

JEE MAIN 2023

Paper with Solution

Chemistry | 1st Feb 2023 _ Shift-1



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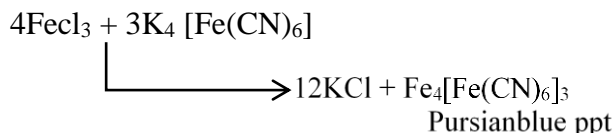
NITIN VIJAY (NV Sir)
Founder & CEO

SECTION - A

31. A solution of FeCl_3 when treated with $\text{K}_4[\text{Fe}(\text{CN})_6]$ gives a prussian blue precipitate due to the formation of

(1) $\text{K}[\text{Fe}_2(\text{CN})_6]$ (2) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$ (3) $\text{Fe}[\text{Fe}(\text{CN})_6]$ (4) $\text{Fe}_3[\text{Fe}(\text{CN})_6]_2$

Sol. 2



32. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R
Assertion A: Hydrogen is an environment friendly fuel.

Reason R: Atomic number of hydrogen is 1 and it is a very light element.

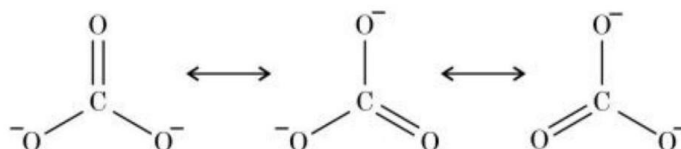
In the light of the above statements, choose the correct answer from the options given below

- (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

Sol. 4

No pollution occurs by combustion of hydrogen and very low density of hydrogen.

33. Resonance in carbonate ion (CO_3^{2-}) is



Which of the following is true?

- (1) All these structures are in dynamic equilibrium with each other.
(2) It is possible to identify each structure individually by some physical or chemical method.
(3) Each structure exists for equal amount of time.
(4) CO_3^{2-} has a single structure i.e., resonance hybrid of the above three structures.

Sol. 4

Resonating structure are hypothetical and resonance hybrid is a real structure which is weighted average of all the resonating struture.

34. Match List I with List II

List I	List II
(A) Tranquilizers	(I) Anti blood clotting
(B) Aspirin	(II) Salvarsan
(C) Antibiotic	(III) antidepressant drugs
(D) Antiseptic	(IV) soframycin

Choose the correct answer from the options given below:

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

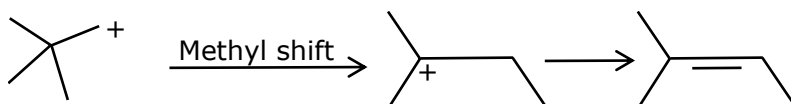
Sol. 3

- A → (iii)
B → (i)
C → (ii)
D → (iv)

35. Identify the incorrect option from the following:

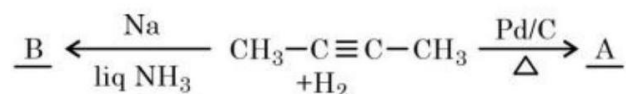
- (1) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{KOH (aq)} \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{OH} + \text{KBr}$
- (2) $\text{C}_6\text{H}_5\text{Cl} \xrightarrow[\text{(ii) HCl}]{\text{(i) NaOH, 623 K, 300 atm}} \text{C}_6\text{H}_5\text{OH}$
- (3) $\text{C}_6\text{H}_5\text{Cl} + \text{H}_3\text{C-CO-Cl} \xrightarrow{\text{anhyd AlCl}_3} \text{C}_6\text{H}_5\text{COCH}_3 + \text{HCl}$
- (4) $(\text{CH}_3)_3\text{CCH}_2\text{Br} + \text{KOH (alc)} \rightarrow (\text{CH}_3)_3\text{CCH}_2\text{OH} + \text{KBr}$

Sol. 4



In question given option reaction is incorrect so right answer is (4)

