Statement II : $K_2Cr_2O_7$ has a higher solubility in water than $Na_2Cr_2O_7$. In the light of the above statements, choose the correct answer from the options given below:

(1) Statement I is false but Statement II is true

(2) Both Statement I and Statement II are true

(3) Statement I is true but Statement II is false

(4) Both Statement I and Statement II are false

Q287. JEE Main 2023 (01 Feb Shift 1)

Highest oxidation state of Mn is exhibited in Mn_2O_7. The correct statements about Mn_2O_7 are

(A) Mn is tetrahedrally surrounded by oxygen atoms

(B) Mn is octahedrally surrounded by oxygen atoms

(C) Contains $Mn - O - Mn$ bridge

(D) Contains $Mn - Mn$ bond.

Choose the correct answer from the options given below

(1) A and C only

(2) A and D only

(3) B and D only

(4) B and C only

Q288. JEE Main 2022 (27 Jul Shift 2)

The oxidation state of manganese in the product obtained in a reaction of potassium permanganate and hydrogen peroxide in basic medium is

Q289. JEE Main 2022 (26 Jul Shift 2)

The spin-only magnetic moment value of the compound with strongest oxidizing ability among MnF_4, MnF_3 and MnF_2 is_____ B. M (nearest integer)

Q290. JEE Main 2021 (27 Aug Shift 2)

Potassium permanganate on heating at 513 K gives a product which is :

(1) paramagnetic and colourless

(2) diamagnetic and colourless

(3) diamagnetic and green

(4) paramagnetic and green

Q291. JEE Main 2020 (05 Sep Shift 1)

The correct electronic configuration and spin-only magnetic moment (BM) of $Gd^{3+}(Z = 64)$, respectively, are :

(1) $[Xe]4f^7$ and 8.9

(2) $[Xe]4f^7$ and 7.9

(3) $[Xe]5f^7$ and 8.9

(4) $[Xe]5f^7$ and 7.9

Chapter: Coordination Compounds

Q292. JEE Main 2025 (8 April Shift 2)

Given below are two statements :

Statement I : A homolepitc octahedral complex, formed using monodentate ligands, will not show stereoisomerism.

Statement II : cis- and trans- platin are heteroleptic complexes of Pd.

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

(1) Both statement I and Statement II are false.

(2) Statement I is false but Statement II is true.

(3) Both statement I and Statement II are true.

(4) Statement I is true but Statement II is false.

Q293. JEE Main 2025 (8 April Shift 2)

Match the LIST-I with LIST-II

	LIST-I (Complex/ Species)		LIST-II (Shape & magnetic moment)
A.	$[Ni(CO)_4]$	I.	Tetrahedral, 2.8 BM
B.	$[Ni(CN)_4]^{2-}$	II.	Square planar, 0 BM
C.	$[NiCl_4]^{2-}$	III.	Tetrahedral, 0 BM
D.	$[MnBr_4]^{2-}$	IV.	Tetrahedral, 5.9 BM

Choose the correct answer from the options given below :

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

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

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

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

Q294. JEE Main 2025 (7 April Shift 2)

The number of unpaired electrons responsible for the paramagnetic nature of the following complex species are respectively:

$[Fe(CN)_6]^{3-}, [FeF_6]^{3-}, [CoF_6]^{3-}, [Mn(CN)_6]^{3-}$

(1) $1, 5, 4, 2$

(2) $1, 5, 5, 2$

(3) $1, 1, 4, 2$

(4) 1.4.4.2

Q295. JEE Main 2025 (7 April Shift 1)

An octahedral complex having molecular composition Co. $5NH_3$. Cl. SO_4 has two isomers A and B. The solution of A gives a white precipitate with $AgNO_3$ solution and the solution of B gives white precipitate with $BaCl_2$ solution. The type of isomerism exhibited by the complex is,

(1) Co-ordinate isomerism

(2) Linkage isomerism

(3) Ionisation isomerism

(4) Geometrical isomerism

Q296. JEE Main 2025 (7 April Shift 1)

The number of paramagnetic complex among $[FeF_6]^{3-}, [Fe(CN)_6]^{3-}, [Mn(CN)_6]^{3-}, [Co(C_2O_4)_3]^{3-}, [MnCl_6]^{3-}$ and $[CoF_6]^{3-}$, which involved d^2sp^3 hybridization is ____

Q297. JEE Main 2025 (4 April Shift 2)

The correct order of $[FeF_6]^{3-}, [CoF_6]^{3-}, [Ni(CO)_4]$ and $[Ni(CN)_4]^{2-}$ complex species based on the number of unpaired electrons present is :

(1) $[FeF_6]^{3-} > [CoF_6]^{3-} > [Ni(CN)_4]^{2-} > [Ni(CO)_4]$

(2) $[Ni(CN)_4]^{2-} > [FeF_6]^{3-} > [CoF_6]^{3-} > [Ni(CO)_4]$

(3) $[CoF_6]^{3-} > [FeF_6]^{3-} > [Ni(CO)_4] > [Ni(CN)_4]^{2-}$

(4) $[FeF_6]^{3-} > [CoF_6]^{3-} > [Ni(CN)_4]^{2-} = [Ni(CO)_4]$

Q298. JEE Main 2025 (4 April Shift 2)

' X ' is the number of electrons in t_{2g} orbitals of the most stable complex ion among $[Fe(NH_3)_6]^{3+}$, $[Fe\,(Cl_6)]^{3-}$, $[Fe(C_2O_4)_3]^{3-}$ and $[Fe(H_2O)_6]^{3+}$. The nature of oxide of vanadium of the type V_2O_X is:

(1) Acidic
(2) Neutral
(3) Basic
(4) Amphoteric

Q299. JEE Main 2025 (3 April Shift 1)

The correct order of the complexes $[Co(NH_3)_5\,(H_2O)]^{3+}$ (A),
$[Co(NH_3)_6]^{3+}$ (B),
$[Co(CN)_6]^{3-}$ (C) and $[CoCl(NH_3)_5]^{2+}$(D) in terms wavelength of light absorbed is :

(1) D>A>B>C
(2) C>B>D>A
(3) D>C>B>A
(4) C>B>A>D

Q300. JEE Main 2025 (29 Jan Shift 2)

The calculated spin-only magnetic moments of $K_3\,[Fe(OH)_6]$ and $K_4\,[Fe(OH)_6]$ respectively are :

(1) 3.87 and 4.90 B.M.
(2) 4.90 and 5.92 B.M.
(3) 4.90 and 4.90 B.M.
(4) 5.92 and 4.90 B.M.

Q301. JEE Main 2025 (29 Jan Shift 1)

Match List - I with List - II.

	List - I (Complex)		List - II (Hybridisation & Magnetic characters)
(A)	$[MnBr_4]^{2-}$	(I)	d^2sp^3 & diamagnetic
(B)	$[FeF_6]^{3-}$	(II)	$sp^3\,d^2$ & paramagnetic
(C)	$[Co(C_2O_4)_3]^{3-}$	(III)	sp^3 & diamagnetic
(D)	$[Ni(CO)_4]$	(IV)	sp^3 & paramagnetic

Choose the correct answer from the options given below :

(1) (A) $-$(IV), (B) $-$ (II), (C) $-$ (I), (D) $-$ (III)
(2) (A) $-$ (III), (B) $-$ (I), (C) $-$ (II), (D) $-$ (IV)
(3) (A) $-$(IV), (B) $-$ (I), (C) $-$ (II), (D) $-$ (III)
(4) (A) $-$ (III), (B) $-$ (II), (C) $-$ (I), (D) $-$ (IV)

Q302. JEE Main 2025 (29 Jan Shift 1)

The correct increasing order of stability of the complexes based on Δ_o value is :

I. $[Mn(CN)_6]^{3-}$
II. $[Co(CN)_6]^{4-}$
III. $[Fe(CN)_6]^{4-}$
IV. $[Fe(CN)_6]^{3-}$

(1) IV < III < II < I
(2) I < II < IV < III
(3) III < II < IV < I
(4) II < III < I < IV

Q303. JEE Main 2025 (24 Jan Shift 2)

Match List - I with List - II.

List - I (Transition metal ion)		List - II (Spin only magnetic moment (B.M.))	
(A)	Ti^{3+}	(I)	3.87
(B)	V^{2+}	(II)	0.00
(C)	Ni^{2+}	(III)	1.73
(D)	Sc^{3+}	(IV)	2.84

Choose the correct answer from the options given below :

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

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

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

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

Q304. JEE Main 2025 (24 Jan Shift 2)

When Ethane-1,2-diamine is added progressively to an aqueous solution of Nickel (II) chloride, the sequence of colour change observed will be :

(1) Violet $\rightarrow$ Blue $\rightarrow$ Pale Blue $\rightarrow$ Green

(2) Pale Blue $\rightarrow$ Blue $\rightarrow$ Green $\rightarrow$ Violet

(3) Green $\rightarrow$ Pale Blue $\rightarrow$ Blue $\rightarrow$ Violet

(4) Pale Blue $\rightarrow$ Blue $\rightarrow$ Violet $\rightarrow$ Green

Q305. JEE Main 2025 (24 Jan Shift 1)

One mole of the octahedral complex compound $Co(NH_3)_5Cl_3$ gives 3 moles of ions on dissolution in water. One mole of the same complex reacts with excess of $AgNO_3$ solution to yield two moles of $AgCl_{(s)}$. The structure of the complex is:

(1) $[Co(NH_3)_4Cl_2]\cdot Cl\cdot NH_3$

(2) $[Co(NH_3)_3Cl_3]\cdot 2NH_3$

(3) $[Co(NH_3)_5Cl]Cl_2$

(4) $[Co(NH_3)_4Cl]\cdot Cl_2\cdot NH_3$

Q306. JEE Main 2025 (23 Jan Shift 1)

$CrCl_3\cdot xNH_3$ can exist as a complex. 0.1 molal aqueous solution of this complex shows a depression in freezing point of $0.558^\circ C$. Assuming 100% ionisation of this complex and coordination number of Cr is 6 , the complex will be

(Given $K_f = 1.86\ K\ kg\ mol^{-1}$)

(1) $[Cr(NH_3)_5Cl]Cl_2$

(2) $[Cr(NH_3)_6]Cl_3$

(3) $[Cr(NH_3)_3Cl_3]$

(4) $[Cr(NH_3)_4Cl_2]Cl$

Q307. JEE Main 2025 (22 Jan Shift 2)

The complex of Ni^{2+} ion and dimethyl glyoxime contains _____ number of Hydrogen (H) atoms.

Q308. JEE Main 2025 (22 Jan Shift 2)

The correct order of the following complexes in terms of their crystal field stabilization energies is :

(1) $[Co(NH_3)_4]^{2+} < [Co(NH_3)_6]^{2+} < [Co(en)_3]^{3+} < [Co(NH_3)_6]^{3+}$

(2) $[Co(NH_3)_6]^{2+} < [Co(NH_3)_6]^{3+} < [Co(NH_3)_4]^{2+} < [Co(en)_3]^{3+}$

(3) $[Co(en)_3]^{3+} < [Co(NH_3)_6]^{3+} < [Co(NH_3)_6]^{2+} < [Co(NH_3)_4]^{2+}$

(4) $[Co(NH_3)_4]^{2+} < [Co(NH_3)_6]^{2+} < [Co(NH_3)_6]^{3+} < [Co(en)_3]^{3+}$

Q309. JEE Main 2025 (22 Jan Shift 1)

From the magnetic behaviour of $[NiCl_4]^{2-}$ (paramagnetic) and $[Ni(CO)_4]$ (diamagnetic), choose the correct geometry and oxidation state.

(1) $[NiCl_4]^{2-}$: Ni^{II}, tetrahedral
$[Ni(CO)_4]$: Ni^{II}, square planar

(2) $[NiCl_4]^{2-}$: Ni^{II}, square planar
$[Ni(CO)_4]$: Ni(0), square planar

(3) $[NiCl_4]^{2-}$: Ni^{II}, tetrahedral
$[Ni(CO)_4]$: Ni(0), tetrahedral

(4) $[NiCl_4]^{2-}$: Ni(0), tetrahedral
$[Ni(CO)_4]$: Ni(0), square planar

Q310. JEE Main 2025 (2 April Shift 2)

The type of hybridization and the magnetic property of $[MnCl_6]^{3-}$ are :

(1) d^2sp^3, paramagnetic with four unpaired electrons

(2) $sp^3\ d^2$, paramagnetic with four unpaired electrons

(3) d^2sp^3, paramagnetic with two unpaired electrons

(4) $sp^3\ d^2$, paramagnetic with two unpaired electrons

Q311. JEE Main 2025 (2 April Shift 1)

Given below are two statements :

Statement (I) : In octahedral complexes, when $\Delta_o < P$ high spin complexes are formed. When $\Delta_o > P$ low spin complexes are formed.

Statement (II) : In tetrahedral complexes because of $\Delta_t < P$, low spin complexes are rarely formed.

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) Statement I is incorrect but Statement II is correct

(4) Both Statement I and Statement II are correct

Q312. JEE Main 2024 (31 Jan Shift 1)

The correct statements from the following are:

A. The strength of anionic ligands can be explained by crystal field theory.

B. Valence bond theory does not give a quantitative interpretation of kinetic stability of coordination compounds.

C. The hybridization involved in formation of $\left[\mathrm{Ni}(\mathrm{CN})_4\right]^{2-}$ complex is dsp^2.

D. The number of possible isomer(s) of cis-$\left[\mathrm{PtCl}_2\ (\mathrm{en})_2\right]^{2+}$ is one

Choose the correct answer from the options given below:

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

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

Q313. JEE Main 2024 (29 Jan Shift 1)

In which one of the following metal carbonyls, CO forms a bridge between metal atoms?

(1) $[\mathrm{Co}_2(\mathrm{CO})_8]$ (2) $[\mathrm{Mn}_2(\mathrm{CO})_{10}]$

(3) $[\mathrm{Os}_3(\mathrm{CO})_{12}]$ (4) $[\mathrm{Ru}_3(\mathrm{CO})_{12}]$

Q314. JEE Main 2024 (27 Jan Shift 2)

The Spin only magnetic moment value of square planar complex $[\mathrm{Pt}\ (\mathrm{NH}_3)_2\ \mathrm{Cl}(\mathrm{NH}_2\ \mathrm{CH}_3)]\ \mathrm{Cl}$ is _____ B.M. (Nearest integer)

(Given atomic number for $\mathrm{Pt} = 78$)

Q315. JEE Main 2024 (06 Apr Shift 1)

Match List I with List II

	List - I (Compound)		List - II (Uses)
A.	Iodoform	I.	Fire extinguisher
B.	Carbon tetrachloride	II.	Insecticide
C.	CFC	III.	Antiseptic
D.	DDT	IV.	Refrigerants

Choose the correct answer from the options given below:

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

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

Q316. JEE Main 2024 (05 Apr Shift 1)

The correct order of ligands arranged in increasing field strength.

(1) $\mathrm{F}^- < \mathrm{Br}^- < \mathrm{I}^- < \mathrm{NH}_3$

(2) $\mathrm{Br}^- < \mathrm{F}^- < \mathrm{H}_2\mathrm{O} < \mathrm{NH}_3$

(3) $\mathrm{H}_2\mathrm{O} < -\mathrm{OH} < \mathrm{CN}^- < \mathrm{NH}_3$

(4) $\mathrm{Cl}^- < -\mathrm{OH} < \mathrm{Br}^- < \mathrm{CN}^-$

Q317. JEE Main 2024 (04 Apr Shift 2)

The number of unpaired d-electrons in $[\mathrm{Co}(\mathrm{H}_2\mathrm{O})_6]^{3+}$ is

(1) 2 (2) 1 (3) 0 (4) 4

Q318. JEE Main 2024 (04 Apr Shift 1)

Number of complexes from the following with even number of unpaired " d " electrons is _____

$[V(H_2O)_6]^{3+}, [Cr(H_2O)_6]^{2+}, [Fe(H_2O)_6]^{3+}, [Ni(H_2O)_6]^{3+}, [Cu(H_2O)_6]^{2+}$

[Given atomic numbers : $V = 23, Cr = 24, Fe = 26, Ni = 28 Cu = 29$]

(1) 2 (2) 1 (3) 4 (4) 5

Q319. JEE Main 2024 (01 Feb Shift 2)

$[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$ are respectively known as:

(1) Spin free Complex, Spin paired Complex

(2) Spin paired Complex, Spin free Complex

(3) Outer orbital Complex, Inner orbital Complex

(4) Inner orbital Complex, Spin paired Complex

Q320. JEE Main 2023 (29 Jan Shift 1)

Chiral complex from the following is :

Here en = ethylene diamine

(1) cis $-[PtCl_2(en)_2]^{2+}$

(2) trans $-[PtCl_2(en)_2]^{2+}$

(3) cis $-[PtCl_2(NH_3)_2]$

(4) trans $-[Co(NH_3)_4Cl_2]^{+}$

Q321. JEE Main 2023 (25 Jan Shift 2)

Match List I with List II

List I Coordination entity		List II Wavelength of light absorbed in nm
(a) $[CoCl(NH_3)_5]^{2+}$	I.	310
(b) $[Co(NH_3)_6]^{3+}$	II.	475
(c) $[Co(CN)_6]^{3-}$	III.	535
(d) $[Cu(H_2O)_4]^{2+}$	IV.	600

Choose the correct answer from the options given below :-

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

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

Q322. JEE Main 2023 (13 Apr Shift 2)

The total number of stereoisomers for the complex $[Cr(ox)_2ClBr]^{3-}$ (where ox = oxalate) is

(1) 3 (2) 2 (3) 4 (4) 1

Q323. JEE Main 2023 (12 Apr Shift 1)

Match List I with List II

	List I Complex		List II $CFSE$ (Δ_0)
A.	$[Cu(NH_3)_6]^{2+}$	I.	-0.6
B.	$[Ti(H_2O)_6]^{3+}$	II.	-2.0
C.	$[Fe(CN)_6]^{3-}$	III.	-1.2
D.	$[NiF_6]^{4-}$	IV.	-0.4

Choose the correct answer from the options given below:

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

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

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

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

Q324. JEE Main 2023 (11 Apr Shift 1)

Which of the following complex has a possibility to exist as meridional isomer?

(1) $[Co(NH_3)_3(NO_2)_3]$ (2) $[Pt\ (NH_3)_2\ Cl_2]$

(3) $[Co(en)_2\ Cl_2]$ (4) $[Co(en)_3]$

Q325. JEE Main 2023 (10 Apr Shift 2)

Match List-I with List-II.

List-I Complex		List-II Crystal Field splitting energy (Δ_0)	
A.	$[Ti(H_2O)_6]^{2+}$	I.	–1.2
B.	$[V(H_2O)_6]^{2+}$	II.	–0.6
C.	$[Mn(H_2O)_6]^{3+}$	III.	0
D.	$[Fe(H_2O)_6]^{3+}$	IV.	–0.8

Choose the correct answer from the options given below:

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

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

Q326. JEE Main 2022 (27 Jun Shift 1)

Which of the following will have maximum stabilization due to crystal field?

(1) $[Ti\,(H_2O)_6]^{3+}$ (2) $[Co\,(H_2O)_6]^{2+}$

(3) $[Co\,(CN)_6]^{3-}$ (4) $[Cu\,(NH_3)_4]^{2+}$

Q327. JEE Main 2022 (25 Jun Shift 1)

If $[Cu\,(H_2O)_4]^{2+}$ absorbs a light of wavelength 600 nm for d – d transition, then the value of octahedral crystal field splitting energy for $[Cu\,(H_2O)_6]^{2+}$ will be____$\times 10^{-21}$ J [Nearest integer] (Given: $h = 6.63 \times 10^{-34}$ Js and $c = 3.08 \times 10^{8}\ ms^{-1}$)

Q328. JEE Main 2022 (25 Jul Shift 2)

The spin-only magnetic moment value of M^{3+} ion (in gaseous state) from the pairs $Cr^{3+}/Cr^{2+}, Mn^{3+}/Mn^{2}, Fe^{3+}/Fe^{2+}$ and Co^{3+}/Co^{2+} that has negative standard electrode potential, is_____ B. M.

Q329. JEE Main 2022 (24 Jun Shift 1)

In the cobalt-carbonyl complex : $[Co_2(CO)_8]$, number of $Co-Co$ bonds is "X" and terminal CO ligands is " Y". $X+Y=$___

Q330. JEE Main 2021 (27 Aug Shift 2)

The additon of dilute NaOH to Cr^{3+} salt solution will give :

(1) a solution of $[Cr(OH)_4]^-$

(2) precipitate of $[Cr(OH)_6]^{3-}$

(3) precipitate of $Cr_2O_3(H_2O)_n$

(4) precipitate of $Cr(OH)_3$

Q331. JEE Main 2021 (17 Mar Shift 2)

Match List-I with List-II :

List-I		List-II	
(a)	$[Co(NH_3)_6][Cr(CN)_6]$	(I)	Linkage isomerism
(b)	$[Co(NH_3)_3(NO_2)_3]$	(II)	Solvate isomerism
(c)	$[Cr(H_2O)_6]Cl_3$	(III)	Co-ordination isomerism
(d)	$cis-[CrCl_2(ox)_2]^{3-}$	(IV)	Optical isomerism

Choose the correct answer from the options given below:

(1) (a) – (iii), (b) – (i), (c) – (ii), (d) – (iv)

(2) (a)-(iv), (b) – (ii), (c) – (iii), (d) – (i)

(3) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

(4) (a) – (i), (b) – (ii), (c) – (iii), (d) – (iv)

Q332. JEE Main 2020 (06 Sep Shift 2)

For a d^4 metal ion in an octahedral field, the correct electronic configuration is :

(1) $t_{2g}^3 e_g^1$ when $\Delta_O < P$

(2) $t_{2g}^3 e_g^1$ when $\Delta_O > P$

(3) $t_{2g}^4 e_g^0$ when $\Delta_O < P$

(4) $e_g^2 t_{2g}^2$ when $\Delta_O < P$

Q333. JEE Main 2020 (05 Sep Shift 1)

The total number of coordination sites in ethylenediaminetetraacetate ($EDTA^{4-}$) is.....

Chapter: Practical Chemistry

Q334. JEE Main 2025 (24 Jan Shift 1)

Among the following cations, the number of cations which will give characteristic precipitate in their identification tests with $K_4[Fe(CN)_6]$ is _____.