36. But-2-yne is reacted separately with one mole of Hydrogen as shown below:

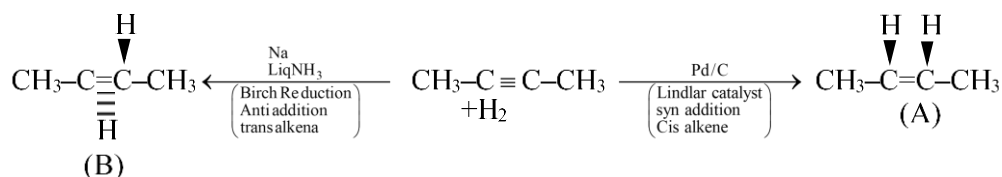


- A. A is more soluble than B.
B. The boiling point & melting point of A are higher and lower than B respectively.
C. A is more polar than B because dipole moment of A is zero.
D. Br₂ adds easily to B than A.

Identify the incorrect statements from the options given below:

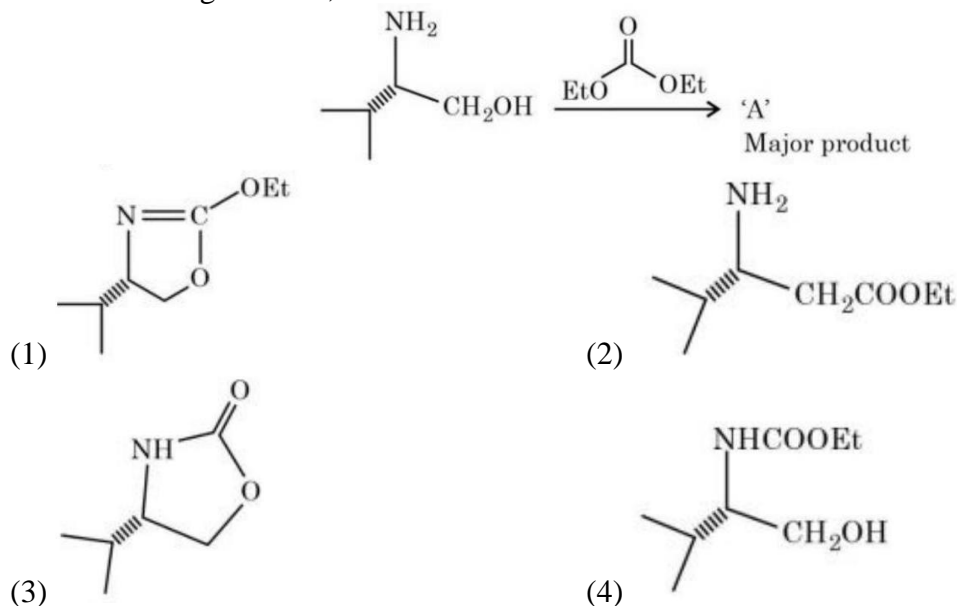
- (1) B, C & D only (2) A and B only (3) A, C & D only (4) B and C only

Sol. 2

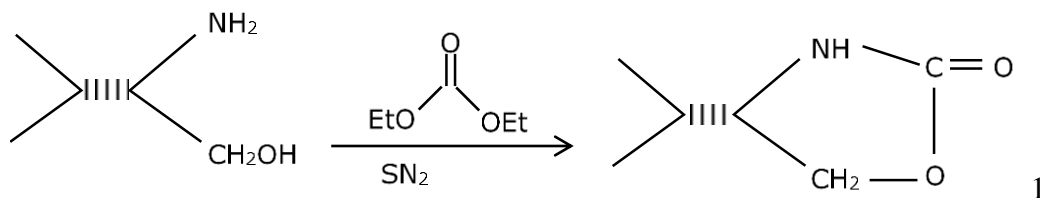


- A) Cis has dipole moment, more soluble than trans (B)
B) B.P.(cis > trans), M.P. (trans > cis)
C) Dipole moment (A > B) but $\mu_A \neq 0$
D) Br₂ add easily to A not B

37. In the following reaction, 'A' is



Sol.



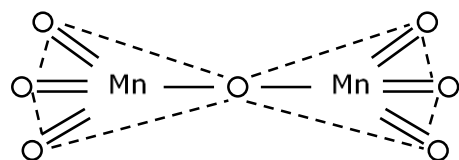
38. Highest oxidation state of Mn is exhibited in Mn_2O_7 . The correct statements about Mn_2O_7 are

- (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 C only (4) B and D only

Sol. 1 (A & C)



39. Match List I with List II

	List I	List II
(A)	Slaked lime	(I) NaOH
(B)	Dead burnt plaster	(II) $Ca(OH)_2$
(C)	Caustic soda	(III) $Na_2CO_3 \cdot 10H_2O$
(D)	Washing soda	(IV) $CaSO_4$

Choose the correct answer from the options given below:

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

Sol. 4

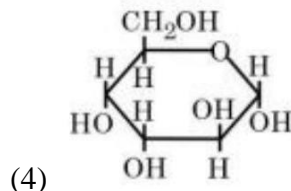
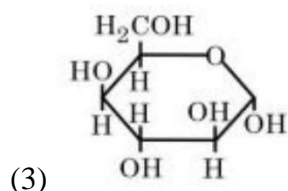
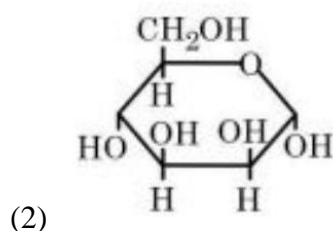
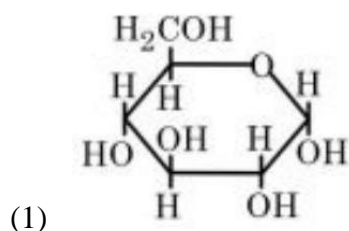
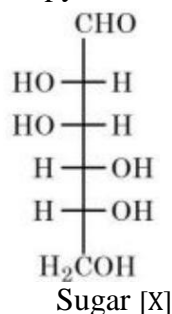
Slaked Lime $\rightarrow \text{Ca(OH)}_2$

Dead burnt plaster $\rightarrow \text{CaSO}_4$

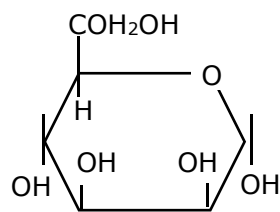
Caustic Soda $\rightarrow \text{NaOH}$

Washing Soda $\rightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

40. The correct representation in six membered pyranose form for the following sugar [X] is



Sol. 2



Haworth structure of mannose

41. Which of the following complex will show largest splitting of d-orbitals ?

- (1) $[\text{FeF}_6]^{3-}$ (2) $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ (3) $[\text{Fe}(\text{CN})_6]^{3-}$ (4) $[\text{Fe}(\text{NH}_3)_6]^{3+}$

Sol. 3

(M) Strong field ligands will split 'd' orbital largely.

CN^- is SF.L Where as F^- , $\text{C}_2\text{O}_4^{2-}$ & NH_3

Are comparatively weak field ligand as common to CN^-

42. Which of the following are the example of double salt?

(A) $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$

(B) $\text{CuSO}_4 \cdot 4\text{NH}_3 \cdot \text{H}_2\text{O}$

(C) $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$

(D) $\text{Fe}(\text{CN})_2 \cdot 4\text{KCN}$

Choose the correct answer

(1) B and D only

(2) A and C only

(3) A and B only

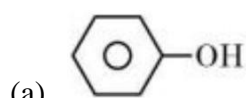
(4) A, B and D only

Sol. 1

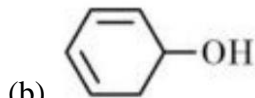
Double salt contain's two or more types of salts.

$\text{CuSO}_4 \cdot 4\text{NH}_3 \cdot \text{H}_2\text{O}$ and $\text{Fe}(\text{CN})_2 \cdot 4\text{KCN}$ are complex compounds.

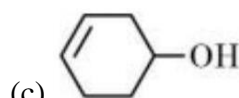
43. Decreasing order of dehydration of the following alcohols is



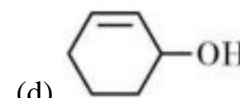
(1) $b > a > d > c$



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



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



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

Sol. 4

Ease of hydration \propto stability of carbocation

$b > d > c > a$

44. Given below are two statements:

Statement I: Chlorine can easily combine with oxygen to form oxides; and the product has a tendency to explode.

Statement II: Chemical reactivity of an element can be determined by its reaction with oxygen and halogens.