$Cu^{2+}, Fe^{3+}, Ba^{2+}, Ca^{2+}, NH_4^+, Mg^{2+}, Zn^{2+}$

Q335. JEE Main 2025 (2 April Shift 1)

Choose the correct tests with respective observations.

(A) $CuSO_4$ (acidified with acetic acid) $+K_4[Fe(CN)_6] \rightarrow$ Chocolate brown precipitate.

(B) $FeCl_3 + K_4[Fe(CN)_6] \rightarrow$ Prussian blue precipitate.

(C) $ZnCl_2 + K_4[Fe(CN)_6]$, neutralised with $NH_4OH \rightarrow$ White or bluish white precipitate.

(D) $MgCl_2 + K_4[Fe(CN)_6] \rightarrow$ Blue precipitate.

(E) $BaCl_2 + K_4[Fe(CN)_6]$, neutralised with NaOH $\rightarrow$ White precipitate.

Choose the correct answer from the options given below :

(1) A, D and E only

(2) B, D and E only

(3) A, B and C only

(4) C, D and E only

Chapter: General Organic Chemistry

Q336. JEE Main 2025 (8 April Shift 2)

What is the correct IUPAC name of

?

(1) 4-Ethyl-1-hydroxycyclopent-2-ene

(2) 1-Ethyl-3-hydroxycyclopent-2-ene

(3) 1-Ethylcyclopent-2-en-3-ol

(4) 4-Ethylcyclopent-2-en-1-ol

Q337. JEE Main 2025 (8 April Shift 2)

Match the LIST-I with LIST-II

	LIST-I		LIST-II
A.	Carbocation	I.	Species that can supply a pair of electrons.
B.	C-Free radical	II.	Species that can receive a pair of electrons.
C.	Nucleophile	III.	sp^2 hybridized carbon with empty p-orbital.
D.	Electrophile	IV.	sp^2/sp^3 hybridized carbon with one unpaired electron.

Choose the correct answer from the options given below :

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

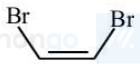
(2) A-II, B-III, C-I, D-IV

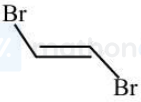
(3) A-III, B-IV, C-II, D-I

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

Q338. JEE Main 2025 (7 April Shift 2)

Given below are two statements :

Statement (I) :  is more polar than 

Statement (II) : Boiling point of  is lower than  but it is more polar than 

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

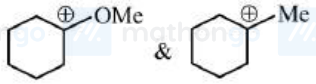
(2) Statement I is incorrect but statement II is correct

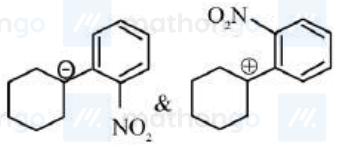
(3) Both statement I and statement II are incorrect

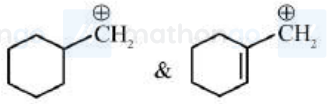
(4) Both statement I and statement II are correct

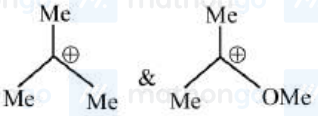
Q339. JEE Main 2025 (4 April Shift 2)

In which pairs, the first ion is more stable than the second?

(A) 

(B) 

(C) 

(D) 

(1) (B) & (D) only
(2) (A) & (B) only
(3) (B) & (C) only
(4) (A) & (C) only

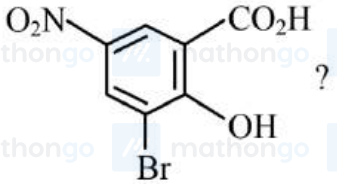
Q340. JEE Main 2025 (4 April Shift 1)

In Dumas' method for estimation of nitrogen 1 g of an organic compound gave 150 mL of nitrogen collected at 300 K temperature and 900 mm Hg pressure. The percentage composition of nitrogen in the compound is _____ % (nearest integer).

(Aqueous tension at 300 K = 15 mmHg)

Q341. JEE Main 2025 (3 April Shift 2)

What is the correct IUPAC name of



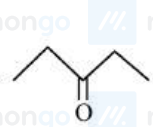
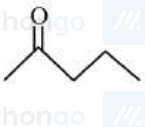
(1) 3-Bromo-2-hydroxy-5-nitrobenzoic acid
(2) 3-Bromo-4-hydroxy-1-nitrobenzoic acid
(3) 2-Hydroxy-3-bromo-5-nitrobenzoic acid
(4) 5-Nitro-3-bromo-2-hydroxybenzoic acid

Q342. JEE Main 2025 (3 April Shift 2)

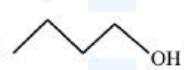
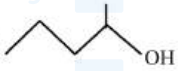
The total number of structural isomers possible for the substituted benzene derivatives with the molecular formula C_9H_{12} is _____.

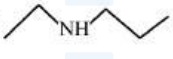
Q343. JEE Main 2025 (3 April Shift 1)

Identify the correct statements from the following

A.  and  are metamers

B.  and  are functional isomers

C.  and  are position isomers

D.  and  are homologous

Choose the correct answer from the options given below

(1) C & D only

(2) B & C only

(3) A & B only

(4) A,B & C only

Q344. JEE Main 2025 (3 April Shift 1)

During estimation of nitrogen by Dumas' method of compound $X(0.42\ g)$:

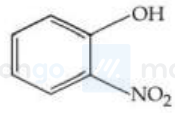
X

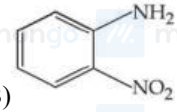
_____ mL of N_2 gas will be liberated at STP. (nearest integer)

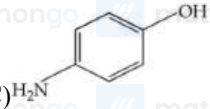
(Given molar mass in $gmol^{-1}$: C : 12, H : 1, N : 14)

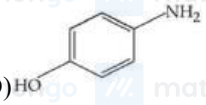
Q345. JEE Main 2025 (29 Jan Shift 1)

The steam volatile compounds among the following are :

(A) 

(B) 

(C) 

(D) 

Choose the correct answer from the options given below :

(1) (B) and (D) Only

(2) (A) and (C) Only

(3) (A), (B) and (C) Only

(4) (A) and (B) Only

Q346. JEE Main 2025 (28 Jan Shift 2)

Given below are two statements :

Statement (I) :  are isomeric compounds.**Statement (II) :**  are functional group isomers.

(1) Both **Statement (I)** and **Statement (II)** are false.

(2) Both **Statement (I)** and **Statement (II)** are true.

(3) **Statement (I)** is false but **Statement (II)** is true.

(4) **Statement (I)** is true but **Statement (II)** is false.

Q347. JEE Main 2025 (24 Jan Shift 2)

Identify correct statement/s :

(A) $-OCH_3$ and $-NHCOCH_3$ are activating group.

(B) -CN and -OH are meta directing group.

(C) -CN and $-SO_3H$ are meta directing group.

(D) Activating groups act as ortho - and para directing groups.

(E) Halides are activating groups.

Choose the correct answer from the options given below :

(1) (A) only

(2) (A), (B) and (E) only

(3) (A) and (C) only

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

Q348. JEE Main 2025 (24 Jan Shift 2)

The possible number of stereoisomers for 5-phenylpent-4-en-2-ol is .....

Q349. JEE Main 2025 (24 Jan Shift 2)

In Carius method of estimation of halogen, 0.25 g of an organic compound gave 0.15 g of silver bromide (AgBr). The percentage of Bromine in the organic compound is ..... $\times 10^{-1}$% (Nearest integer).

(Given : Molar mass of Ag is 108 and Br is 80 g mol^{-1})

Q350. JEE Main 2025 (24 Jan Shift 1)

Given below are two statements I and II.

Statement I: Dumas method is used for estimation of "Nitrogen" in an organic compound.

Statement II: Dumas method involves the formation of ammonium sulphate by heating the organic compound with conc H_2SO_4.

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

(1) Statement I is true but Statement II is false

(2) Both Statement I and Statement II are false

(3) Statement I is false but Statement II is true

(4) Both Statement I and Statement II are true

Q351. JEE Main 2025 (23 Jan Shift 1)

Given below are two statements:

Statement I: In Lassaigne's test, the covalent organic molecules are transformed into ionic compounds.

Statement II: The sodium fusion extract of an organic compound having N and S gives prussian blue colour with $FeSO_4$ and $Na_4[Fe(CN)_6]$

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

(1) Statement I is true but Statement II is false

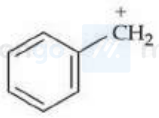
(2) Both Statement I and Statement II are false

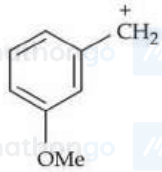
(3) Both Statement I and Statement II are true

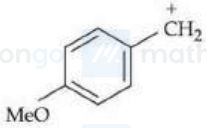
(4) Statement I is false but Statement II is true

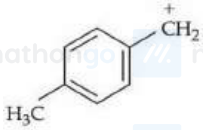
Q352. JEE Main 2025 (22 Jan Shift 2)

The most stable carbocation from the following is :

(1) 

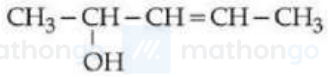
(2) 

(3) 

(4) 

Q353. JEE Main 2025 (22 Jan Shift 1)

How many different stereoisomers are possible for the given molecule?



(1) 2

(2) 1

(3) 4

(4) 3

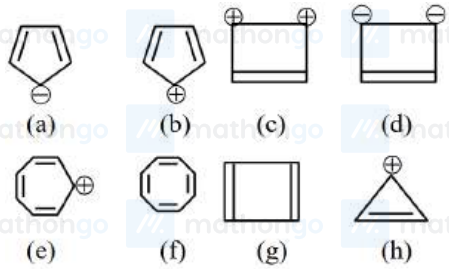
Q354. JEE Main 2025 (22 Jan Shift 1)

In Carius method for estimation of halogens, 180 mg of an organic compound produced 143.5 mg of AgCl. The percentage composition of chlorine in the compound is _____ %.

(Given : molar mass in $gmol^{-1}$ of Ag : 108, Cl : 35.5)

Q355. JEE Main 2025 (2 April Shift 1)

Designate whether each of the following compounds is aromatic or not aromatic.



(1) e, g aromatic and a, b, c, d, f, h not aromatic
(2) b, e, f, g aromatic and a, c, d, h not aromatic
(3) a, b, c, d aromatic and e, f, g, h not aromatic
(4) a, c, d, e, h aromatic and b, f, g not aromatic

Q356. JEE Main 2024 (31 Jan Shift 1)

Match List I with List II

LIST I (Technique)	LIST II (Application)
A. Distillation	I. Separation of glycerol from spent-lye
B. Fractional distillation	II. Aniline - Water mixture
C. Steam distillation	III. Separation of crude oil fractions
D. Distillation under reduced pressure	IV. Chloroform-Aniline

Choose the correct answer from the options given below:

(1) A-IV, B-I, C-II, D-III
(2) A-IV, B-III, C-II. D-I
(3) A-I. B-II, C-IV, D-III
(4) A-II, B-III. C-I, D-IV

Q357. JEE Main 2024 (30 Jan Shift 2)

The correct stability order of carbocations is

(1) $(CH_3)_3C^+ > CH_3 - \overset{+}{C}H_2 > (CH_3)_2\overset{+}{C}H > \overset{+}{C}H_3$

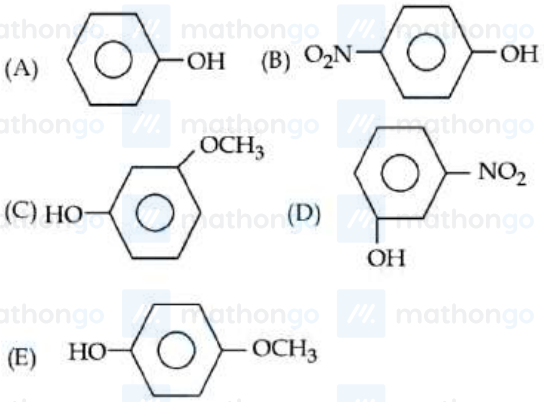
(2) $\overset{+}{C}H_3 > (CH_3)_2\overset{+}{C}H > CH_3 - \overset{+}{C}H_2 > (CH_3)_3\overset{+}{C}$

(3) $(CH_3)_3\overset{+}{C} > (CH_3)_2\overset{+}{C}H > CH_3 - \overset{+}{C}H_2 > \overset{+}{C}H_3$

(4) $\overset{+}{C}H_3 > CH_3 - \overset{+}{C}H_2 > CH_3 - \underset{CH_3}{\overset{+}{C}H} > (CH_3)C^+$

Q358. JEE Main 2024 (09 Apr Shift 1)

For the given compounds, the correct order of increasing pK_a value :



Choose the correct answer from the options given below :

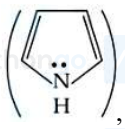
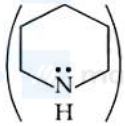
(1) (B) < (D) < (C) < (A) < (E)

(2) (D) < (E) < (C) < (B) < (A)

(3) (E) < (D) < (C) < (B) < (A)

(4) (E) < (D) < (B) < (A) < (C)

Q359. JEE Main 2024 (09 Apr Shift 1)

Correct order of basic strength of Pyrrole  , Pyridine  , and Piperidine  is:

(1) Pyrrole > Piperidine > Pyridine

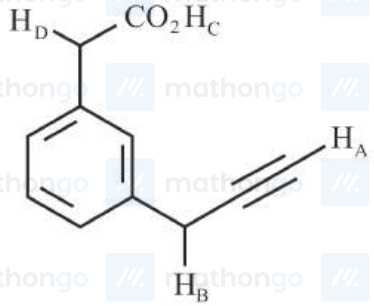
(2) Pyrrole > Pyridine > Piperidine

(3) Pyridine > Piperidine > Pyrrole

(4) Piperidine > Pyridine > Pyrrole

Q360. JEE Main 2023 (30 Jan Shift 1)

What is the correct order of acidity of the protons marked *A*–*D* in the given compounds?



(1) $H_C > H_D > H_B > H_A$

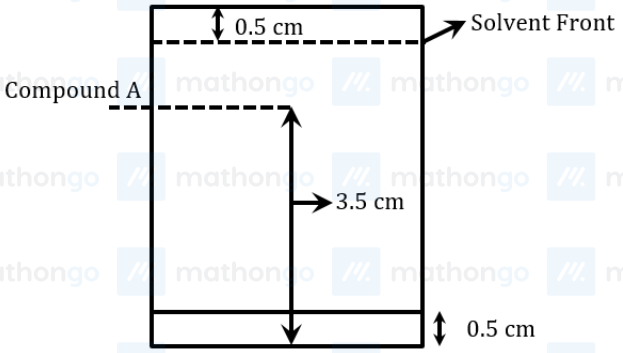
(2) $H_C > H_D > H_A > H_B$

(3) $H_D > H_C > H_B > H_A$

(4) $H_C > H_A > H_D > H_B$

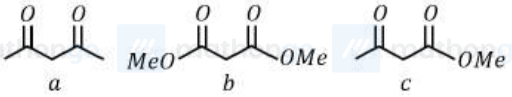
Q361. JEE Main 2023 (29 Jan Shift 1)

Following chromatogram was developed by adsorption of compound 'A' on a 6 cm TLC glass plate. Retardation factor of the compound 'A' is _____ $\times 10^{-1}$.



Q362. JEE Main 2023 (24 Jan Shift 2)

Which will undergo deprotonation most readily in basic medium?



(1) a only
(2) c only
(3) Both a and c
(4) b only

Q363. JEE Main 2023 (13 Apr Shift 2)

Given below are two statements :

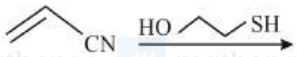
Statement I : Tropolone is an aromatic compound and has 8π electrons.

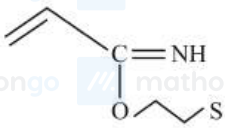
Statement II : π electrons of $> C = O$ group in tropolone is involved in aromaticity. In the light of the above statements choose the correct answer from the options given below:

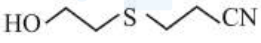
(1) Statement I is true but Statement II is false
(2) Statement I is false but Statement II is true
(3) Both Statement I and Statement II are false
(4) Both Statement I and Statement II are true

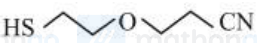
Q364. JEE Main 2023 (13 Apr Shift 2)

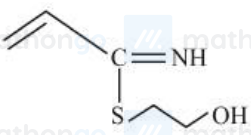
The major product for the following reaction is:



(1) 

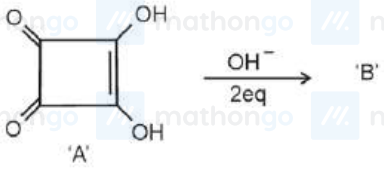
(2) 

(3) 

(4) 

Q365. JEE Main 2023 (12 Apr Shift 1)

Correct statements for the given reaction are:



A. Compound 'B' is aromatic

B. The completion of above reaction is very slow

C. 'A' shows tautomerism

D. The bond lengths of C – C in compound B are found to be same

Choose the correct answer from the options given below.

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

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

Q366. JEE Main 2023 (10 Apr Shift 2)

In Carius tube, an organic compound ' X ' is treated with sodium peroxide to form a mineral acid ' Y '. The solution of $BaCl_2$ is added to ' Y ' to form a precipitate ' Z '. ' Z ' is used for the quantitative estimation of an extra element. ' X ' could be

(1) Cytosine (2) A nucleotide

(3) Methionine (4) Chloroxylenol

Q367. JEE Main 2023 (01 Feb Shift 2)

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

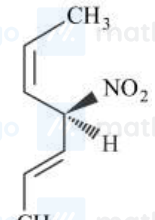
(4) Statement I is incorrect but Statement II is correct.

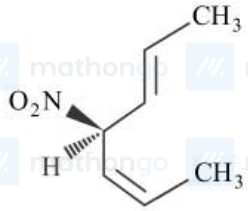
Q368. JEE Main 2022 (29 Jun Shift 2)

The number of chiral alcohol(s) with molecular formula $C_4H_{10}O$ is _____ (Assume stereoisomers as different chiral alcohols)

Q369. JEE Main 2022 (29 Jul Shift 2)

Given below are two statements.

Statement I : The compound  is optically active.

Statement II :  is mirror image of above compound A.

In the light of the above statement, choose the most appropriate answer from the options given below.

(1) Both Statement I and Statement II are correct

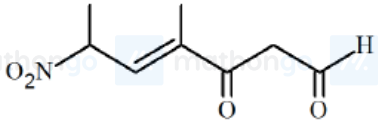
(2) Both Statement I and Statement II are incorrect.

(3) Statement I is correct but Statement II is incorrect.

(4) Statement I is incorrect but Statement II is correct.

Q370. JEE Main 2022 (28 Jun Shift 2)

The correct IUPAC name of the following compound is



(1) 4-methyl-2-nitro-5-oxohept-3-enal

(2) 4-methyl-5-oxo-2-nitrohept-3-enal

(3) 4-methyl-6-nitro-3-oxohept-4-enal

(4) 6-formyl-4-methyl-2-nitrohex-3-enal

Q371. JEE Main 2022 (28 Jul Shift 2)

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

Assertion A : Thin layer chromatography is an adsorption chromatography.

Reason R : A thin layer of silica gel is spread over a glass plate of suitable size in thin layer chromatography which acts as an adsorbent. In the light of the above statements, choose the correct answer from the options given below

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

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

(3) A is true but R is false

(4) A is false but R is true

Q372. JEE Main 2022 (27 Jun Shift 2)

0. 25 g of an organic compound containing chlorine gave 0. 40 g of silver chloride in Carius estimation. The percentage of chlorine present in the compound is [in nearest integer]

(Given: Molar mass of Ag is 108 g mol^{-1} and that of Cl is 35. 5 g mol^{-1})

Q373. JEE Main 2022 (27 Jul Shift 1)

In Carius method of estimation of halogen. 0.45 g of an organic compound gave 0.36 g of AgBr. Find out the percentage of bromine in the compound.

(Molar masses : $AgBr = 188\ g\ mol^{-1}$: $Br = 80\ g\ mol^{-1}$)

(1) 34.04%

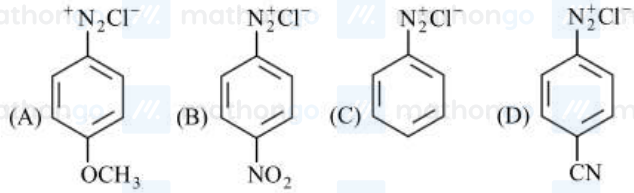
(2) 40.04%

(3) 36.03%

(4) 38.04%

Q374. JEE Main 2022 (26 Jul Shift 1)

The correct stability order of the following diazonium salt is



(1) (A) > (B) > (C) > (D)

(2) (A) > (C) > (D) > (B)

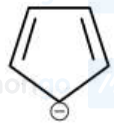
(3) (C) > (A) > (D) > (B)

(4) (C) > (D) > (B) > (A)

Q375. JEE Main 2022 (26 Jul Shift 1)

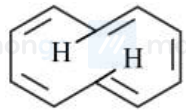
Which of the following compounds is not aromatic?

(1)

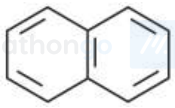


(2)

(3)



(4)



Q376. JEE Main 2022 (25 Jun Shift 2)

Given below are two statements: one is labelled as Assertion and the other is labelled as Reason.

Assertion: A mixture contains benzoic acid and napthalene. The pure benzoic acid can be separated out by the use of benzene.

Reason: Benzoic acid is soluble in hot water.

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

(1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

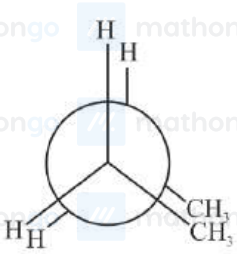
(2) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

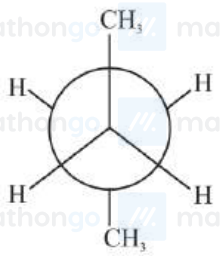
(3) Assertion is true but Reason is false.

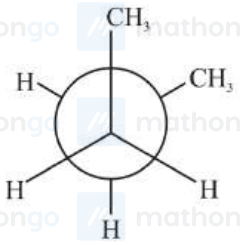
(4) Assertion is false but Reason is true.