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

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

Sol. 1

Chlorine oxides, Cl_2O , ClO_2 , Cl_2O_6 and Cl_2O_7 are heighly Reactive oxidising Agents and tend to explode.

45. Choose the correct statement(s):

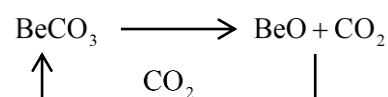
- A. Beryllium oxide is purely acidic in nature.
- B. Beryllium carbonate is kept in the atmosphere of CO_2 .
- C. Beryllium sulphate is readily soluble in water.
- D. Beryllium shows anomalous behavior.

Choose the correct answer from the options given below:

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

Sol. 1

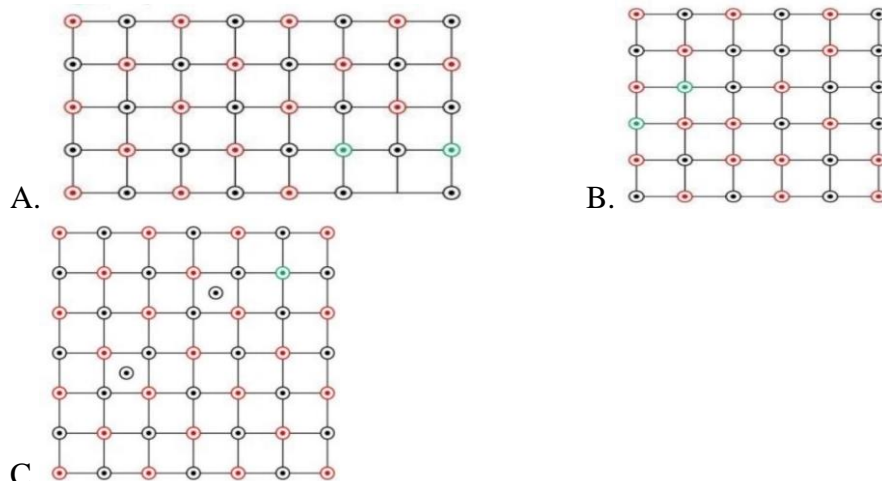
BeO is Amphoteric



BeSO_4 is solube in water

Due to small size Be shows anomalous behaviour.

46. Which of the following represents the lattice structure of $A_{0.95}O$ containing A^{2+} , A^{3+} and O^{2-} ions?
 $\odot A^{2+}$ $\odot A^{3+}$ $\odot O^{2-}$



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

Sol. 1

Some vacancy generated by this type defect.

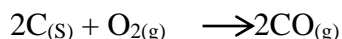
47. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R
Assertion A: In an Ellingham diagram, the oxidation of carbon to carbon monoxide shows a negative slope with respect to temperature.

Reason R: CO tends to get decomposed at higher temperature.

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

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

Sol. 3



$$\Delta S^\circ \text{ is the, } \Delta G^\circ = \Delta H^\circ - T \Delta S$$

Thus slope is Negative.

As temperature Increase ΔC becomes more Negative thus it has loner tendency to get decomposed.

48. Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R
Assertion A: Amongst He, Ne, Ar and Kr; 1 g of activated charcoal adsorbs more of Kr.

Reason R: The critical volume V_c ($\text{cm}^3 \text{mol}^{-1}$) and critical pressure P_c (atm) is highest for Krypton but the compressibility factor at critical point Z_c is lowest for Krypton.

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

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

Sol. 1

Assertion A correct but Reason is wrong.

49. Match List I with List II

List I	List II
Test	Functional group / Class of Compound
(A) Molisch's Test	(I) Peptide
(B) Biuret Test	(II) Carbohydrate
(C) Carbylamine Test	(III) Primary amine
(D) Schiff's Test	(IV) Aldehyde

Choose the correct answer from the options given below:

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

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

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

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

Sol. 2

A → (II) C → (III)

B → (I) D → (IV)

50. How can photochemical smog be controlled?

(1) By using catalytic convertors in the automobiles/industry.

(2) By complete combustion of fuel.

(3) By using tall chimneys.

(4) By using catalyst.

Sol. 1

1) By using catalytic convertors in the automobiles / industry.