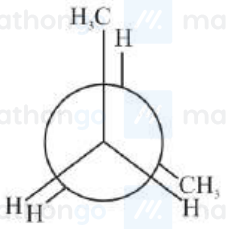
Q377. JEE Main 2022 (25 Jun Shift 1)

In the following structures, which one is having staggered conformation with maximum dihedral angle?

(1) 

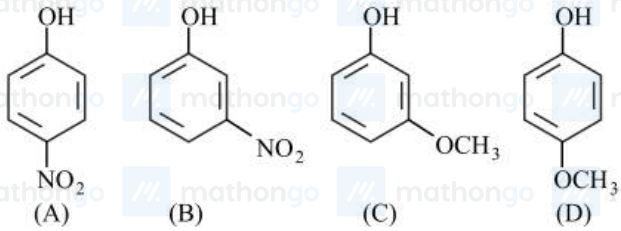
(2) 

(3) 

(4) 

Q378. JEE Main 2022 (25 Jul Shift 2)

Arrange the following in decreasing acidic strength.



(A) (B) (C) (D)

(1) A > B > C > D
(2) B > A > C > D
(3) D > C > A > B
(4) D > C > B > A

Q379. JEE Main 2022 (24 Jun Shift 2)

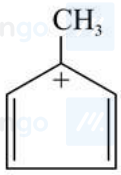
0.2 g of an organic compound was subjected to estimation of nitrogen by Dumas method in which volume of N_2 evolved (at STP) was found to be 22.400 mL. The percentage of nitrogen in the compound is - [nearest integer]
(Given: Molar mass of N_2 is 28 g mol^{-1}, Molar volume of N_2 at STP : 22.4 L)

Q380. JEE Main 2021 (17 Mar Shift 2)

The correct pair(s) of the ambident nucleophiles is (are):
(A) AgCN / KCN
(B) RCOOAg / RCOOK
(C) $AgNO_2$ / KNO_2
(D) AgI / KI
(1) (B) and (C) only
(2) (A) only
(3) (A) and (C) only
(4) (B) only

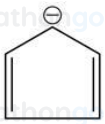
Q381. JEE Main 2021 (01 Sep Shift 2)

Which one of the following compounds is aromatic in nature?

(1) 

(2) 

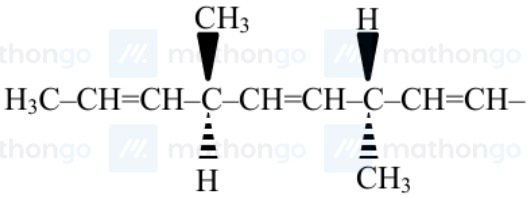
(3) Both 1 and 2

(4) 

Chapter: Hydrocarbons

Q382. JEE Main 2025 (7 April Shift 2)

The number of optically active products obtained from the complete ozonolysis of the given compound is :



(1) 2
(2) 0
(3) 1
(4) 4

Q383. JEE Main 2025 (7 April Shift 1)

Given below are two statements :

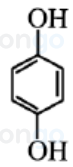
Statement I : Ozonolysis followed by treatment with Zn, H_2O of cis-2-butene gives ethanal.**Statement II :** The production obtained by ozonolysis followed by treatment with Zn, H_2O of 3, 6-dimethyloct-4-ene has no chiral carbon atom.

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

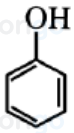
(1) Both Statement I and Statement II are true
(2) Statement I is false but Statement II are true
(3) Statement I is true but Statement II is false
(4) Both Statement I and Statement II are false

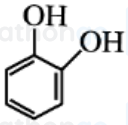
Q384. JEE Main 2025 (4 April Shift 1)

Benzene is treated with oleum to produce compound (X) which when further heated with molten sodium hydroxide followed by acidification produces compound (Y).The compound Y is treated with zinc metal to produce compound (Z). Identify the structure of compound (Z) from the following option.

(1) 

(2) 

(3) 

(4) 

Q385. JEE Main 2025 (3 April Shift 2)

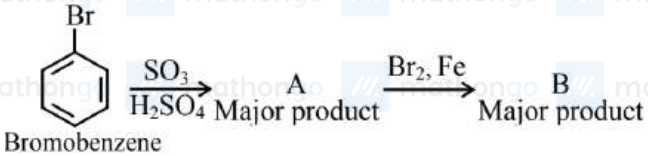
X g of nitrobenzene on nitration gave 4.2 g of m-dinitrobenzene.

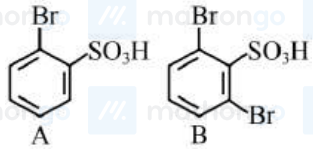
X =_____ g. (nearest integer)

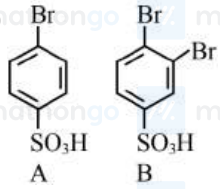
[Given : molar mass (in $gmol^{-1}$) C : 12, H : 1, O : 16, N : 14]

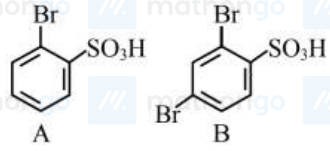
Q386. JEE Main 2025 (3 April Shift 2)

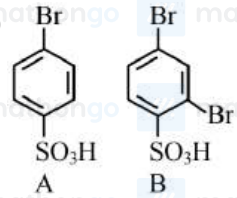
In the following series of reactions identify the major products A \& B respectively.



(1) 

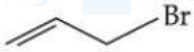
(2) 

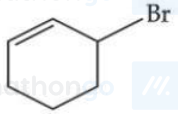
(3) 

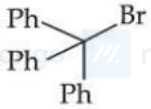
(4) 

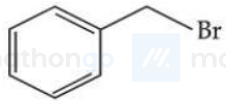
Q387. JEE Main 2025 (29 Jan Shift 2)

Which among the following halides will generate the most stable carbocation in the nucleophilic substitution reaction?

(1) 

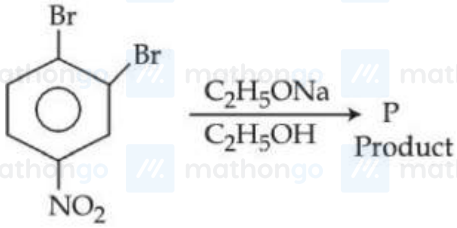
(2) 

(3) 

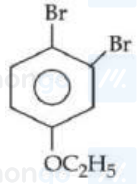
(4) 

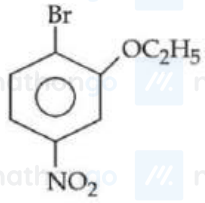
Q388. JEE Main 2025 (29 Jan Shift 1)

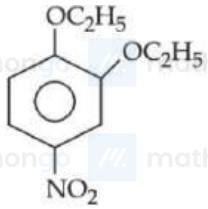
In the following substitution reaction:

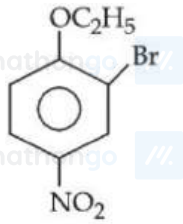


product 'P' formed is :

(1) 

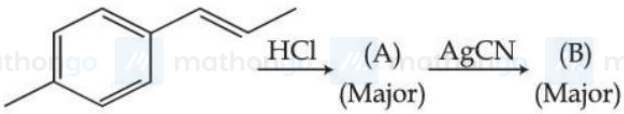
(2) 

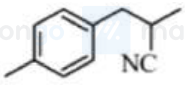
(3) 

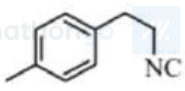
(4) 

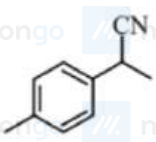
Q389. JEE Main 2025 (28 Jan Shift 2)

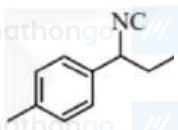
The product *B* formed in the following reaction sequence is :



(1) 

(2) 

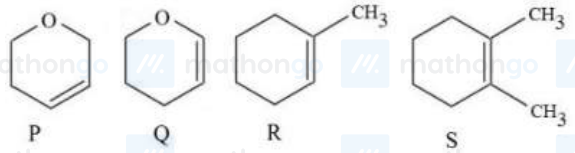
(3) 

(4) 

Q390. JEE Main 2025 (24 Jan Shift 1)

Following are the four molecules "P", "Q", "R" and "S".

Which one among the four molecules will react with $H - Br_{(aq)}$ at the fastest rate?

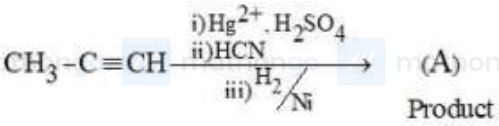


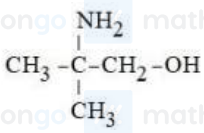
(1) R (2) P

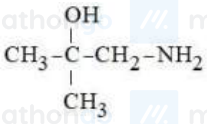
(3) Q (4) S

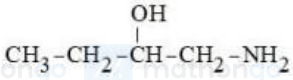
Q391. JEE Main 2025 (24 Jan Shift 1)

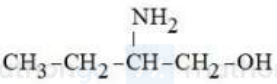
The product (A) formed in the following reaction sequence is



(1) 

(2) 

(3) 

(4) 

Q392. JEE Main 2025 (22 Jan Shift 1)

Given below are two statements :

Statement I : One mole of propyne reacts with excess of sodium to liberate half a mole of H_2 gas.

Statement II : Four g of propyne reacts with $NaNH_2$ to liberate NH_3 gas which occupies 224 mL at STP.

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

(1) Statement I is incorrect but Statement II is correct

(2) Both Statement I and Statement II are correct

(3) Statement I is correct but Statement II is incorrect

(4) Both Statement I and Statement II are incorrect

Q393. JEE Main 2025 (2 April Shift 2)

Given below are two statements :

Statement (I) : Neopentane forms only one monosubstituted derivative.

Statement (II) : Melting point of neopentane is higher than n-pentane

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

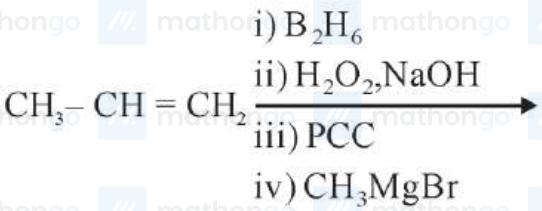
(2) Both Statement I and Statement II are correct

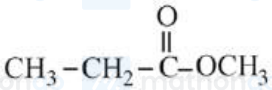
(3) Both Statement I and Statement II are incorrect

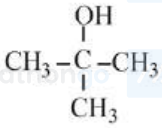
(4) Statement I is incorrect but Statement II is correct

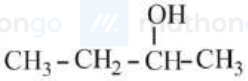
Q394. JEE Main 2023 (15 Apr Shift 1)

The product formed in the following multistep reaction is:



(1) 

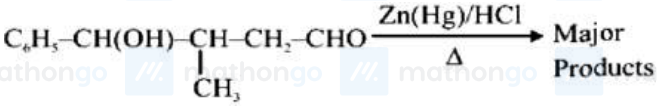
(2) 

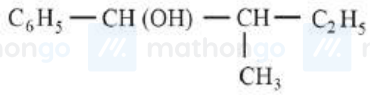
(3) 

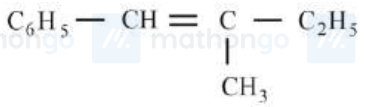
(4) 

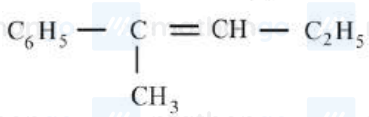
Q395. JEE Main 2023 (11 Apr Shift 2)

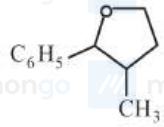
The major product formed in the following reaction is



A. 

B. 

C. 

D. 

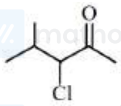
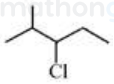
choose the correct answer from the options Given below:

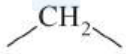
(1) B only (2) A only

(3) C only (4) D only

Q396. JEE Main 2023 (11 Apr Shift 2)

Given below are two statements, one is labelled as Assertion **A** and the other is labelled as Reason **R**.

Assertion **A**:  can be subjected to Wolff-Kishner reduction to give 

Reason **R**: Wolff-Kishner reduction is used to convert  into 

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

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

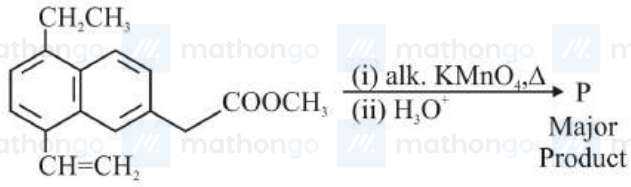
(2) **A** is false but **R** is true

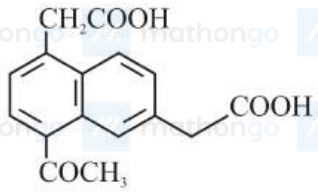
(3) Both **A** and **R** are true and **R** is the correct explanation of **A**

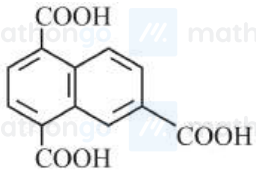
(4) Both **A** and **R** are true and **R** is NOT the correct explanation of **A**

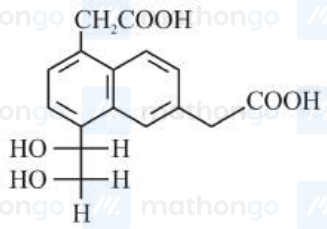
Q397. JEE Main 2023 (10 Apr Shift 1)

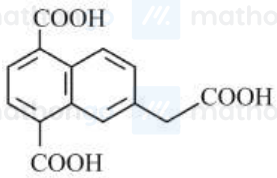
The major product 'P' formed in the given reaction is



(1) 

(2) 

(3) 

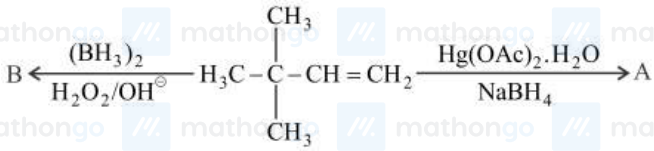
(4) 

Q398. JEE Main 2022 (29 Jul Shift 1)

In bromination of Propyne, with Bromine $1,1,2,2$-tetrabromopropane is obtained in 27% yield. The amount of $1,1,2,2$ tetrabromopropane obtained from 1 g of Bromine in this reaction is_____$\times 10^{-1}$ g. (Molar Mass : Bromine $= 80$ g/ mol)

Q399. JEE Main 2022 (28 Jul Shift 1)

Choose the correct option for the following reactions.



(1) 'A' and 'B' are both Markovnikov addition products.

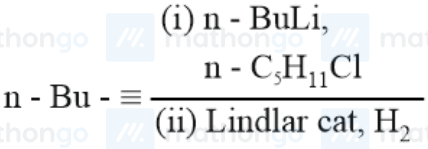
(2) 'A' is Markovnikov product and 'B' is antiMarkovnikov product.

(3) 'A' and 'B' are both anti-Markovnikov products.

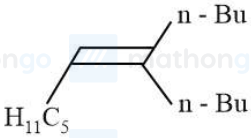
(4) 'B' is Markovnikov and 'A' is anti-Markovnikov product.

Q400. JEE Main 2022 (27 Jun Shift 2)

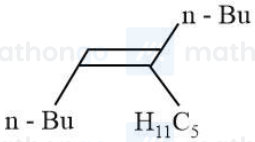
What will be the major product of following sequence of reactions?



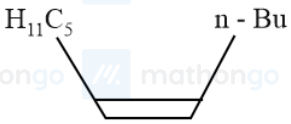
(1)



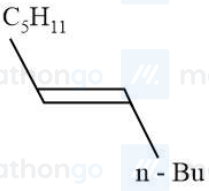
(2)



(3)



(4)

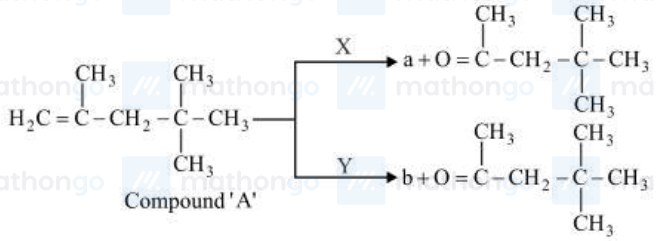


Q401. JEE Main 2022 (25 Jul Shift 2)

The total number of monobromo derivatives formed by the alkanes with molecular formula C_5H_{12} is (excluding stereo isomers)

Q402. JEE Main 2022 (25 Jul Shift 1)

A compound 'A' on reaction with 'X' and 'Y produces the same major product but different by product 'a' and 'b'. Oxidation of 'a' gives a substance produced by ants.



'X' and 'Y' respectively are

(1) $KMnO_4$ /$H^+$and dil. $KMnO_4$, 273 K

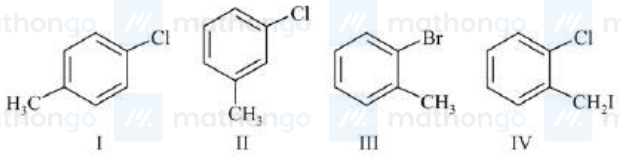
(2) $KMnO_4$,(dilute), 273 K and $KMnO_4$ /H^+

(3) $KMnO_4$ /H^+ and O_3, H_2O/ Zn

(4) O_3, H_2O/ Zn and $KMnO_4$ /H^+

Q403. JEE Main 2021 (26 Aug Shift 1)

Among the following compounds I – IV, which one forms a yellow precipitate on reacting sequentially with (i) NaOH (ii) dil. HNO_3 (iii) $AgNO_3$?



(1) III

(2) II

(3) I

(4) IV

Q404. JEE Main 2021 (25 Feb Shift 1)

Consider the following chemical reaction.

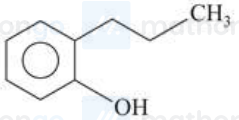
$CH \equiv CH \xrightarrow[2)\ CO,HCl,AlCl_3]{1)\ Red\ hot\ Fe\ tube,\ 873\ K} >$ Product

The number of sp^2 hybridized carbon atom(s) present in the product is

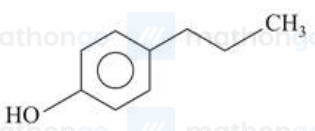
Q405. JEE Main 2021 (24 Feb Shift 1)

Which of the following compound gives pink colour on reaction with phthalic anhydride in conc. H_2SO_4 followed by treatment with NaOH?

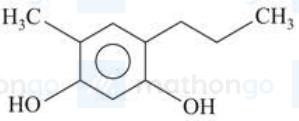
(1)



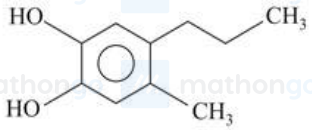
(2)



(3)



(4)



Q406. JEE Main 2021 (01 Sep Shift 2)

In the following sequence of reactions, $C_3H_6 \xrightarrow{H^+/H_2O} A \xrightarrow[\text{dilKOH}]{KIO} B + C$. The compounds B and C respectively are :

(1) CI_3COOK, CH_3I

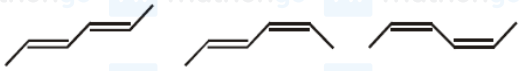
(2) CH_3I, $HCOOK$

(3) CI_3COOK, $HCOOH$

(4) CHI_3, CH_3COOK

Q407. JEE Main 2020 (09 Jan Shift 1)

The correct order of heat of combustion for following alkadienes is:



(a) (b) (c)

(1) (a) < (b) < (c)

(2) (a) < (c) < (b)

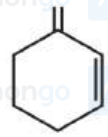
(3) (c) < (b) < (a)

(4) (b) < (c) < (a)

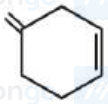
Q408. JEE Main 2020 (08 Jan Shift 2)

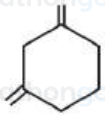
An unsaturated hydrocarbon X absorbs two hydrogen molecules on catalytic hydrogenation, and also gives following reaction:

$X \xrightarrow[\substack{(ii)\,Zn\\H_2O}]{(i)O_3} A \xrightarrow{[Ag(NH_3)_2]^+} B$ (3-oxo-hexanedicarboxylic acid) X will be:

(1) 

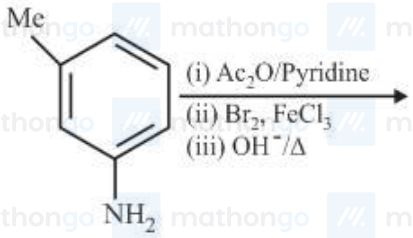
(2) 

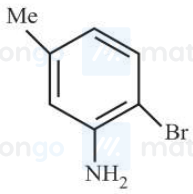
(3) 

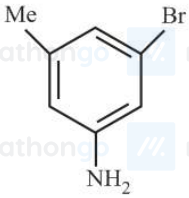
(4) 

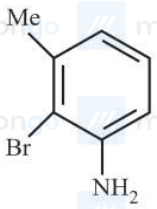
Q409. JEE Main 2020 (05 Sep Shift 2)

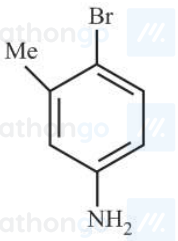
The final major product of the following reaction is :



(1) 

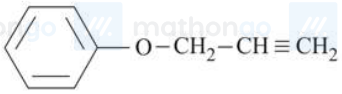
(2) 

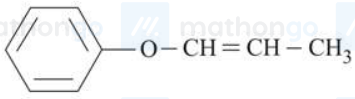
(3) 

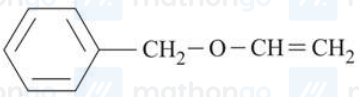
(4) 

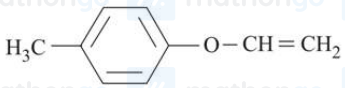
Q410. JEE Main 2020 (02 Sep Shift 2)

An organic compound 'A' $(C_9H_{10}O)$ when treated with conc. HI undergoes cleavage to yield compound 'B' and 'C'. 'B' gives yellow precipitate with $AgNO_3$ where as 'C' tautomerizes to 'D'. 'D' gives positive iodoform test. 'A' could be:

(1) 

(2) 

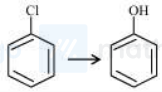
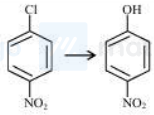
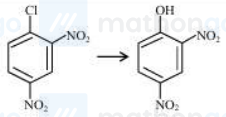
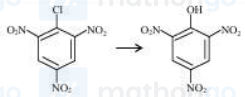
(3) 

(4) 

Chapter: Haloalkanes and Haloarenes

Q411. JEE Main 2025 (7 April Shift 2)

Match List-I with List-II

List-I Conversion		List-II Reagents, Conditions used	
(A)		(I)	Warm, H_2O
(B)		(II)	(a) NaOH, 368 K ; (b) H_3O^+
(C)		(III)	(a) NaOH, 443 K; (b) H_3O^+
(D)		(IV)	(a) NaOH, 623 K, 300 atm ; (b) H_3O^+

Choose the correct answer from the options given below :

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

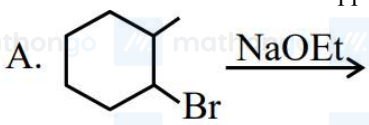
(2) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

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

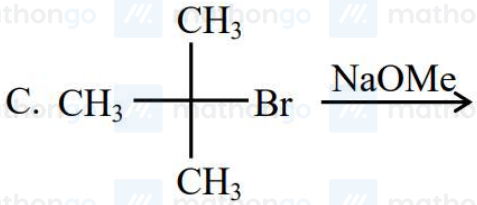
(4) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

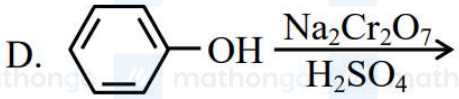
Q412. JEE Main 2025 (7 April Shift 1)

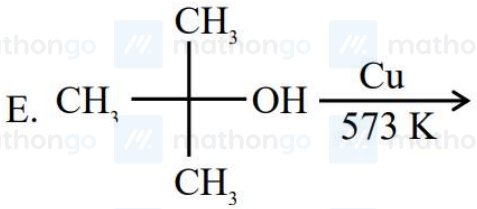
The reactions which cannot be applied to prepare an alkene by elimination, are

A. 