51. (i) $X(g) \rightleftharpoons Y(g) + Z(g)$ $K_{p1} = 3$

(ii) $A(g) \rightleftharpoons 2 B(g)$ $K_{p2} = 1$

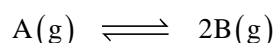
If the degree of dissociation and initial concentration of both the reactants $X(g)$ and $A(g)$ are equal, then the ratio of the total pressure at equilibrium $\left(\frac{p_1}{p_2}\right)$ is equal to $x : 1$. The value of x is ____ (Nearest integer)

Sol. $x(g) \rightleftharpoons y(g) + z(g) \quad K_{p_1} = 3$

$$t = 0 \quad 1 \quad 0 \quad 0$$

$$\text{teq} \quad 1-x \quad x \quad x$$

$$\text{Partial Pressure} \quad \frac{(1-x)}{1+x} P_1 \quad \frac{xP_1}{1+x} \quad \frac{xP_1}{1+x}$$



$$t = 0 \quad 1 \quad 0$$

$$\text{teq} \quad 1-x \quad 2x$$

$$\text{Partial Pressure} \quad \frac{1-x}{1+x} \times P_2 \quad \frac{2x}{1+x} \times P_2$$

$$K_{p_1} = \frac{\left(\frac{xP_1}{1+x}\right)\left(\frac{xP_1}{1+x}\right)}{\left(\frac{1-x}{1+x}P_1\right)}$$

$$K_{p_2} = \frac{(2x)^2 \times P_2^2}{\left(\frac{1-x}{1+x}\right)P_2}$$

$$\frac{K_{p_1}}{K_{p_2}} = \frac{3}{1} = \frac{P_1}{4P_2}$$

$$\frac{P_1}{P_2} = \frac{12}{1}$$

52. Electrons in a cathode ray tube have been emitted with a velocity of 1000 m s^{-1} . The number of following statements which is/are true about the emitted radiation is

Given : $h = 6 \times 10^{-34} \text{ Js}$, $m_e = 9 \times 10^{-31} \text{ kg}$.

(A) The deBroglie wavelength of the electron emitted is 666.67 nm .

(B) The characteristic of electrons emitted depend upon the material of the electrodes of the cathode ray tube.

(C) The cathode rays start from cathode and move towards anode.

(D) The nature of the emitted electrons depends on the nature of the gas present in cathode ray tube.

Sol. 2

$$(A) \lambda = \frac{h}{mv} = \frac{6 \times 10^{-34}}{9 \times 10^{-31} \times 1000} \\ = 666.67 \times 10^{-9} \text{ m}$$

(C) The cathode ray start from Cathode and move towards anode.

53. A and B are two substances undergoing radioactive decay in a container.

The half life of A is 15 min and that of B is 5 min . If the initial concentration of B is 4 times that of A and they both start decaying at the same time, how much time will it take for the concentration of both of them to be same? _____ min.

Sol. 15

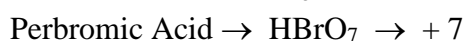
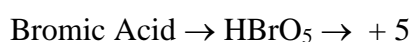
$$\text{Condition} \Rightarrow [B] = 4[A]$$

$$\text{For A} \quad A \xrightarrow[15 \text{ min}]{t_{1/2}} \frac{A}{2}$$

$$\text{For B} \quad 4A \xrightarrow[5 \text{ min}]{t_{1/2}} 2A \xrightarrow[5 \text{ min}]{t_{1/2}} A \xrightarrow[5 \text{ min}]{t_{1/2}} \frac{A}{2}$$

54. Sum of oxidation states of bromine in bromic acid and perbromic acid is

Sol. 12



$$\text{Sum of oxidation state} = 5 + 7 = 12$$

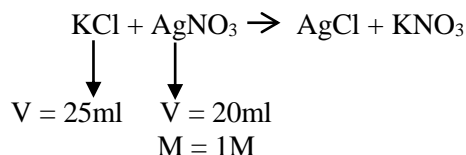
55. 25 mL of an aqueous solution of KCl was found to require 20 mL of 1M AgNO₃ solution when titrated using K₂CrO₄ as an indicator. What is the depression in freezing point of KCl solutions of the given concentration? _____ (Nearest integer).