B. $CH_3-CH_2-\underset{\underset{Br}{|}}{CH}-CH_3 \xrightarrow{KOH\ (aq.)}$

C. 

D. 

E. 

Choose the ***correct*** answer from the option given below :

(1) B & E Only

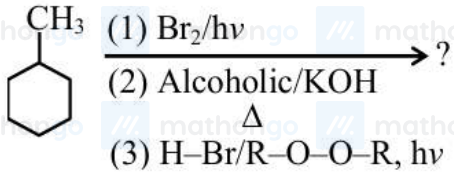
(2) B, C & D Only

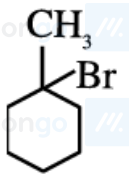
(3) A, C & D Only

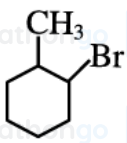
(4) B & D Only

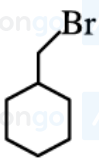
Q413. JEE Main 2025 (4 April Shift 1)

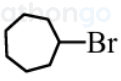
Predict the major product of the following reaction sequence :-



(1) 

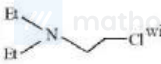
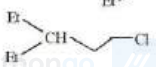
(2) 

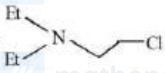
(3) 

(4) 

Q414. JEE Main 2025 (28 Jan Shift 1)

Given below are two statements:

Statement I:  will undergo alkaline hydrolysis at a faster rate than 

Statement II: In  , intramolecular substitution takes place first by involving lone pair of electrons on nitrogen.

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

(1) Statement I is incorrect but Statement II is correct

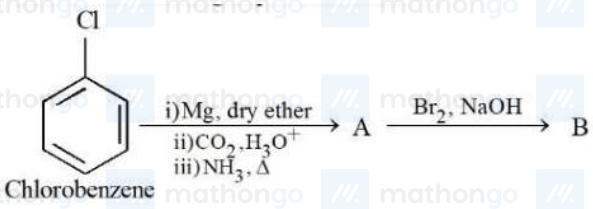
(2) Statement I is correct but Statement II is incorrect

(3) Both Statement I and Statement II are correct

(4) Both Statement I and Statement II are incorrect

Q415. JEE Main 2025 (28 Jan Shift 1)

Consider the following sequence of reactions:



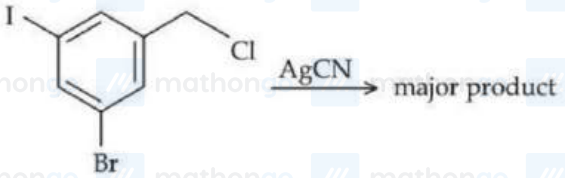
11.25 mg of chlorobenzene will produce _____ $\times 10^{-1}$mg of product B.

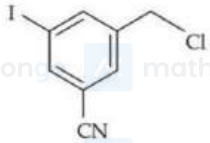
(Consider the reactions result in complete conversion.)

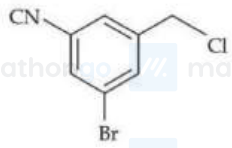
[Given molar mass of C, H, O, N and Cl as 12, 1, 16, 14 and 35.5 g mol^{-1} respectively]

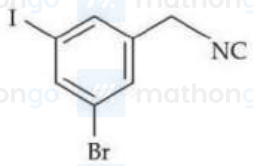
Q416. JEE Main 2025 (24 Jan Shift 2)

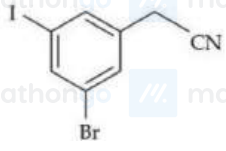
The structure of the major product formed in the following reaction is :



(1) 

(2) 

(3) 

(4) 

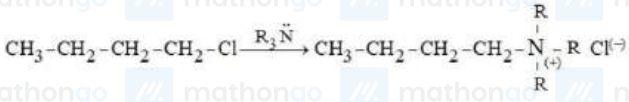
Q417. JEE Main 2025 (24 Jan Shift 1)

Given below are two statements:

Statement I: The conversion proceeds well in the less polar medium.

$CH_3 - CH_2 - CH_2 - CH_2 - Cl \xrightarrow{HO^-} CH_3 - CH_2 - CH_2 - CH_2 - OH + Cl^{(-)}$

Statement II: The conversion proceeds well in the more polar medium.



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

(1) Both Statement I and Statement II are true

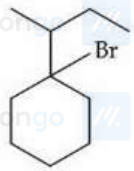
(2) Statement I is true but Statement II is false

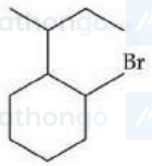
(3) Statement I is false but Statement II is true

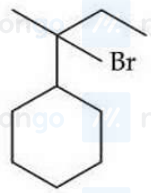
(4) Both Statement I and Statement II are false

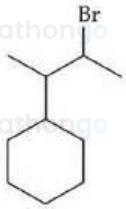
Q418. JEE Main 2025 (22 Jan Shift 2)

When sec-butylcyclohexane reacts with bromine in the presence of sunlight, the major product is :

(1) 

(2) 

(3) 

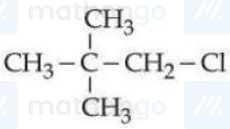
(4) 

Q419. JEE Main 2025 (22 Jan Shift 1)

Given below are two statements :

Statement I : $CH_3 - O - CH_2 - Cl$ will undergo S_N1 reaction though it is a primary halide.

Statement II :



will not undergo S_N2 reaction very easily though it is a primary halide.

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 incorrect

(2) Both Statement I and Statement II are correct

(3) Statement I is incorrect but Statement II is correct

(4) Statement I is correct but Statement II is incorrect

Q420. JEE Main 2024 (30 Jan Shift 2)

Given below are two statements:

Statement - I: High concentration of strong nucleophilic reagent with secondary alkyl halides which do not have bulky substituents will follow S_N2 mechanism.

Statement - II: A secondary alkyl halide when treated with a large excess of ethanol follows S_N1 mechanism.

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

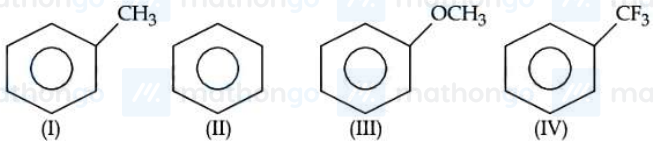
(1) Statement I is true but Statement II is false.

(2) Statement I is false but Statement II is true.

(3) Both statement I and Statement II are false.

(4) Both statement I and Statement II are true.

Q421. JEE Main 2024 (06 Apr Shift 2)



The correct arrangement for decreasing order of electrophilic substitution for above compounds is

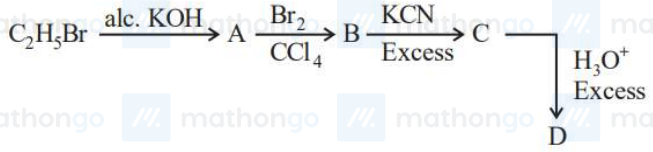
(1) (III) > (I) > (II) > (IV)

(2) (IV) > (I) > (II) > (III)

(3) (III) > (IV) > (II) > (I)

(4) (II) > (IV) > (III) > (I)

Q422. JEE Main 2024 (01 Feb Shift 2)



Acid D formed in above reaction is:

(1) Gluconic acid

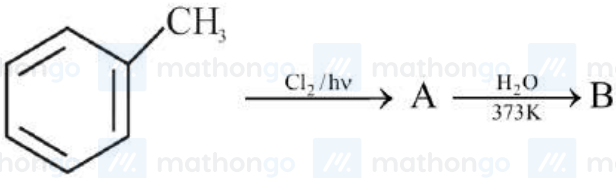
(2) Succinic acid

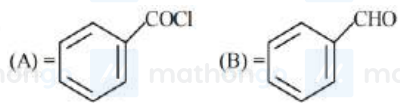
(3) Oxalic acid

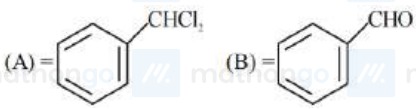
(4) Malonic acid

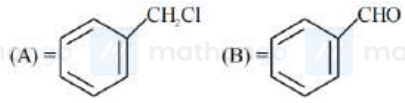
Q423. JEE Main 2024 (01 Feb Shift 1)

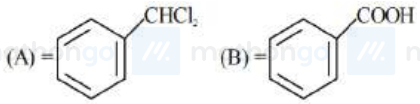
Identify A and B in the following sequence of reaction



(1) 

(2) 

(3) 

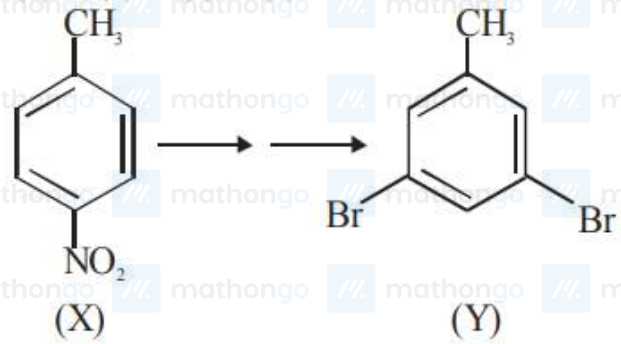
(4) 

Q424. JEE Main 2023 (31 Jan Shift 2)

In the following halogenated organic compounds the one with maximum number of chlorine atoms in its structure is:

(1) Chloral
(2) Gammaxene
(3) Chloropicrin
(4) Freon-12

Q425. JEE Main 2023 (30 Jan Shift 2)



In the above conversion of compound (X) to product (Y), the sequence of reagents to be used will be:

(1) (i) Br_2, Fe
(ii) Fe, H^+
(iii) $LiAlH_4$

(2) (i) $Br_2(aq)$
(ii) $LiAlH_4$
(iii) H_3O^+

(3) (i) Fe, H^+
(ii) $Br_2(aq)$
(iii) HNO_2
(iv) CuBr

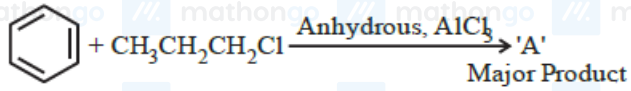
(4) (i) Fe, H^+
(ii) $Br_2(aq)$
(iii) HNO_2
(iv) H_3PO_2

Q426. JEE Main 2023 (13 Apr Shift 1)

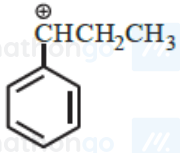
2−Methyl propyl bromide reacts with $C_2H_5O^-$ and gives 'A' whereas on reaction with C_2H_5OH it gives 'B'. The mechanism followed in these reactions and the products 'A' and 'B' respectively are:

(1) S_N2, A =iso-butyl ethyl ether; S_N1, B =tert-butyl ethyl ether
(2) S_N1, A =tert-butyl ethyl ether; S_N1, B = 2−butyl ethyl ether
(3) S_N2, A = 2−butyl ethyl ether; S_N2, B =iso-butyl ethyl ether
(4) S_N1, A =tert-butyl ethyl ether; S_N2, B =iso-butyl ethyl ether

Q427. JEE Main 2022 (29 Jun Shift 2)



The stable carbocation formed in the above reaction is :

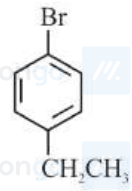
(1) $CH_3CH_2\overset{+}{C}H_2$
(2) $CH_3\overset{\oplus}{C}HCH_2$
(3) $CH_3-\overset{\oplus}{C}H-CH_3$
(4) 

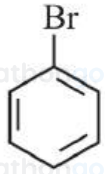
Q428. JEE Main 2022 (28 Jun Shift 2)

Consider the following reaction,

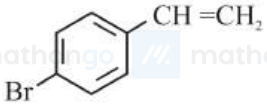
$$A \xrightarrow[2.\ CN^-]{1.\ Cl_2/hv} 4-\text{bromophenylacetic acid}$$
$$3.\ H_2O/H^+/\Delta$$

What is A in the above reaction?

(1) 

(2) 

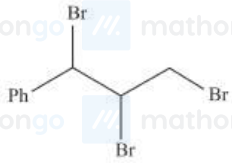
(3) 

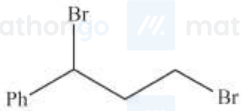
(4) 

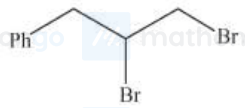
Q429. JEE Main 2022 (28 Jun Shift 1)

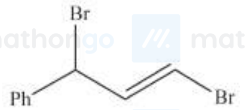
The major product (P) in the reaction

 ? (P) [Ph is - C_6H_5]

(1) 

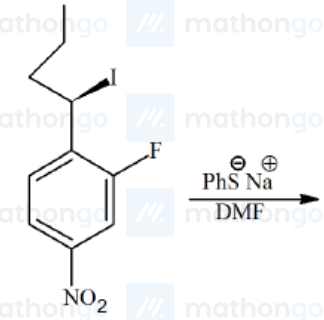
(2) 

(3) 

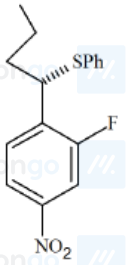
(4) 

Q430. JEE Main 2022 (27 Jun Shift 1)

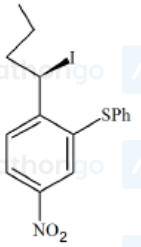
The major product of the following reaction is



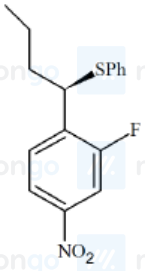
(1)



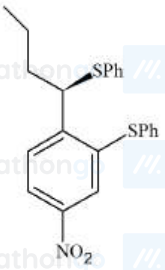
(2)



(3)

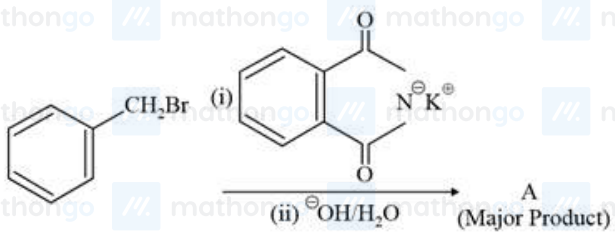


(4)

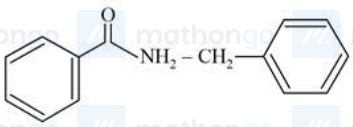


Q431. JEE Main 2021 (27 Jul Shift 2)

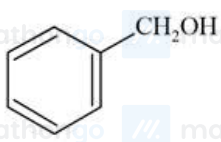
What is A in the following reaction?



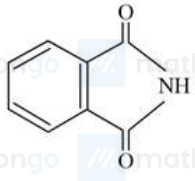
(1)



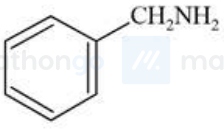
(2)



(3)

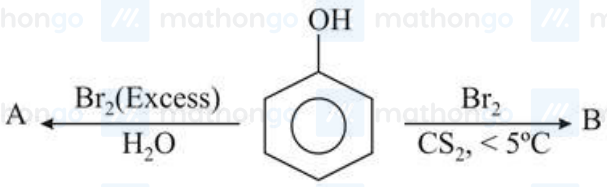


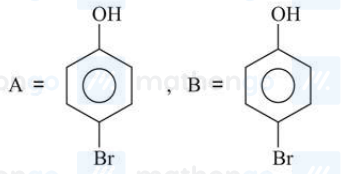
(4)



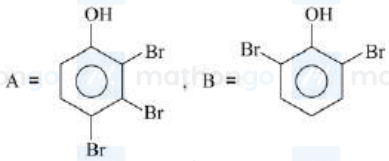
Q432. JEE Main 2021 (26 Aug Shift 1)

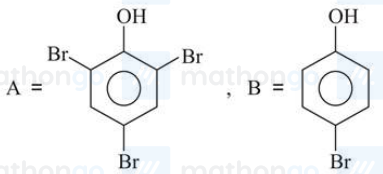
The correct options for the products A and B of the following reactions are:



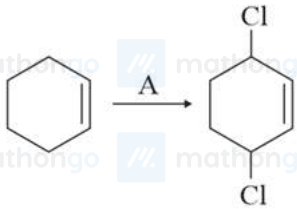
(1) 

(2) 

(3) 

(4) 

Q433. JEE Main 2021 (16 Mar Shift 2)



Identify the reagent(s) 'A' and condition(s) for the reaction :

(1) A = HCl; Anhydrous $AlCl_3$

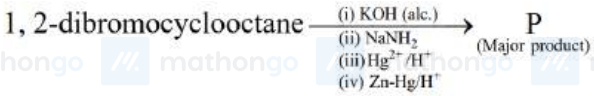
(2) A = HCl, $ZnCl_2$

(3) A = Cl_2; UV light

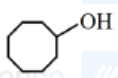
(4) A = Cl_2; dark, Anhydrous $AlCl_3$

Chapter: Alcohols Phenols and Ethers

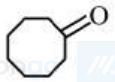
Q434. JEE Main 2025 (8 April Shift 2)



'P' is

(1) 

(2) 

(3) 

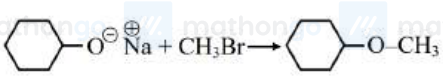
(4) 

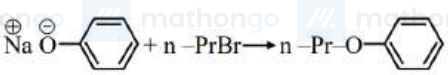
Q435. JEE Main 2025 (8 April Shift 2)

Which one of the following reactions will not lead to the desired ether formation in major proportion?

(iso-Bu ⇒ isobutyl, sec-Bu ⇒ sec-butyl, nPr ⇒ n-propyl, ^{t}Bu ⇒ tert-butyl, Et ⇒ ethyl)

(1) $^t\text{BuO}^{\ominus}\,\text{Na}^{\oplus} + \text{EtBr} \longrightarrow {}^t\text{Bu–O–Et}$

(2) 

(3) 

(4) $\text{iso-BuO}^{\ominus}\,\text{Na}^{\oplus} + \text{sec} - \text{BuBr} \longrightarrow \text{Sec–Bu–O–iso–Bu}$

Q436. JEE Main 2025 (4 April Shift 2)

A toxic compound " A " when reacted with NaCN in aqueous acidic medium yields an edible cooking component and food preservative ' B '. " B " is converted to "C" by diborane and can be used as an additive to petrol to reduce emission. "C" upon reaction with oleum at 140°C yields an inhalable anesthetic "D". Identify "A", "B", "C" and "D", respectively.

(1) Methanol; formaldehyde; methyl chloride; chloroform

(2) Ethanol; acetonitrile; ethylamine; ethylene

(3) Methanol; acetic acid; ethanol; diethyl ether

(4) Acetaldehyde;2- hydroxypropanoic acid; propanoic acid; dipropyl ether

Q437. JEE Main 2025 (4 April Shift 1)

An organic compound (X) with molecular formula $\text{C}_3\text{H}_6\text{O}$ is not readily oxidised. On reduction it gives $\text{C}_3\text{H}_8\text{O}(\text{Y})$ which reacts with HBr to give a bromide (Z) which is converted to Grignard reagent. This Grignard reagent on reaction with (X) followed by hydrolysis give 2,3-dimethylbutan-2-ol. Compounds $(\text{X}), (\text{Y})$ and (Z) respectively are :

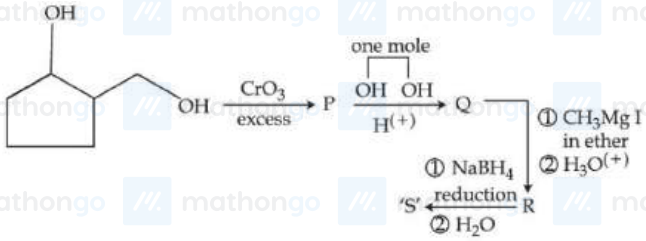
(1) $\text{CH}_3\text{COCH}_3, \text{CH}_3\text{CH}_2\text{CH}_2\text{OH}, \text{CH}_3\text{CH(Br)CH}_3$

(2) $\text{CH}_3\text{COCH}_3, \text{CH}_3\text{CH(OH)CH}_3, \text{CH}_3\text{CH(Br)CH}_3$

(3) $\text{CH}_3\text{CH}_2\text{CHO}, \text{CH}_3\text{CH}_2\text{CH}_2\text{OH}, \text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$

(4) $\text{CH}_3\text{CH}_2\text{CHO}, \text{CH}_3\text{CH} = \text{CH}_2, \text{CH}_3\text{CH(Br)CH}_3$

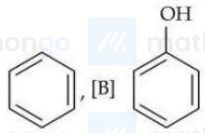
Q438. JEE Main 2025 (29 Jan Shift 1)

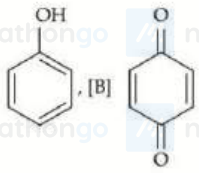


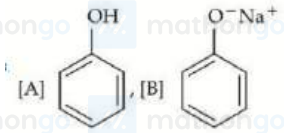
0.1 mole of compound ' S ' will weigh _____ g. (Given molar mass in gmol^{-1} $\text{C}: 12, \text{H}: 1, \text{O}: 16$)

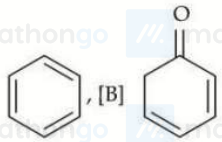
Q439. JEE Main 2025 (23 Jan Shift 2)

Identify the products $[A]$ and $[B]$, respectively in the following reaction :

(1) 

(2) 

(3) 

(4) 

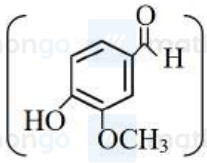
Q440. JEE Main 2025 (23 Jan Shift 1)

What amount of bromine will be required to convert 2 g of phenol into 2,4,6-tribromophenol? (Given molar mass in $gmol^{-1}$ of C, H, O, Br are 12, 1, 16, 80 respectively)

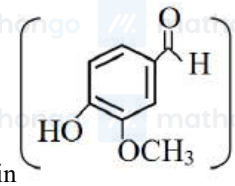
(1) 20.44 g
(2) 4.0 g
(3) 6.0 g
(4) 10.22

Q441. JEE Main 2025 (2 April Shift 1)

Given below are two statements :

Statement (I) : Vanillin 

will react with NaOH and also with Tollen's reagent.

Statement (II) : Vanillin 

will undergo self aldol condensation very easily.

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

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

Q442. JEE Main 2024 (31 Jan Shift 1)

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

Assertion A: pK_a value of phenol is 10.0 while that of ethanol is 15.9.

Reason R: Ethanol is stronger acid than phenol.

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

(1) A is true but R is false

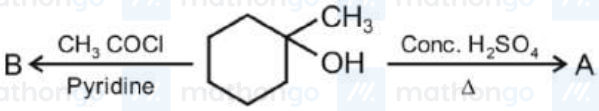
(2) A is false but R is true

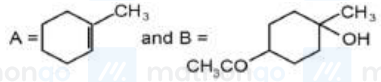
(3) Both A and R are true and R is the correct explanation of A

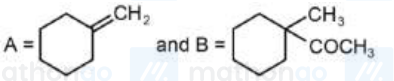
(4) Both A and R are true but R is NOT the correct explanation of A.

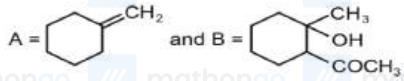
Q443. JEE Main 2024 (08 Apr Shift 1)

Identify the major products A and B respectively in the following set of reactions.



(1) 

(2) 

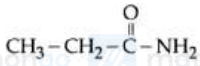
(3) 

(4) 

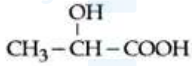
Q444. JEE Main 2024 (06 Apr Shift 2)

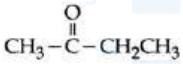
Consider the given reaction, identify the major product P.

$$CH_3 - COOH \xrightarrow[(iv)\ H_2O/\overline{OH},\Delta]{(i)\ LiAlH_4\ (ii)\ PCC\ (iii)\ HCN/\overline{OH}} \text{"P"}$$

(1) 

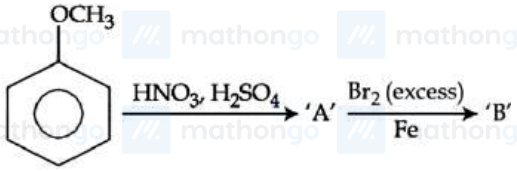
(2) $CH_3 - CH_2 - CH_2 - OH$

(3) 

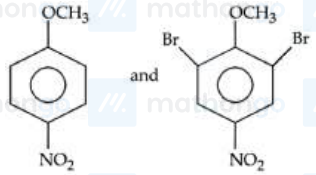
(4) 

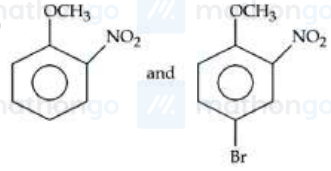
Q445. JEE Main 2024 (06 Apr Shift 2)

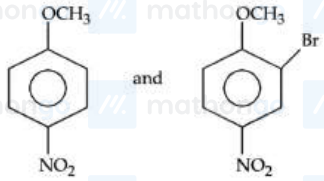
The major products formed :

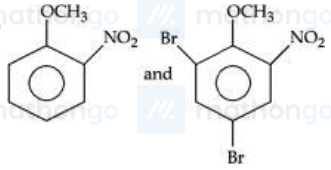


A and B respectively are:

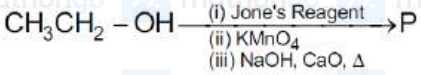
(1) 

(2) 

(3) 

(4) 

Q446. JEE Main 2024 (05 Apr Shift 2)

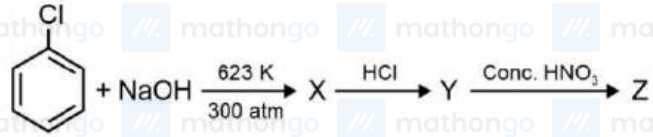


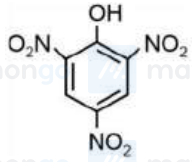
Consider the above reaction sequence and identify the major product P.

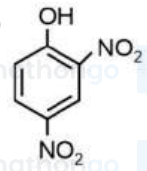
(1) Methoxymethane
(2) Methanoic acid
(3) Methanal
(4) Methane

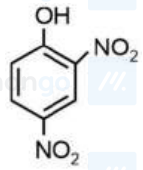
Q447. JEE Main 2024 (05 Apr Shift 1)

Identify compound (Z) in the following reaction sequence.



(1) 

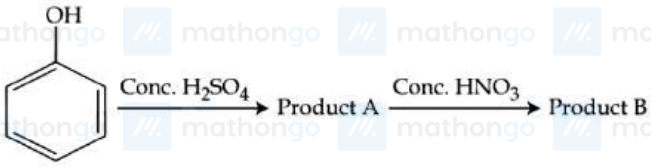
(2) 

(3) 

(4) 

Q448. JEE Main 2024 (05 Apr Shift 1)

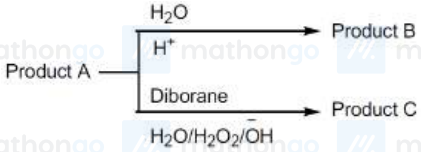
Consider the given chemical reaction sequence :



Total sum of oxygen atoms in Product A and Product B are _____

Q449. JEE Main 2024 (04 Apr Shift 2)

$CH_3 - CH_2 - CH_2 - Br + NaOH \xrightarrow{C_2H_5OH}$ Product 'A'



Consider the above reactions, identify product B and product C.

(1) B = 1-Propanol C = 2-Propanol

(2) B = C = 2-Propanol

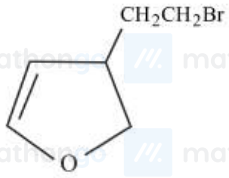
(3) B = 2-Propanol C = 1-Propanol

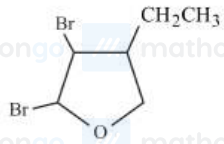
(4) B = C = 1-Propanol

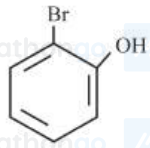
Q450. JEE Main 2023 (31 Jan Shift 1)

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) 

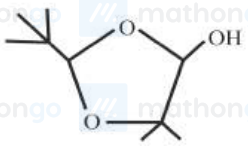
(2) 

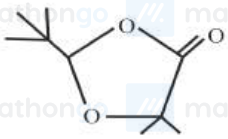
(3) 

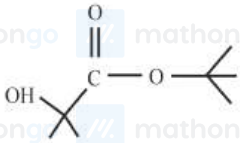
(4) 

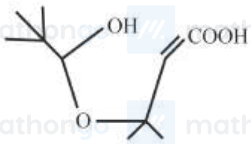
Q451. JEE Main 2023 (25 Jan Shift 2)

' A ' in the given reaction is

(1) 

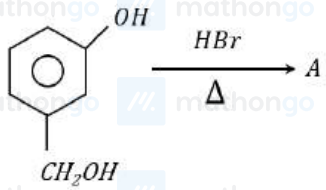
(2) 

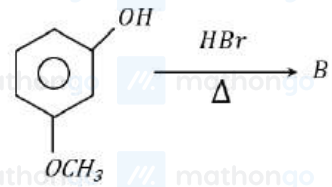
(3) 

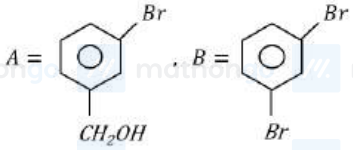
(4) 

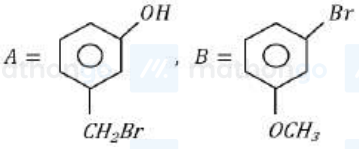
Q452. JEE Main 2023 (24 Jan Shift 1)

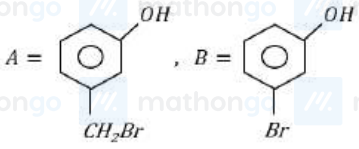
A' and 'B' formed in the following set of reactions are:

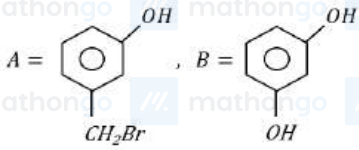




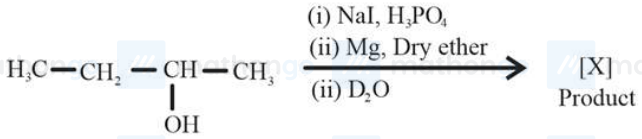
(1) 

(2) 

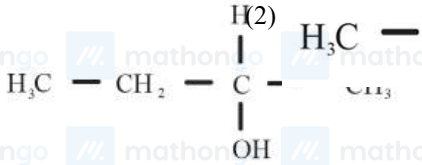
(3) 

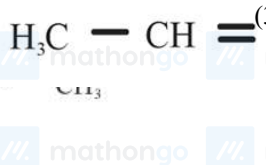
(4) 

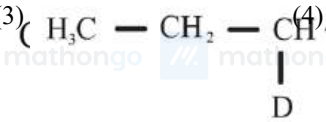
Q453. JEE Main 2023 (11 Apr Shift 2)

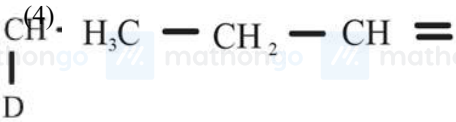


Product [X] formed in the above reaction is:

(1) 

(2) 

(3) 

(4) 

Q454. JEE Main 2023 (08 Apr Shift 2)

A compound 'X' when treated with phthalic anhydride in presence of concentrated H_2SO_4 yields 'Y'. 'Y' is used as an acid/base indicator. 'X' and 'Y' are respectively

(1) Anisole, methyl orange

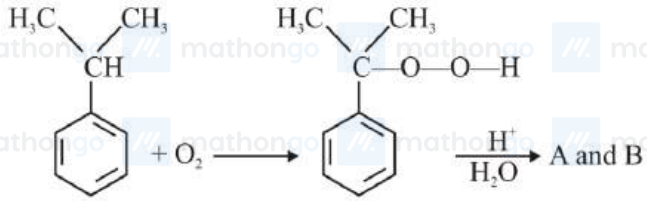
(2) Salicylaldehyde, Phenolphthalein

(3) Toluidine, Phenolphthalein

(4) Carbolic acid, Phenolphthalein

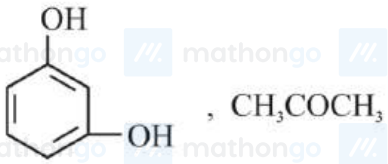
Q455. JEE Main 2022 (25 Jun Shift 1)

In the following reaction :

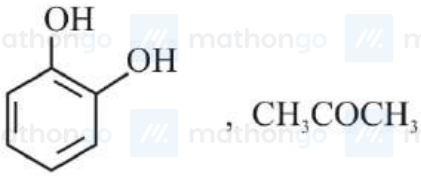


The compounds A and B respectively are

(1) 

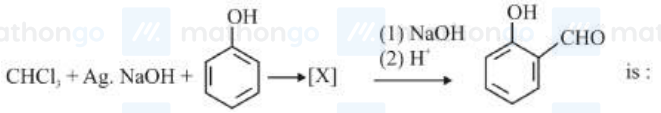
(2) 

(3) 

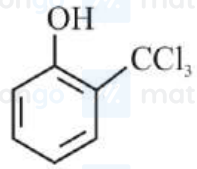
(4) 

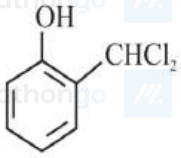
Q456. JEE Main 2022 (25 Jun Shift 1)

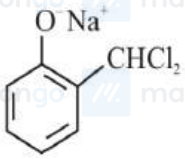
The intermediate X, in the reaction

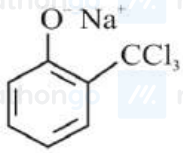


is :

(1) 

(2) 

(3) 

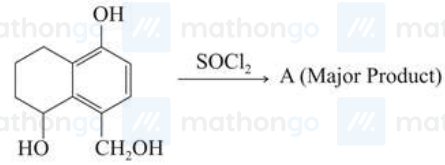
(4) 

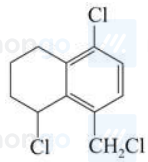
Q457. JEE Main 2022 (25 Jul Shift 2)

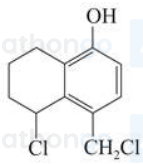
A sample of 4.5 mg of an unknown monohydric alcohol, $R-OH$ was added to methylmagnesium iodide. A gas is evolved and is collected and its volume measured to be 3.1 mL. The molecular weight of the unknown alcohol is g/ mol.

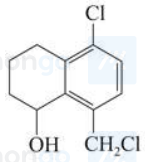
Q458. JEE Main 2021 (26 Feb Shift 2)

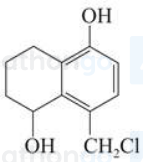
Identify A in the given reaction.



(1) 

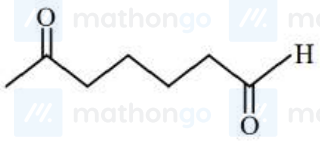
(2) 

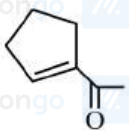
(3) 

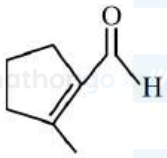
(4) 

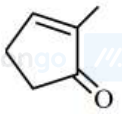
Chapter: Aldehydes and Ketones

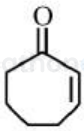
Q459. JEE Main 2025 (8 April Shift 2)

When  undergoes intramolecular aldol condensation, the major product formed is :

(1) 

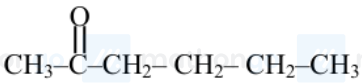
(2) 

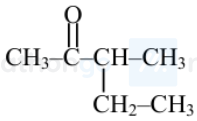
(3) 

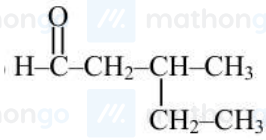
(4) 

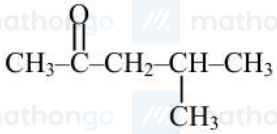
Q460. JEE Main 2025 (7 April Shift 2)

"P" is an optically active compound with molecular formula $C_6H_{12}O$. When " P " is treated with 2,4-dinitrophenylhydrazine, it gives a positive test. However, in presence of Tollens reagent, "P" gives a negative test. Predict the structure of "P".

(1) 

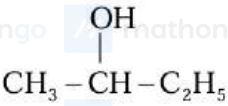
(2) 

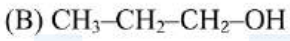
(3) 

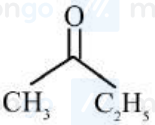
(4) 

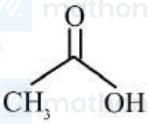
Q461. JEE Main 2025 (4 April Shift 2)

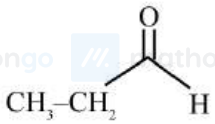
Which among the following compounds give yellow solid when reacted with NaOI/NaOH ?

(A) 

(B) 

(C) 

(D) 

(E) 

Choose the correct answer from the options given below :

(1) (B), (C) and (E) Only

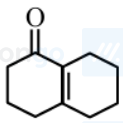
(2) (A) and (C) Only

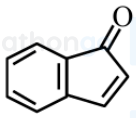
(3) (C) and (D) Only

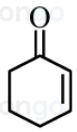
(4) (A), (C) and (D) Only

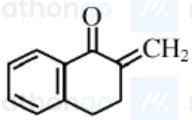
Q462. JEE Main 2025 (4 April Shift 1)

Aldol condensation is a popular and classical method to prepare α, β-unsaturated carbonyl compounds. This reaction can be both intermolecular and intramolecular. Predict which one of the following is not a product of intramolecular aldol condensation?

(1) 

(2) 

(3) 

(4) 

Q463. JEE Main 2025 (3 April Shift 1)

Number of molecules from below which cannot give ioddoform reaction is :

Ethanol, Isopropyl alcohol, Bromoacetone, 2-Butanol, 2-Butanone, Butanal, 2-Pentanone, 3-Pentanone, Pentanal and 3-Pentanol

(1) 5 (2) 4 (3) 3 (4) 2

Q464. JEE Main 2025 (28 Jan Shift 1)

Both acetaldehyde and acetone (individually) undergo which of the following reactions?

A. Iodoform Reaction

B. Cannizaro Reaction

C. Aldol Condensation

D. Tollen's Test

E. Clemmensen Reduction

Choose the correct answer from the options given below:

(1) A, B and D Only

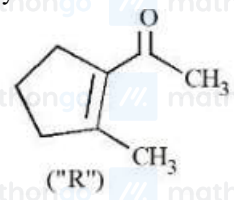
(2) *C* and E Only

(3) A, C and E Only

(4) B, C and D Only

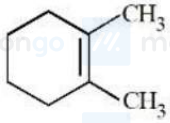
Q465. JEE Main 2025 (28 Jan Shift 1)

A molecule (" P ") on treatment with acid undergoes rearrangement and gives ("Q"). ("Q") on ozonolysis followed by reflux under alkaline condition gives (" R "). The structure of (" R ") is given below.

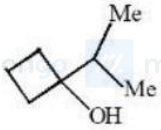


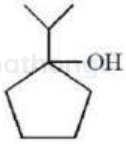
("R")

The structure of (" $\mathbf{P}''$) is

(1) 

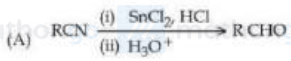
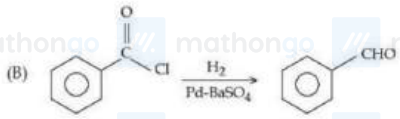
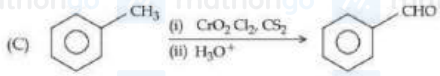
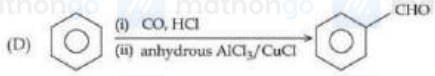
(2) 

(3) 

(4) 

Q466. JEE Main 2025 (24 Jan Shift 2)

Match **List - I** with **List - II**.

List - I	List - II
(A) 	(I) Etard reaction
(B) 	(II) Gatterman-Koch reaction
(C) 	(III) Rosenmund reduction
(D) 	(IV) Stephen reaction

Choose the correct answer from the options given below :

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

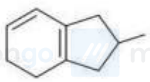
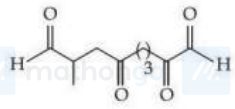
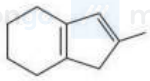
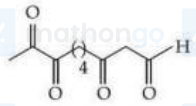
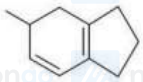
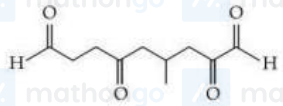
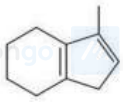
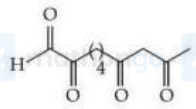
(2) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

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

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

Q467. JEE Main 2025 (23 Jan Shift 2)

Match **List - I** with **List - II**.

List - I (Isomers of $C_{10}H_{14}$)	List - II (Ozonolysis product)
(A) 	(I) 
(B) 	(II) 
(C) 	(III) 
(D) 	(IV) 

Choose the correct answer from the options given below :

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

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

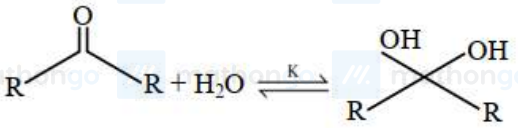
(3) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

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

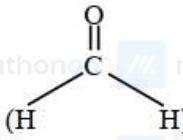
Q468. JEE Main 2025 (23 Jan Shift 2)

Given below are two statements :

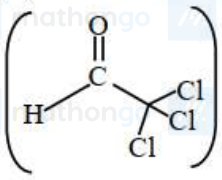
Consider the following reaction



Statement (I) : In the case of formaldehyde



(H H), K is about 2280, due to small substituents, hydration is faster.

Statement (II) : In the case of trichloro acetaldehyde  , K is about 2000 due to – I effect of – Cl.