(Given: $K_f = 2.0 \text{ K kg mol}^{-1}$)

Assume 1) 100% ionization and

2) density of the aqueous solution as 1 g mL^{-1}

Sol. 3



At equivalence point,

Mmole of KCl = mmole of AgNO₃ = 20 mmole

Volume of solution = 25 ml

Mass of solution = 25 gm

Mass of solvent = 25 – mass of solute
 $= 25 - [20 \times 10^{-3} \times 74.5]$
 $= 23.51 \text{ gm}$

Molality of KCl = $\frac{\text{mole of KCl}}{\text{mass of solvent in kg}}$

$$= \frac{20 \times 10^{-3}}{23.51 \times 10^{-3}} = 0.85$$

i of KCl = 2 (100% ionisation)

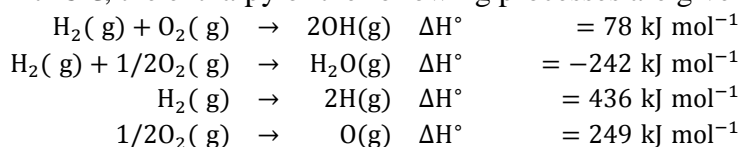
$$\Delta T_f = i \times K_f \times m$$

$$= 2 \times 2 \times 0.85$$

$$= 3.4$$

$$\approx 3$$

56. At 25°C, the enthalpy of the following processes are given:

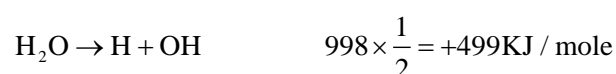
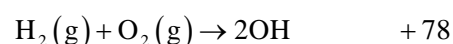
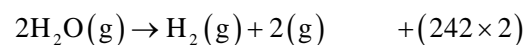


What would be the value of X for the following reaction?

(Nearest integer)



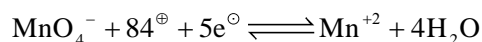
Sol. 499



57. At what pH, given half cell $\text{MnO}_4^- (0.1\text{M}) \mid \text{Mn}^{2+} (0.001\text{M})$ will have electrode potential of 1.282 V ? (Nearest Integer)

Given $E_{\text{MnO}_4^-/\text{Mn}^{2+}}^0 = 1.54 \text{ V}, \frac{2.303RT}{F} = 0.059 \text{ V}$

Sol. 3



$$E = E^0 - \frac{0.059}{5} \log \frac{[\text{Mn}^{2+}]}{[\text{MnO}_4^-][\text{H}^+]^8}$$

$$1.282 = 1.54 - \frac{0.059}{5} \log \frac{10^{-3}}{10^{-1} \times [\text{H}^+]^8}$$

$$\frac{0.258 \times 5}{0.059} = \log \frac{10^{-2}}{[\text{H}^+]^8}$$

$$21.86 = -2 + 8\text{pH}$$

$$\text{pH} = 2.98 \approx 3$$

58. The density of 3M solution of NaCl is 1.0 g mL^{-1} . Molality of the solution is $\times 10^{-2} \text{ m}$. (Nearest integer).

Given: Molar mass of Na and Cl is 23 and 35.5 g mol^{-1} respectively.

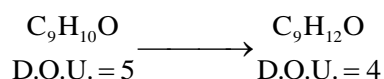
Sol. 364

$$m = \frac{1000 \times M}{1000d - M \times \text{M.wt}} = \frac{1000 \times 3}{1000 \times 1 - (3 \times 58.5)} = 3.64$$

$$= 364 \times 10^{-2}$$

59. Number of isomeric compounds with molecular formula $\text{C}_9\text{H}_{10}\text{O}$ which (i) do not dissolve in NaOH (ii) do not dissolve in HCl. (iii) do not give orange precipitate with 2,4DNP (iv) on hydrogenation give identical compound with molecular formula $\text{C}_9\text{H}_{12}\text{O}$ is