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

(1) Both Statement I and Statement II are false

(2) Statement I is true but Statement II is false

(3) Statement I is false but Statement II is true

(4) Both Statement I and Statement II are true

Q469. JEE Main 2025 (2 April Shift 1)

An optically active alkyl halide C_4H_9Br [A] reacts with hot KOH dissolved in ethanol and forms alkene [B] as major product which reacts with bromine to give dibromide [C]. The compound [C] is converted into a gas [D] upon reacting with alcoholic $NaNH_2$. During hydration 18 gram of water is added to 1 mole of gas [D] on warming with mercuric sulphate and dilute acid at 333 K to form compound [E]. The IUPAC name of compound [E] is :

(1) But-2-yne

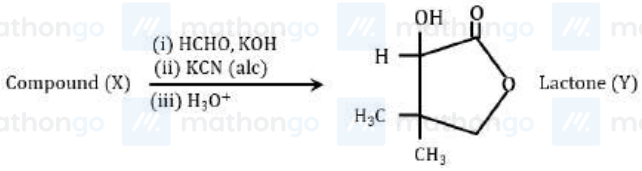
(2) Butan-2-ol

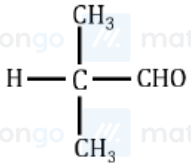
(3) Butan-2-one

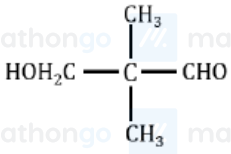
(4) Butan-1-al

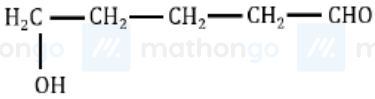
Q470. JEE Main 2023 (24 Jan Shift 1)

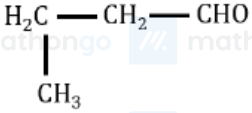
Compound (X) undergoes following sequence of reactions to give the Lactone (Y).



(1) 

(2) 

(3) 

(4) 

Q471. JEE Main 2023 (13 Apr Shift 1)

$$\text{D}-(+)-\text{Glyceraldehyde} \xrightarrow[\text{ii)}\,H_2O/H^+ \\ \text{iii)}\,HNO_3]{\text{i) HCN}}$$

The products formed in the above reaction are

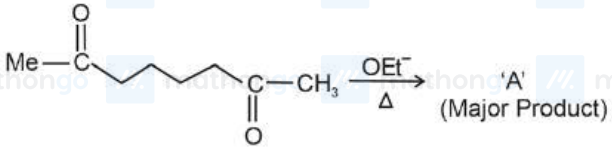
(1) One optically active and one meso product

(2) Two optically inactive products

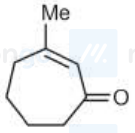
(3) Two optically active products

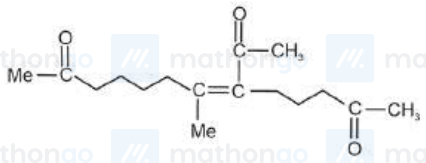
(4) One optically inactive and one meso product

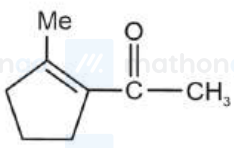
Q472. JEE Main 2023 (12 Apr Shift 1)

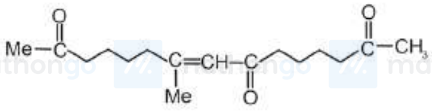


A in the above reaction is :

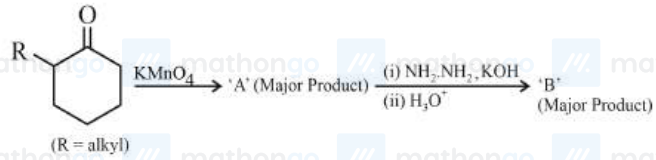
(1) 

(2) 

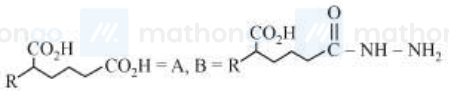
(3) 

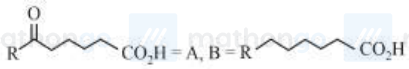
(4) 

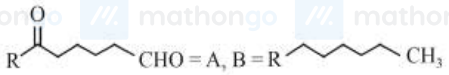
Q473. JEE Main 2023 (11 Apr Shift 1)

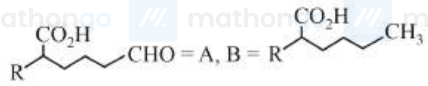


'A' and 'B' in the above reactions are:

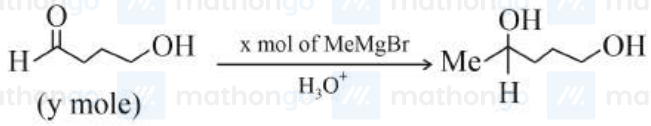
(1) 

(2) 

(3) 

(4) 

Q474. JEE Main 2023 (11 Apr Shift 1)



The ratio x/y on completion of the above reaction is _____.

Q475. JEE Main 2022 (27 Jun Shift 1)

'A' and 'B' respectively are

A. $\xrightarrow[(2)Zn-H_2O]{(1)O_3}$ Ethane-1, 2-dicarbaldehyde + Glyoxal/Oxaldehyde

B $\xrightarrow[(2)Zn-H_2O]{(1)O_3}$ 5- -oxohexanal

(1) 1-methylcyclohex-1, 3-diene & cyclopentene.

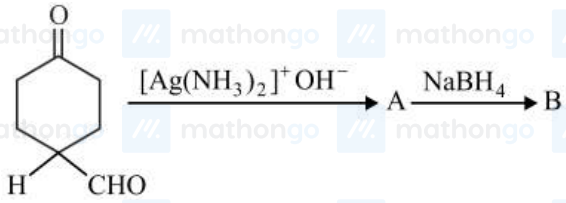
(2) Cyclohex-1, 3-diene & cyclopentene

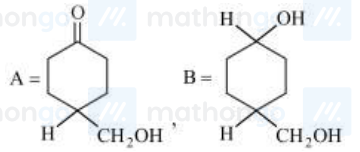
(3) Cyclohex-1, 3-diene & 1-methylcyclopent-1-ene

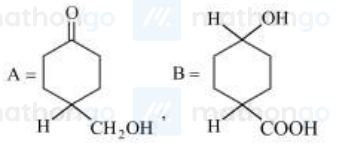
(4) 1-methylcyclohex- 1, 4-diene & 1-methylcyclopent-1-ene

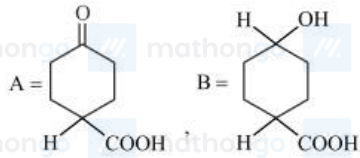
Q476. JEE Main 2022 (26 Jul Shift 1)

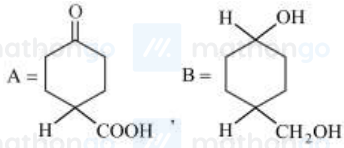
The products formed in the following reaction, A and B are



(1) 

(2) 

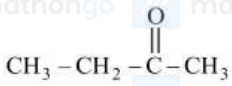
(3) 

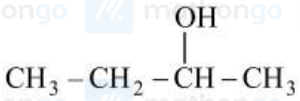
(4) 

Q477. JEE Main 2022 (25 Jul Shift 2)

$CH_3 - CH_2 - CN \xrightarrow[\text{Ether}]{CH_3MgBr} A \xrightarrow{H_3O^+} B \xrightarrow[HCl]{Zn-Hg} C$. The correct structure of C is

(1) $CH_3 - CH_2 - CH_2 - CH_3$

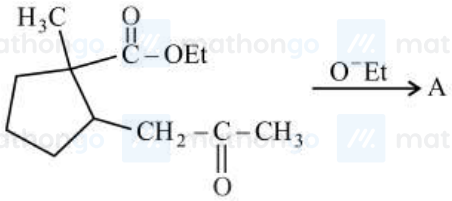
(2) 

(3) 

(4) $CH_3 - CH_2 - CH = CH_2$

Q478. JEE Main 2022 (25 Jul Shift 1)

In the given reaction

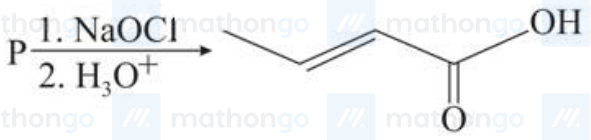


(Where Et is $-C_2H_5$)

The number of chiral carbon/s in product A is

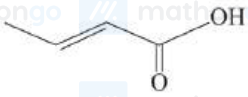
Q479. JEE Main 2021 (27 Aug Shift 1)

The structure of the starting compound P used in the reaction given below is:



(1) 

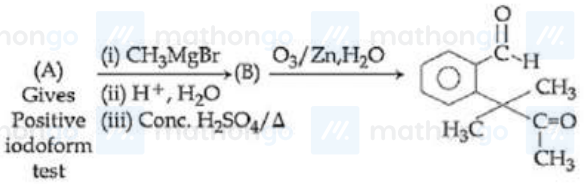
(2) 

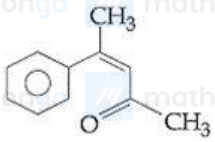
(3) 

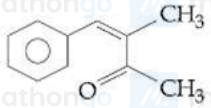
(4) 

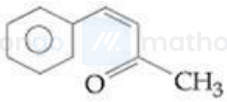
Q480. JEE Main 2020 (09 Jan Shift 1)

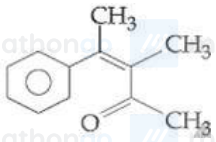
Identify (A) in the following reaction sequence:



(1) 

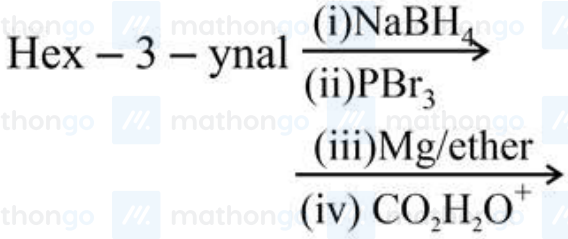
(2) 

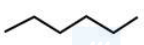
(3) 

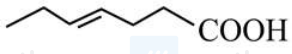
(4) 

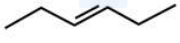
Q481. JEE Main 2020 (07 Jan Shift 1)

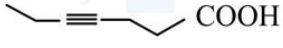
What is the product of following reaction?



(1) 

(2) 

(3) 

(4) 

Chapter: Carboxylic Acid Derivatives

Q482. JEE Main 2025 (7 April Shift 2)

Mixture of 1 g each of chlorobenzene, aniline and benzoic acid is dissolved in 50 mL ethyl acetate and placed in a separating funnel, 5 M NaOH (30 mL) was added in the same funnel. The funnel was shaken vigorously and then kept aside. The ethyl acetate layer in the funnel contains :

(1) benzoic acid

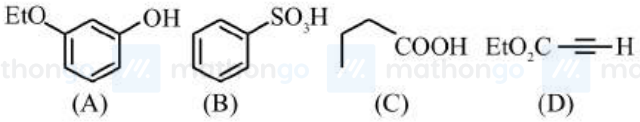
(2) benzoic acid and aniline

(3) benzoic acid and chlorobenzene

(4) chlorobenzene and aniline

Q483. JEE Main 2025 (3 April Shift 1)

The least acidic compund, among the following is :



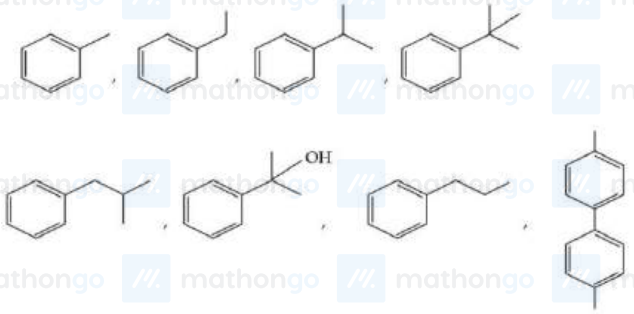
(A) (B) (C) (D)

(1) D (2) A

(3) B (4) C

Q484. JEE Main 2025 (28 Jan Shift 2)

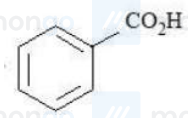
The total number of compounds from below when treated with hot $KMnO_4$ giving benzoic acid is :

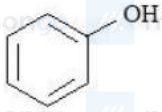


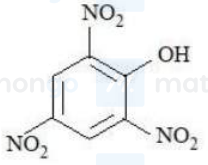
(1) 6 (2) 3 (3) 5 (4) 4

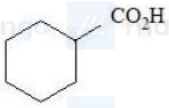
Q485. JEE Main 2025 (28 Jan Shift 1)

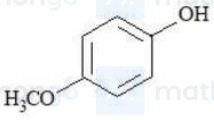
The compounds that produce CO_2 with aqueous $NaHCO_3$ solution are:

A. 

B. 

C. 

D. 

E. 

Choose the correct answer from the options given below:

(1) A, C and D Only

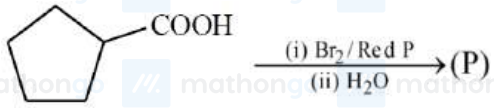
(2) A, B and E Only

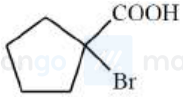
(3) A and C Only

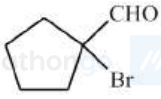
(4) A and B Only

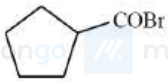
Q486. JEE Main 2024 (08 Apr Shift 1)

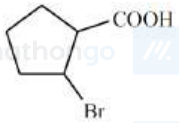
Identify the product (P) in the following reaction:



(1) 

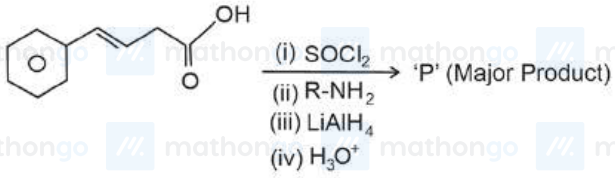
(2) 

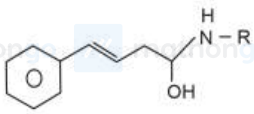
(3) 

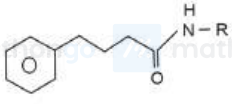
(4) 

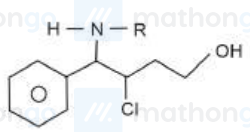
Q487. JEE Main 2023 (12 Apr Shift 1)

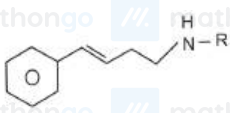
The major product 'P' formed in the following sequence of reactions is



(1) 

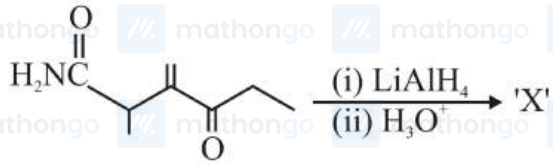
(2) 

(3) 

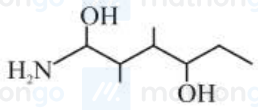
(4) 

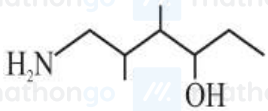
Q488. JEE Main 2023 (10 Apr Shift 2)

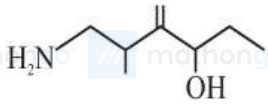
In the reaction given below

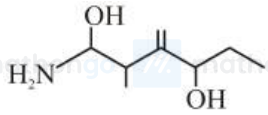


The product 'X' is :

(1) 

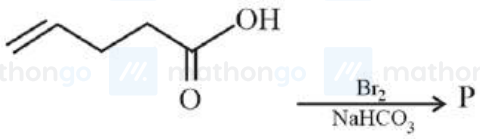
(2) 

(3) 

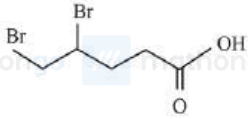
(4) 

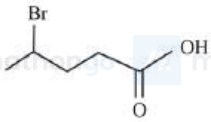
Q489. JEE Main 2023 (08 Apr Shift 2)

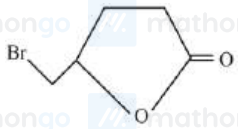
Major product /P/ formed in the following reaction is

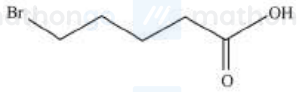


Major product

(1) 

(2) 

(3) 

(4) 

Q490. JEE Main 2022 (29 Jun Shift 1)

Given below are two statements :

Statement I: The esterification of carboxylic acid with an alcohol is a nucleophilic acyl substitution.

Statement II: Electron withdrawing groups in the carboxylic acid will increase the rate of esterification reaction.

Choose the most appropriate option

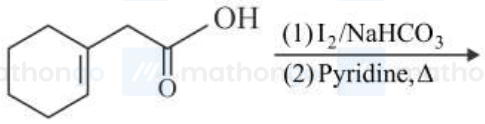
(1) Statement I is correct but Statement II is incorrect.

(2) Both Statement I and Statement II are incorrect.

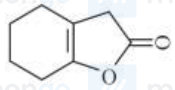
(3) Both Statement I and Statement II are correct.

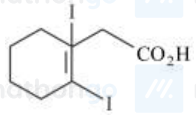
(4) Statement I is incorrect but Statement II is correct.

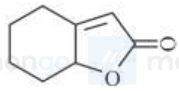
Q491. JEE Main 2022 (28 Jul Shift 2)

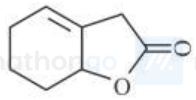


Find out the major product for the above reaction.

(1) 

(2) 

(3) 

(4) 

Q492. JEE Main 2021 (26 Aug Shift 1)

The correct sequential addition of reagents in the preparation of 3−nitrobenzoic acid from benzene is:

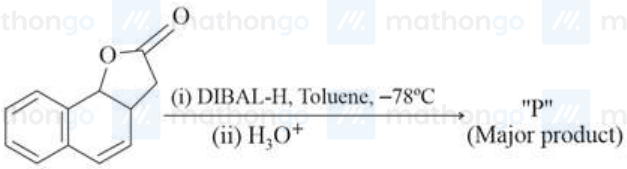
(1) Br_2 / $AlBr_3$, HNO_3 /H_2SO_4, Mg / ether, CO_2, H_3O^+

(2) Br_2 / $AlBr_3$, NaCN, H_3O^+, HNO_3 /H_2SO_4

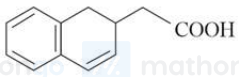
(3) Br_2 / $AlBr_3$, HNO_3 /H_2SO_4, NaCN, H_3O^+

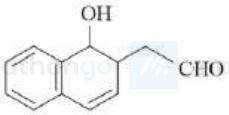
(4) HNO_3 /H_2SO_4, Br_2 / $AlBr_3$, Mg / ether, CO_2, H_3O^+

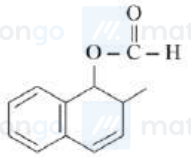
Q493. JEE Main 2021 (16 Mar Shift 1)

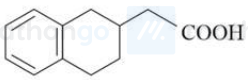


The product "P" in the above reaction is :

(1) 

(2) 

(3) 

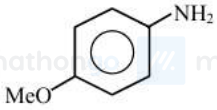
(4) 

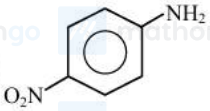
Chapter: Amines

Q494. JEE Main 2025 (7 April Shift 2)

The descending order of basicity of following amines is:

(A) 

(B) 

(C) 

(D) CH_3NH_2

(E) $(CH_3)_2NH$

Choose the correct answer from the options given below :

(1) B > E > D > A > C

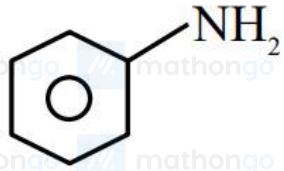
(2) E > D > B > A > C

(3) E > D > A > B > C

(4) E > A > D > C > B

Q495. JEE Main 2025 (7 April Shift 1)

Which of the following amine (s) show (s) positive carbylamines test?

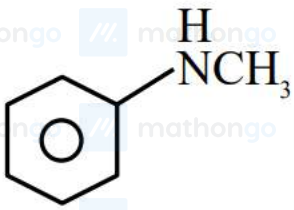


(A)

(B) $(CH_3)_2NH$

(C) CH_3NH_2

(D) $(CH_3)_3$ N



(E)

(1) A and E Only

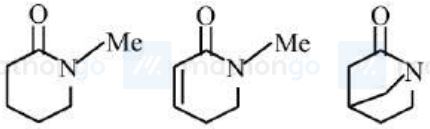
(2) C Only

(3) A and C Only

(4) B, C and D Only

Q496. JEE Main 2025 (4 April Shift 2)

The correct order of basicity for the following molecules is:



(P) (Q) (R)

(1) P > Q > R

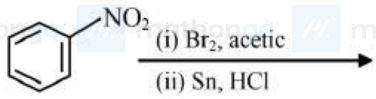
(2) R > P > Q

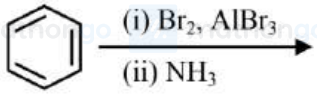
(3) Q > P > R

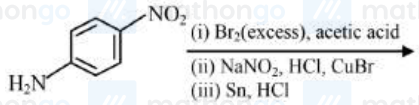
(4) R > Q > P

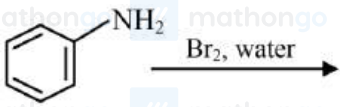
Q497. JEE Main 2025 (3 April Shift 2)

The sequence from the following that would result in giving predominantly 3, 4, 5-Tribromoaniline is :

(1) 

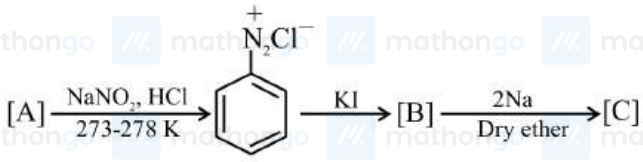
(2) 

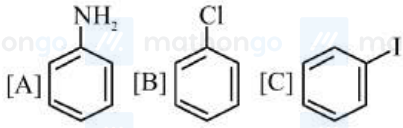
(3) 

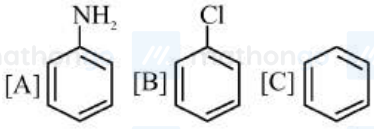
(4) 

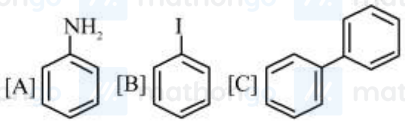
Q498. JEE Main 2025 (3 April Shift 1)

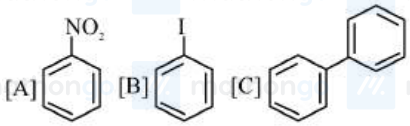
Identify [A], [B], and [C], respectively in the following reaction sequence :



(1) 

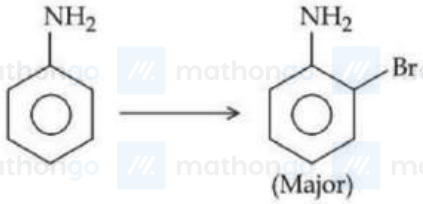
(2) 

(3) 

(4) 

Q499. JEE Main 2025 (24 Jan Shift 2)

For reaction



The correct order of set of reagents for the above conversion is :

(1) $Br_2 \mid FeBr_3, H_2O(\Delta), NaOH$

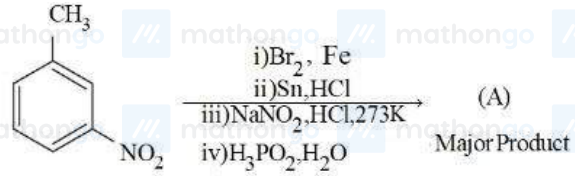
(2) $H_2SO_4, Ac_2O, Br_2, H_2O(\Delta), NaOH$

(3) $Ac_2O, Br_2, H_2O(\Delta), NaOH$

(4) $Ac_2O, H_2SO_4, Br_2, NaOH$

Q500. JEE Main 2025 (23 Jan Shift 1)

Consider the following sequence of reactions to produce major product (A)

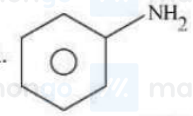


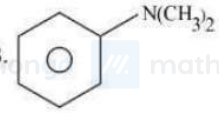
Molar mass of product (A) is _____ $gmol^{-1}$.