Sol. 2



Do not dissolve in NaOH, So no acidic group

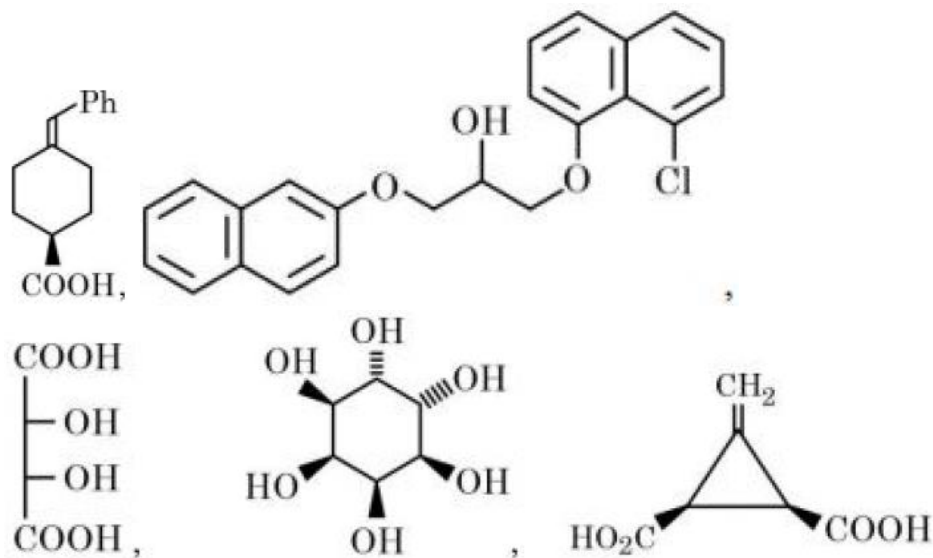
Do not dissolve in HCl, So no basic group, no alkene

Do not give orange PPT with 2, 4-DNP so no carbonyl group

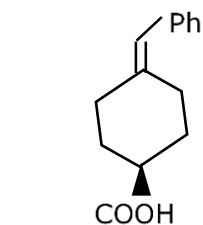
Possible compounds – cis and trans of $\text{Ph} - \text{CH} = \text{CH} - \text{O} - \text{CH}_3$

(Also Many possible products are there)

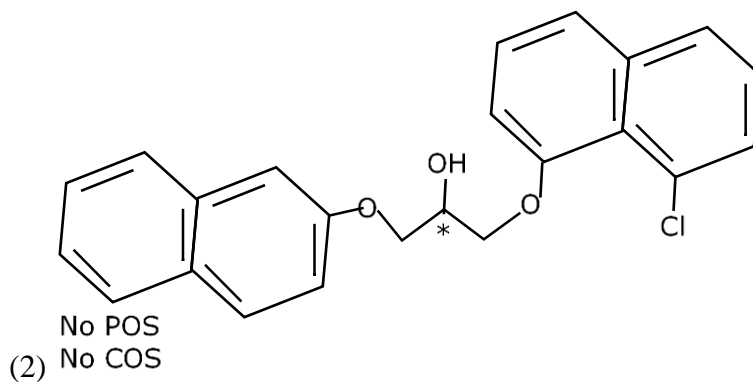
60. The total number of chiral compound/s from the following is



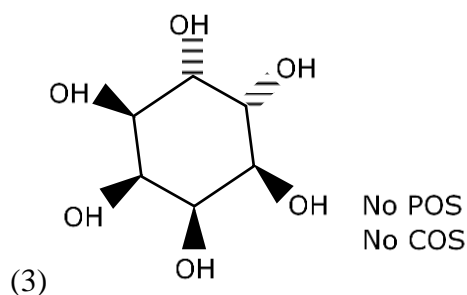
Sol.



(1) No POS
No COS



(2) No POS
No COS



(3)

No POS
No COS

Note :- Take note from gammaxene structure

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ADMISSION ANNOUNCEMENT

Session 2023-24 (English & हिन्दी Medium)

Target: JEE/NEET 2025
Nurture & प्रयास Batch
Class 10th to 11th Moving

Target: JEE/NEET 2024
Enthuse & प्रयास Batch
Class 11th to 12th Moving

Target: JEE/NEET 2024
Dropper & प्रयास Batch
Class 12th to 13th Moving

Target: PRE FOUNDATION
SIP, Evening & Tapasya Batch
Class 6th to 10th Students

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