(Given molar mass in $gmol^{-1}$ of C : 12, H : 1, O : 16, Br : 80, N : 14, P : 31)

Q501. JEE Main 2025 (23 Jan Shift 1)

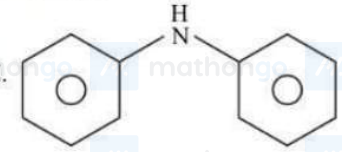
Which among the following react with Hinsberg's reagent?

A. 

B. 

C. $CH_3 - NH_2$

D. $N(CH_3)_3$

E. 

Choose the correct answer from the options given below:

(1) A, B and E Only

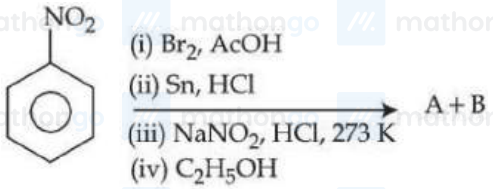
(2) A, C and E Only

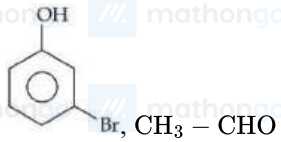
(3) C and D Only

(4) B and D Only

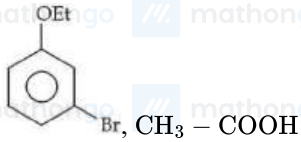
Q502. JEE Main 2025 (22 Jan Shift 1)

The products formed in the following reaction sequence are :

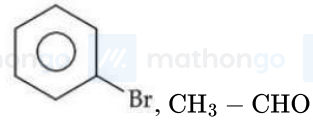


(1) 

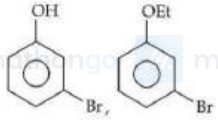
, $CH_3 - CHO$

(2) 

, $CH_3 - COOH$

(3) 

, $CH_3 - CHO$

(4) 

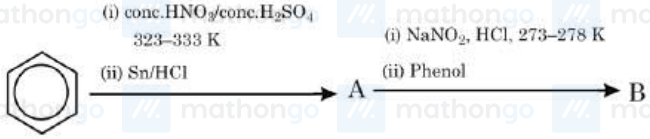
Q503. JEE Main 2025 (2 April Shift 2)

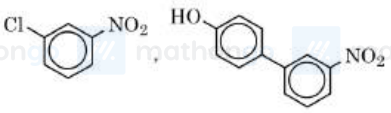
When a concentrated solution of sulphanilic acid and 1-naphthylamine is treated with nitrous acid (273 K) and acidified with acetic acid, the mass (g) of 0.1 mole of product formed is :
(Given molar mass in $gmol^{-1}$ H : 1, C : 12, N : 14, O : 16, S : 32)

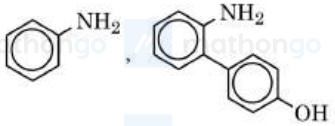
(1) 343
(2) 330
(3) 33
(4) 66

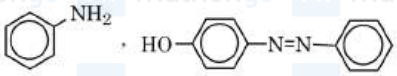
Q504. JEE Main 2024 (30 Jan Shift 2)

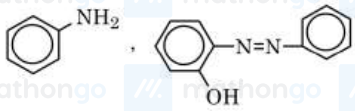
The products A and B formed in the following reaction scheme are respectively



(1) 

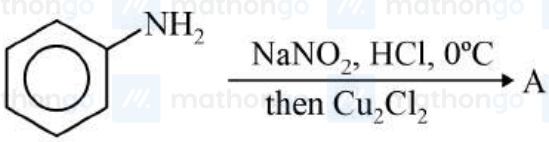
(2) 

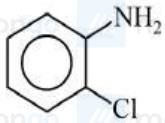
(3) 

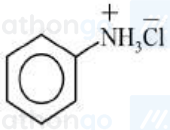
(4) 

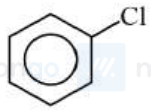
Q505. JEE Main 2024 (29 Jan Shift 2)

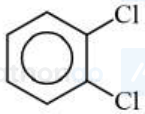
The product A formed in the following reaction is:



(1) 

(2) 

(3) 

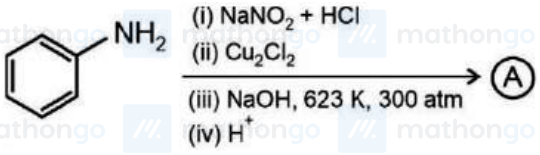
(4) 

Q506. JEE Main 2024 (08 Apr Shift 1)

If 279 g of aniline is reacted with one equivalent of benzenediazonium chloride, the maximum amount of aniline yellow formed will be _____ g. (nearest integer)
(consider complete conversion).

Q507. JEE Main 2024 (06 Apr Shift 2)

Identify the product (A) in the following reaction.



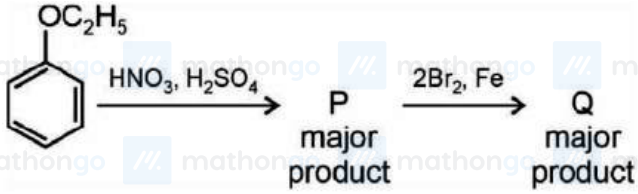
(1) 

(2) 

(3) 

(4) 

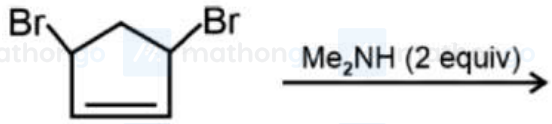
Q508. JEE Main 2024 (06 Apr Shift 2)

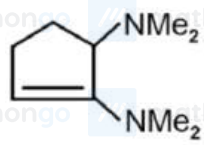


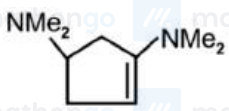
The ratio of number of oxygen atoms to bromine atoms in the product Q is _____ $\times 10^{-1}$.

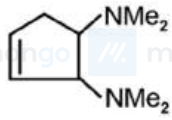
Q509. JEE Main 2024 (04 Apr Shift 2)

Find out the major product formed from the following reaction. [Me : $-CH_3$]



(1) 

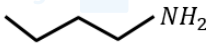
(2) 

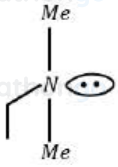
(3) 

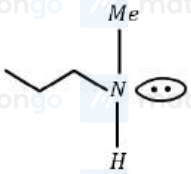
(4) 

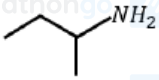
Q510. JEE Main 2023 (31 Jan Shift 2)

An organic compound $[A](C_4H_{11}N)$, shows optical activity and gives N_2 gas on treatment with HNO_2. The compound $[A]$ reacts with $PhSO_2Cl$ producing a compound which is soluble in KOH. The structure of A is :

(1) 

(2) 

(3) 

(4) 

Q511. JEE Main 2023 (10 Apr Shift 1)

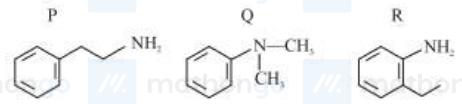
Isomeric amines with molecular formula $C_8H_{11}N$ give the following tests

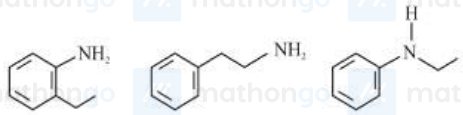
Isomer(P) $\Rightarrow$ Can be prepared by Gabriel phthalimide synthesis

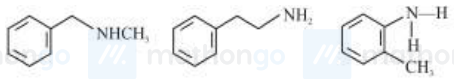
Isomer(Q) $\Rightarrow$ Reacts with Hinsberg's reagent to give solid insoluble in NaOH

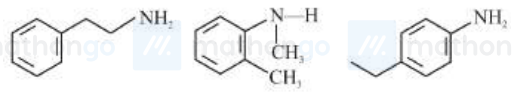
Isomer(R) $\Rightarrow$ Reacts with HONO followed by β-naphthol in NaOH to give red dye.

Isomers(P), (Q) and (R) respectively are

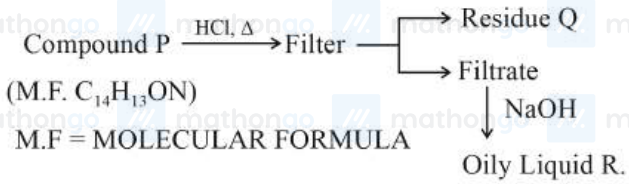
(1) 

(2) 

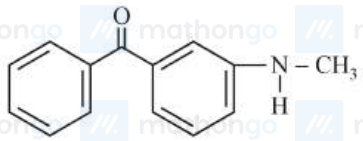
(3) 

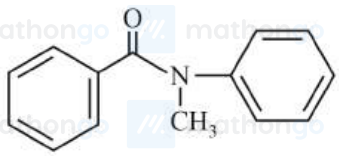
(4) 

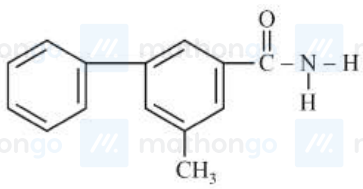
Q512. JEE Main 2023 (06 Apr Shift 1)

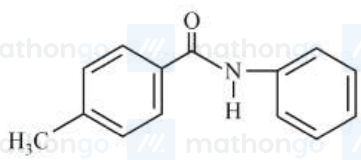


Compound P is neutral, Q gives effervescence with $NaHCO_3$ while R reacts with Hinsberg's reagent to give solid soluble in NaOH. Compound P is

(1) 

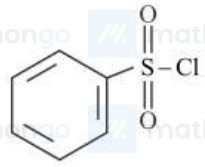
(2) 

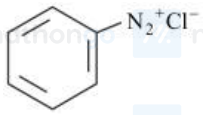
(3) 

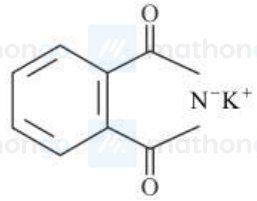
(4) 

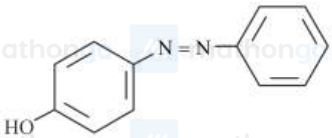
Q513. JEE Main 2022 (29 Jul Shift 2)

The Hinsberg reagent is

(1) 

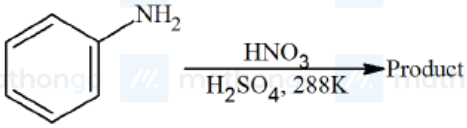
(2) 

(3) 

(4) 

Q514. JEE Main 2022 (28 Jun Shift 2)

With respect to the following reaction, consider the given statements:



(A) o-Nitroaniline and p-nitroaniline are the predominant products.
(B) p-Nitroaniline and m-nitroaniline are the predominant products.
(C) HNO_3 acts as an acid.
(D) H_2SO_4 acts as an acid.

Choose the correct option.

(1) (A) & (C) are correct statements.
(2) (A) & (D) are correct statement.
(3) (B) & (D) are correct statements.
(4) (B) & (C) are correct statements.

Q515. JEE Main 2022 (27 Jul Shift 1)

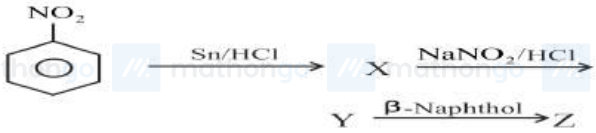
Match List-I with List-II

List-I	List-II
(a) Benzenesulphonyl chloride	(I) Test for primary amines
(b) Hoffmann bromamide reaction	(II) Anti Saytzeff
(c) Carbylamine reaction	(III) Hinsberg reagent
(d) Hoffmann orientation	(IV) Known reaction of Isocyanates.

Choose the correct answer from the options given below

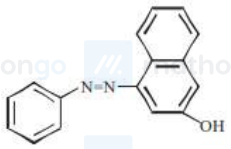
(1) A – IV, B – III, C – II, D – I
(2) A – IV, B – II, C – I, D – III
(3) A – III, B – IV, C – I, D – II
(4) A – IV, B – III, C – I, D – II

Q516. JEE Main 2022 (26 Jun Shift 2)

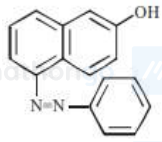


Identify 'Z' among the following

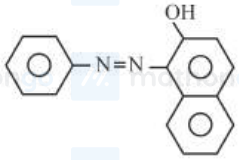
(1)



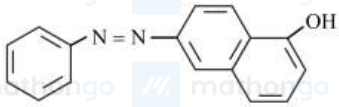
(2)



(3)



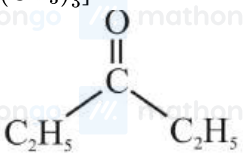
(4)



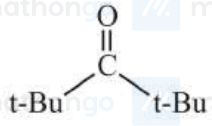
Q517. JEE Main 2022 (25 Jun Shift 2)

Which of the following ketone will NOT give enamine on treatment with secondary amines? [where t − Bu is $-C(CH_3)_3$]

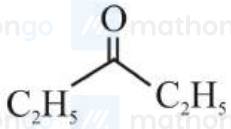
(1)



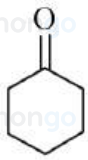
(2)



(3)

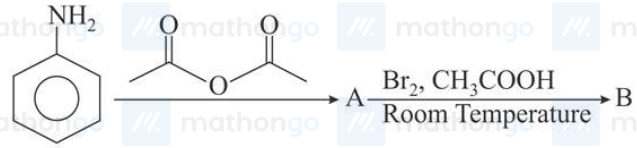


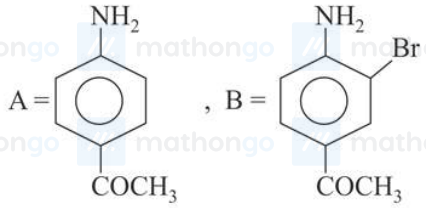
(4)

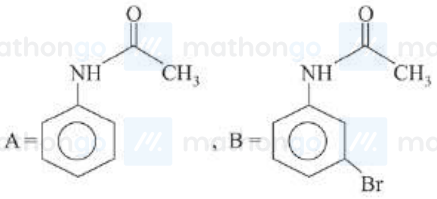


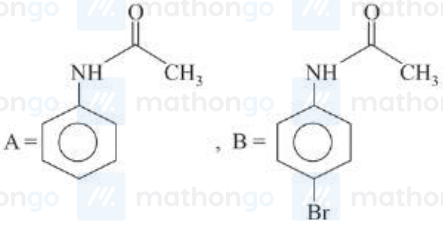
Q518. JEE Main 2021 (31 Aug Shift 2)

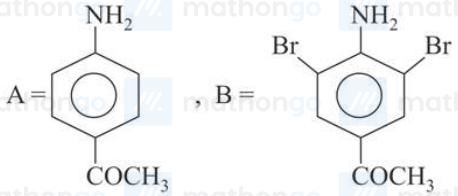
The major products A and B formed in the following reaction sequence are :



(1) 

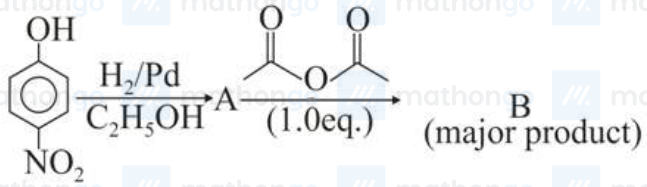
(2) 

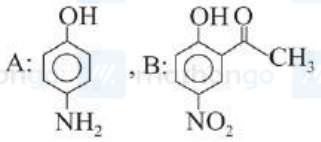
(3) 

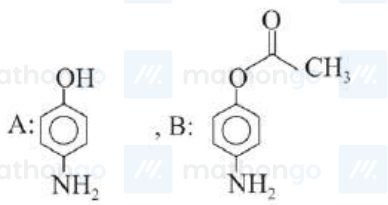
(4) 

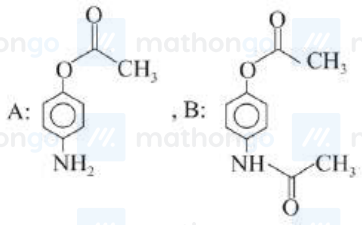
Q519. JEE Main 2021 (27 Aug Shift 2)

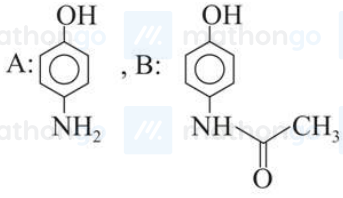
The correct structures of A and B formed in the following reactions are :



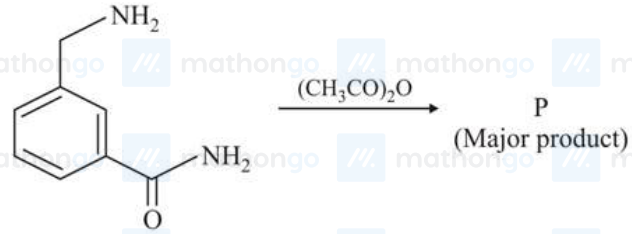
(1) 

(2) 

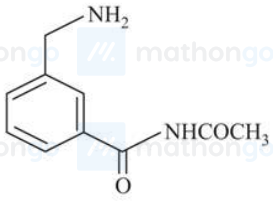
(3) 

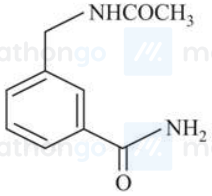
(4) 

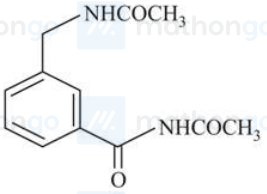
Q520. JEE Main 2021 (26 Aug Shift 2)

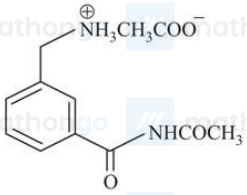


The Major Product in the above reaction is :

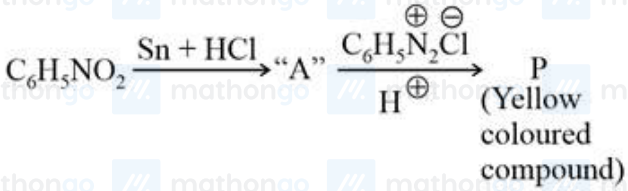
(1) 

(2) 

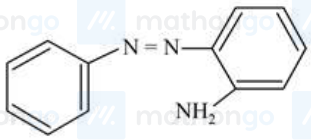
(3) 

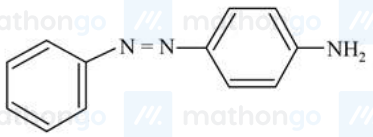
(4) 

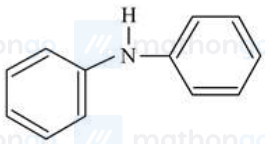
Q521. JEE Main 2021 (25 Jul Shift 2)

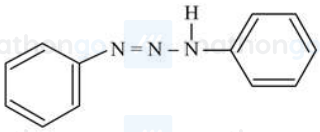


Consider the above reaction, the Product "P" is :

(1) 

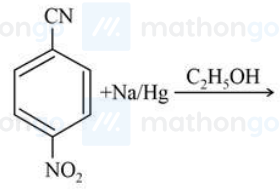
(2) 

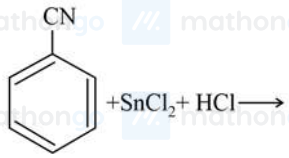
(3) 

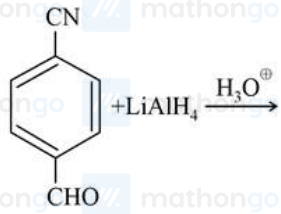
(4) 

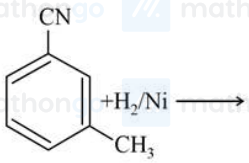
Q522. JEE Main 2021 (25 Jul Shift 1)

Which one of the products of the following reactions does not react with Hinsberg reagent to form sulphonamide?

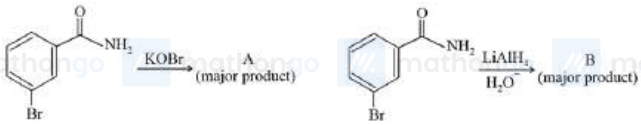
(1) 

(2) 

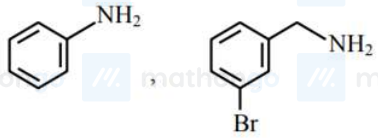
(3) 

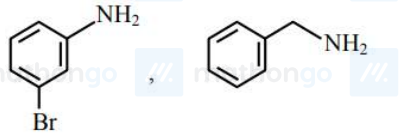
(4) 

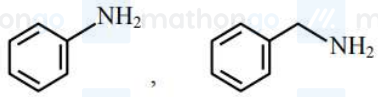
Q523. JEE Main 2021 (20 Jul Shift 2)

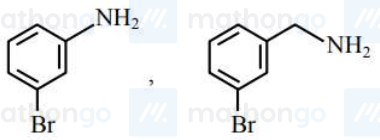


In the above reactions, product A and product B respectively are:

(1) 

(2) 

(3) 

(4) 

Chapter: Biomolecules

Q524. JEE Main 2025 (7 April Shift 2)

Given below are two statements :

Statement (I) : On hydrolysis, oligo peptides give rise to fewer number of α-amino acids while proteins give rise to a large number of β-amino acids.

Statement (II) : Natural proteins are denatured by acids which convert the water soluble form of fibrous proteins to their water insoluble form.

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) Statement I is incorrect but Statement II is correct

(3) Both statement I and statement II are incorrect

(4) Statement I is correct but Statement II is incorrect

Q525. JEE Main 2025 (7 April Shift 1)

Given below are two statements:

Statement I : D-(+)-glucose $+$D $-$ (+) fructose $\xrightarrow{-H_2O}$

Statement II : Invert sugar is formed during sucrose hydrolysis.

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

(1) Both Statement I and Statement II are true.

(2) Statement I is false but Statement II are true.

(3) Statement I is true but Statement II is false.

(4) Both Statement I and Statement II are false.

Q526. JEE Main 2025 (4 April Shift 1)

Identify the pair of reactants that upon reaction, with elimination of HCl will give rise to the dipeptide Gly-Ala.

(1) NH_2-CH_2-COCl and $NH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH$

(2) NH_2-CH_2-COCl and $\overset{\oplus}{N}H_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COCl$

(3) NH_2-CH_2-COOH and $NH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COCl$

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

Q527. JEE Main 2025 (4 April Shift 1)

The total number of hydrogen bonds of a DNA-double Helix strand whose one strand has the following sequence of bases is_____.

5′ - G - G-C-A-A-A-T-C-G-G-C-T-A-3'

Q528. JEE Main 2025 (3 April Shift 2)

Given below are two statements :

Statement I : Wet cotton clothes made of cellulose based carbohydrate takes comparatively longer time to get dried than wet nylon polymer based clothes.

Statement II : Intermolecular hydrogen bonding with water molecule is more in nylon-based clothes than in the case of cotton clothes.

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

(1) Statement I is false but Statement II is true

(2) Statement I is true but Statement II is false

(3) Both Statement I and Statement II are true

(4) Both Statement I and Statement II are false

Q529. JEE Main 2025 (29 Jan Shift 2)

Identify the essential amino acids from below :

(A) Valine

(B) Proline

(C) Lysine

(D) Threonine

(E) Tyrosine

Choose the correct answer from the options given below :

(1) (A), (C) and (E) only

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

(3) (C), (D) and (E) only

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

Q530. JEE Main 2025 (28 Jan Shift 1)

Given below are two statements:

Statement I : D-glucose pentaacetate reacts with 2, 4-dinitrophenylhydrazine

Statement II : Starch, on heating with concentrated sulfuric acid at 100°C and 2-3 atmosphere pressure produces glucose.

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

(1) Statement I is false but Statement II is true

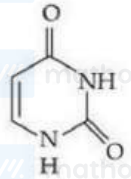
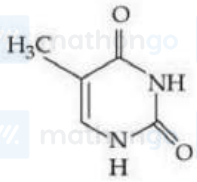
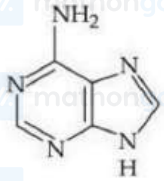
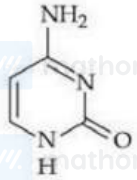
(2) Both Statement I and Statement II are false

(3) Both Statement I and Statement II are true

(4) Statement I is true but Statement II is false

Q531. JEE Main 2025 (24 Jan Shift 2)

Match **List - I** with **List - II**.

List - I	List - II
(A) Adenine	(I) 
(B) Cytosine	(II) 
(C) Thymine	(III) 
(D) Uracil	(IV) 

Choose the correct answer from the options given below :

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

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

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

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

Q532. JEE Main 2025 (24 Jan Shift 1)

The carbohydrate "Ribose" present in DNA, is

A. A pentose sugar

B. present in pyranose from

C. in "D" configuration

D. a reducing sugar, when free

E. in α-anomeric form

Choose the correct answer from the options given below:

(1) A, D and E Only

(2) A, C and D Only

(3) A, B and E Only

(4) B, D and E Only

Q533. JEE Main 2025 (22 Jan Shift 1)

Which of the following acids is a vitamin?

(1) Adipic acid
(2) Ascorbic acid
(3) Saccharic acid
(4) Aspartic acid

Q534. JEE Main 2025 (2 April Shift 2)

A tetrapeptide " x " on complete hydrolysis produced glycine (Gly), alanine (Ala), valine (Val), leucine (Leu) in equimolar proportion each. The number of tetrapeptides (sequences) possible involving each of these amino acids is

(1) 16 (2) 32 (3) 8 (4) 24

Q535. JEE Main 2025 (2 April Shift 1)

Identify the correct statement among the following:

(1) All naturally occurring amino acids except glycine contain one chiral centre.
(2) All naturally occurring amino acids are optically active.
(3) Glutamic acid is the only amino acid that contains a-COOH group at the side chain.
(4) Amino acid, cysteine easily undergo dimerization due to the presence of free SH group.

Q536. JEE Main 2024 (31 Jan Shift 1)

Match List I with List II

	List-I		**List-II**
A.	Glucose/$NaHCO_3/\Delta$	I.	Gluconic acid
B.	Glucose/HNO_3	II.	No reaction
C.	Glucose/HI/Δ	III.	n-hexane
D.	Glucose/Bromine water	IV.	Saccharic acid

Choose the correct answer from the options given below:

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

Q537. JEE Main 2024 (29 Jan Shift 2)

Match List I with List II

List I (Bio Polymer)		**List II (Monomer)**	
A.	Starch	I.	nucleotide
B.	Cellulose	II.	α-glucose
C.	Nucleic acid	III.	β-glucose
D.	Protein	IV.	α-amino acid

Choose the correct answer from the options given below :-

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

Q538. JEE Main 2024 (29 Jan Shift 1)

Match List I with List I

List I (Substances)	List II (Element Present)
A. Ziegler catalyst	I. Rhodium
B. Blood Pigment	II. Cobalt
C. Wilkinson catalyst	III. Iron
D. Vitamin B12	IV. Titanium

Choose the correct answer from the options given below:

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

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

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

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

Q539. JEE Main 2024 (09 Apr Shift 2)

The incorrect statement about Glucose is :

(1) Glucose is soluble in water because of having aldehyde functional group

(2) Glucose remains in multiple isomeric form in its aqueous solution

(3) Glucose is one of the monomer unit in sucrose

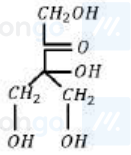
(4) Glucose is an aldohexose

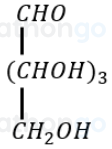
Q540. JEE Main 2024 (08 Apr Shift 2)

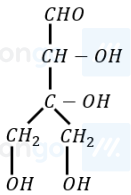
The total number of carbon atoms present in tyrosine, an amino acid, is _____

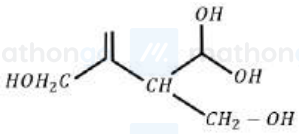
Q541. JEE Main 2023 (31 Jan Shift 2)

Compound A, $C_5H_{10}O_5$, given a tetraacetate with AC_2O and oxidation of A with $Br_2 - H_2O$ gives an acid, $C_5H_{10}O_6$. Reduction of A with HI gives isopentane. The possible structure of A is :

(1) 

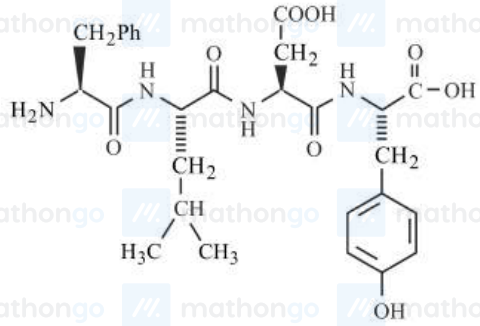
(2) 

(3) 

(4) 

Q542. JEE Main 2023 (29 Jan Shift 2)

Following tetrapeptide can be represented as



(F, L, D, Y, I, Q, P are one letter codes for amino acids)

(1) FIQY
(2) FLDY
(3) YQLF
(4) PLDY

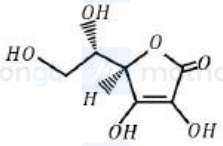
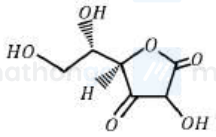
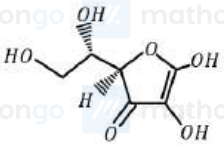
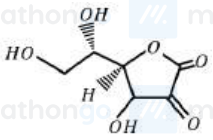
Q543. JEE Main 2023 (15 Apr Shift 1)

Which is not true for arginine?

(1) It has a fairly high melting point
(2) It is associated with more than one pK_a values.
(3) It has high solubility in benzene.
(4) It is a crystalline solid.

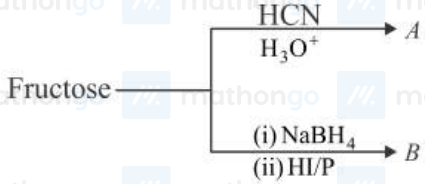
Q544. JEE Main 2023 (01 Feb Shift 2)

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

(1) 
(2) 
(3) 
(4) 

Q545. JEE Main 2022 (28 Jul Shift 2)

The formulas of A and B for the following reaction sequence are



(1) $A = C_7H_{14}O_8, B = C_6H_{14}$
(2) $A = C_7H_{13}O_7, B = C_7H_{14}O$
(3) $A = C_7H_{12}O_8, B = C_6H_{14}$
(4) $A = C_7H_{14}O_8, B = C_6H_{14}O_6$

Q546. JEE Main 2021 (27 Jul Shift 2)

Compound A gives D-Galactose and D-Glucose on hydrolysis. The compound A is :

(1) Amylose
(2) Sucrose
(3) Maltose
(4) Lactose

Q547. JEE Main 2021 (27 Aug Shift 2)

Hydrolysis of sucrose gives:

(1) $\alpha-D-(+)-$ Glucose and
$\alpha-D-(-)$-Fructose

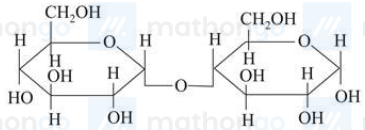
(2) $\alpha-D-(+)-$ Glucose and
$\beta-D-(-)-$Fructose

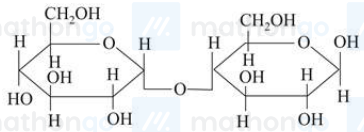
(3) $\alpha-D-(-)$-Glucose and
$\beta-D-(-)$-Fructose

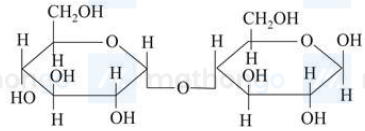
(4) $\alpha-D-(-)-$ Glucose and
$\alpha-D-(+)$-Fructose

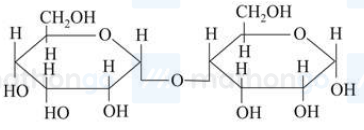
Q548. JEE Main 2021 (25 Feb Shift 2)

Which of the following is correct structure of α-anomer of maltose?

(1) 

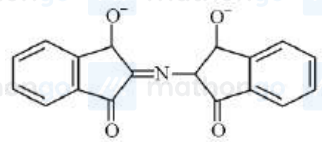
(2) 

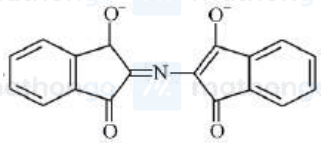
(3) 

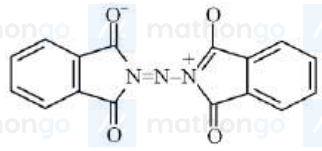
(4) 

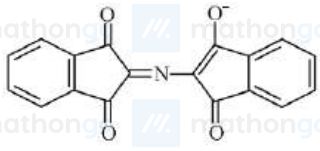
Q549. JEE Main 2021 (20 Jul Shift 1)

The correct structure of Ruhemann's Purple, the compound formed in the reaction of Ninhydrin with proteins is:

(1) 

(2) 

(3) 

(4) 

Q550. JEE Main 2020 (02 Sep Shift 1)

Consider the following reactions :

(i) Glucose $+\mathrm{ROH} \xrightarrow{\text{dry HCl}} \text{Acetal} \xrightarrow[(\mathrm{CH_3CO})_2]{\text{x eq. of}}$ acetyl derivative

(ii) Glucose $\xrightarrow{\mathrm{Ni/H_2}} \mathrm{A} \xrightarrow[(\mathrm{CH_3CO})_2\mathrm{O}]{\text{y eq. of}}$ acetyl derivative

(iii) Glucose $\xrightarrow[(\mathrm{CH_3CO})_2\mathrm{O}]{\text{z eq. of}}$ acetyl derivative 'x' , 'y' and 'z' in these reactions are respectively.

(1) 5, 4 & 6

(2) 4, 6 & 5

(3) 4, 5 & 5

(4) 5, 6 & 5

ANSWER KEYS

1. (2)	**2.** 12	**3.** (3)	**4.** (2)	**5.** (2)	**6.** 1655	**7.** 125	**8.** 153
9. (3)	**10.** 184	**11.** 372	**12.** 11	**13.** 164	**14.** (4)	**15.** 14	**16.** (3)
17. (4)	**18.** 2	**19.** (2)	**20.** (3)	**21.** 25	**22.** (2)	**23.** (2)	**24.** (4)
25. (4)	**26.** (1)	**27.** (3)	**28.** (1)	**29.** (3)	**30.** (4)	**31.** (1)	**32.** (3)
33. (2)	**34.** (2)	**35.** (1)	**36.** (1)	**37.** (3)	**38.** (1)	**39.** 548	**40.** 2
41. (2)	**42.** (4)	**43.** 2	**44.** 98	**45.** (3)	**46.** (4)	**47.** (3)	**48.** (3)
49. (4)	**50.** (3)	**51.** (1)	**52.** (3)	**53.** (4)	**54.** (1)	**55.** 2850	**56.** (3)
57. (2)	**58.** (1)	**59.** 1200	**60.** 274	**61.** 125	**62.** 847	**63.** (1)	**64.** 54
65. 8630	**66.** (2)	**67.** 200	**68.** 104	**69.** (3)	**70.** 182	**71.** 3	**72.** 128
73. (2)	**74.** (3)	**75.** (2)	**76.** (1)	**77.** 74	**78.** (2)	**79.** 2	**80.** (2)
81. (4)	**82.** 710	**83.** (1)	**84.** 1	**85.** 354	**86.** 48	**87.** (2)	**88.** 3
89. (2)	**90.** (4)	**91.** (4)	**92.** (3)	**93.** (3)	**94.** 7	**95.** (3)	**96.** 10
97. (2)	**98.** (1)	**99.** 0	**100.** 476	**101.** (4)	**102.** (3)	**103.** (4)	**104.** 2
105. 37	**106.** (2)	**107.** (4)	**108.** 45	**109.** (2)	**110.** (4)	**111.** 13	**112.** 1
113. 4	**114.** (3)	**115.** 85	**116.** (2)	**117.** (3)	**118.** 33	**119.** (4)	**120.** 2
121. (3)	**122.** (4)	**123.** (4)	**124.** (1)	**125.** (4)	**126.** 25	**127.** (4)	**128.** (4)
129. 73	**130.** 23	**131.** 31	**132.** 80	**133.** 25	**134.** 2.18	**135.** (2)	**136.** 5
137. (2)	**138.** 400	**139.** (3)	**140.** 3	**141.** (2)	**142.** (2)	**143.** (2)	**144.** (1)
145. 2	**146.** (3)	**147.** (3)	**148.** (2)	**149.** 23	**150.** 6	**151.** 5	**152.** (4)
153. (2)	**154.** (2)	**155.** 1	**156.** 3	**157.** (3)	**158.** 16	**159.** 14	**160.** 23
161. 266	**162.** 28	**163.** (3)	**164.** (3)	**165.** (1)	**166.** (4)	**167.** (2)	**168.** (4)
169. (3)	**170.** (2)	**171.** (1)	**172.** 20	**173.** 897	**174.** 69	**175.** 43	**176.** (1)
177. 2435	**178.** 399	**179.** (1)	**180.** 24	**181.** 1	**182.** 2	**183.** 1350	**184.** 2
185. 40	**186.** 1	**187.** (2)	**188.** 10	**189.** 100	**190.** (4)	**191.** (3)	**192.** (2)
193. (1)	**194.** (1)	**195.** (3)	**196.** (3)	**197.** (1)	**198.** (1)	**199.** (1)	**200.** (4)
201. (2)	**202.** (3)	**203.** (2)	**204.** (2)	**205.** (2)	**206.** (3)	**207.** (2)	**208.** (2)
209. (2)	**210.** (2)	**211.** (3)	**212.** (2)	**213.** (1)	**214.** (2)	**215.** 2	**216.** (4)
217. (3)	**218.** 15	**219.** 6	**220.** (4)	**221.** (2)	**222.** (2)	**223.** (2)	**224.** (2)
225. (4)	**226.** (1)	**227.** 0	**228.** (2)	**229.** (2)	**230.** (2)	**231.** (4)	**232.** (4)
233. (3)	**234.** 3	**235.** (4)	**236.** (3)	**237.** 4	**238.** (3)	**239.** 4	**240.** (3)
241. 2	**242.** (1)	**243.** (4)	**244.** (4)	**245.** (3)	**246.** (3)	**247.** (4)	**248.** (2)
249. (2)	**250.** (3)	**251.** (2)	**252.** (2)	**253.** (4)	**254.** 15	**255.** (1)	**256.** (2)

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257. (4)	**258.** (1)	**259.** (3)	**260.** (3)	**261.** (4)	**262.** (1)	**263.** (3)	**264.** (3)
265. (2)	**266.** (4)	**267.** 6	**268.** 160	**269.** (4)	**270.** (2)	**271.** (3)	**272.** 11
273. (3)	**274.** (2)	**275.** (2)	**276.** (3)	**277.** (4)	**278.** 2	**279.** 0	**280.** (2)
281. 5	**282.** (4)	**283.** (1)	**284.** (4)	**285.** (2)	**286.** (3)	**287.** (1)	**288.** 4
289. 5	**290.** (4)	**291.** (2)	**292.** (4)	**293.** (3)	**294.** (1)	**295.** (3)	**296.** 2
297. (4)	**298.** (4)	**299.** (1)	**300.** (4)	**301.** (1)	**302.** (2)	**303.** (1)	**304.** (3)
305. (3)	**306.** (1)	**307.** 14	**308.** (4)	**309.** (3)	**310.** (2)	**311.** (4)	**312.** (4)
313. (1)	**314.** 0	**315.** (2)	**316.** (2)	**317.** (3)	**318.** (1)	**319.** (2)	**320.** (1)
321. (2)	**322.** (1)	**323.** (2)	**324.** (1)	**325.** (3)	**326.** (3)	**327.** 766	**328.** 4
329. 7	**330.** (3)	**331.** (1)	**332.** (1)	**333.** 6	**334.** 4	**335.** (3)	**336.** (4)
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361. 6	**362.** (1)	**363.** (1)	**364.** (2)	**365.** (3)	**366.** (3)	**367.** (4)	**368.** 2
369. (3)	**370.** (3)	**371.** (1)	**372.** 40	**373.** (1)	**374.** (2)	**375.** (3)	**376.** (4)
377. (2)	**378.** (1)	**379.** 14	**380.** (3)	**381.** (4)	**382.** (2)	**383.** (3)	**384.** (2)
385. 3	**386.** (2)	**387.** (3)	**388.** (4)	**389.** (4)	**390.** (3)	**391.** (2)	**392.** (3)
393. (2)	**394.** (3)	**395.** (1)	**396.** (2)	**397.** (2)	**398.** 3	**399.** (2)	**400.** (3)
401. 8	**402.** (4)	**403.** (4)	**404.** 7	**405.** (1)	**406.** (4)	**407.** (1)	**408.** (3)
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417. (1)	**418.** (3)	**419.** (2)	**420.** (4)	**421.** (1)	**422.** (2)	**423.** (2)	**424.** (2)
425. (4)	**426.** (1)	**427.** (3)	**428.** (3)	**429.** (2)	**430.** (1)	**431.** (4)	**432.** (4)
433. (3)	**434.** (2)	**435.** (4)	**436.** (3)	**437.** (2)	**438.** 13	**439.** (2)	**440.** (4)
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457. 33	**458.** (2)	**459.** (1)	**460.** (2)	**461.** (2)	**462.** (4)	**463.** (2)	**464.** (3)
465. (4)	**466.** (4)	**467.** (3)	**468.** (4)	**469.** (3)	**470.** (1)	**471.** (1)	**472.** (3)
473. (2)	**474.** 2	**475.** (3)	**476.** (3)	**477.** (1)	**478.** 2	**479.** (2)	**480.** (2)
481. (4)	**482.** (4)	**483.** (1)	**484.** (3)	**485.** (1)	**486.** (1)	**487.** (4)	**488.** (3)
489. (3)	**490.** (3)	**491.** (3)	**492.** (4)	**493.** (2)	**494.** (2)	**495.** (3)	**496.** (4)
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505. (3)	**506.** 591	**507.** (4)	**508.** 15	**509.** (3)	**510.** (4)	**511.** (4)	**512.** (4)
513. (1)	**514.** (3)	**515.** (3)	**516.** (3)	**517.** (2)	**518.** (3)	**519.** (4)	**520.** (2)

521. (2)	**522.** (2)	**523.** (4)	**524.** (3)	**525.** (2)	**526.** (1)	**527.** 33	**528.** (2)
529. (2)	**530.** (1)	**531.** (2)	**532.** (2)	**533.** (2)	**534.** (4)	**535.** (4)	**536.** (2)
537. (4)	**538.** (4)	**539.** (1)	**540.** 9	**541.** (3)	**542.** (2)	**543.** (3)	**544.** (1)
545. (1)	**546.** (4)	**547.** (2)	**548.** (1)	**549.** (4)	**550.** (2)		