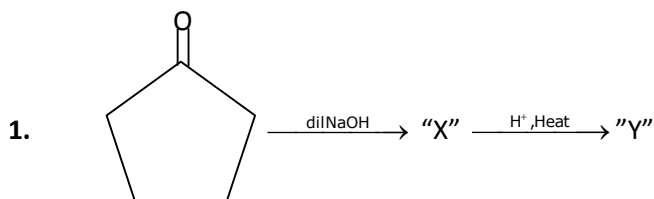
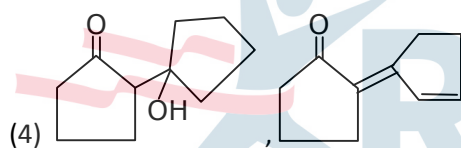
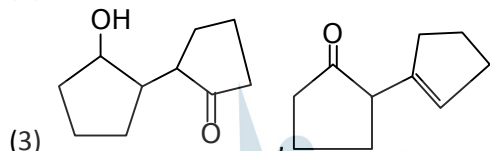
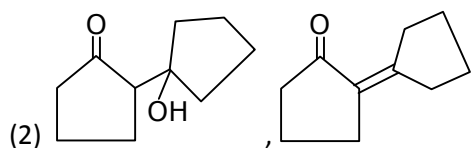
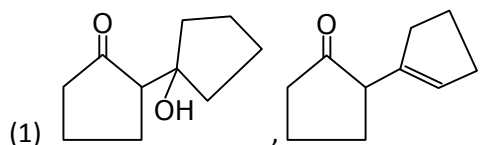


CHEMISTRY
JEE-MAIN (MARCH-Attempt) 18 MARCH
(Shift-2) Paper

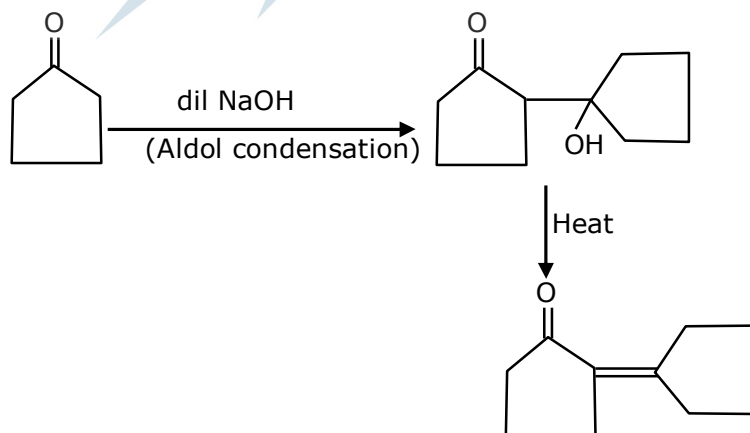
SECTION - A



Consider the above reaction, the product 'X' and 'Y' respectively are :



Ans. Sol.



2. The charges on the colloidal CdS sol and TiO₂ sol are, respectively :
- (1) positive and negative (2) negative and negative
 (3) negative and positive (4) positive and positive

Ans. (3)

Sol. CdS → Sulphide sol. → Negative sol.
 TiO₂ → Oxide sol. → Positive sol.

3. The oxide that shows magnetic property is :
 (1) SiO_2 (2) Na_2O (3) Mn_3O_4 (4) MgO

Ans. (3)

Sol. Mn_3O_4 is paramagnetic due to presence of unpaired electrons.

4. Given below are two statements :

Statement I : Bohr's theory accounts for the stability and line spectrum of Li^+ ion.

Statement II : Bohr's theory was unable to explain the splitting of spectral lines in the presence of a magnetic field.

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 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.

Ans. (3)

Sol. S-1 \rightarrow false

S-2 \rightarrow True

Hence option 3

5. Match List-I with List-II :

List-I	List-II
(1) Mercury	(i) Vapour phase refining
(2) Copper	(ii) Distillation Refining
(3) Silicon	(iii) Electrolytic Refining
(4) Nickel	(iv) Zone Refining

Choose the most appropriate answer from the option given below :

- (1) (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv) (2) (a)-(i), (b)-(iv), (c)-(ii), (d)-(iii)
 (3) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(ii) (4) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

Ans. (4)

Sol. Theory based

6. Match List-I with List-II :

List-I	List-II
(Class of Chemicals)	(Example)
(a) Antifertility drug	(i) Meprobamate
(b) Antibiotic	(ii) Alitame
(c) Tranquilizer	(iii) Norethindrone
(d) Artificial Sweetener	(iv) Salvarsan

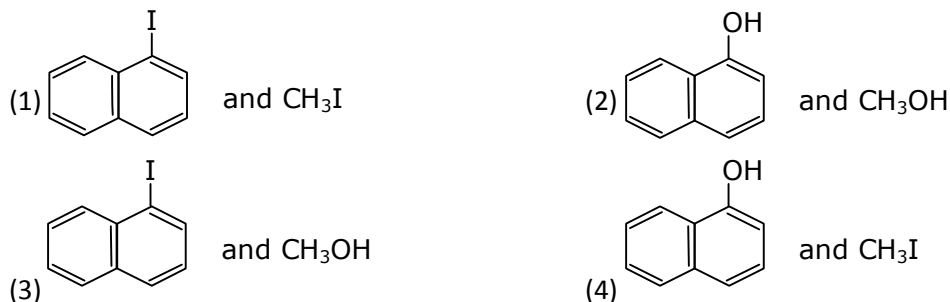
Options :

- (1) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i) (2) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
 (3) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii) (4) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

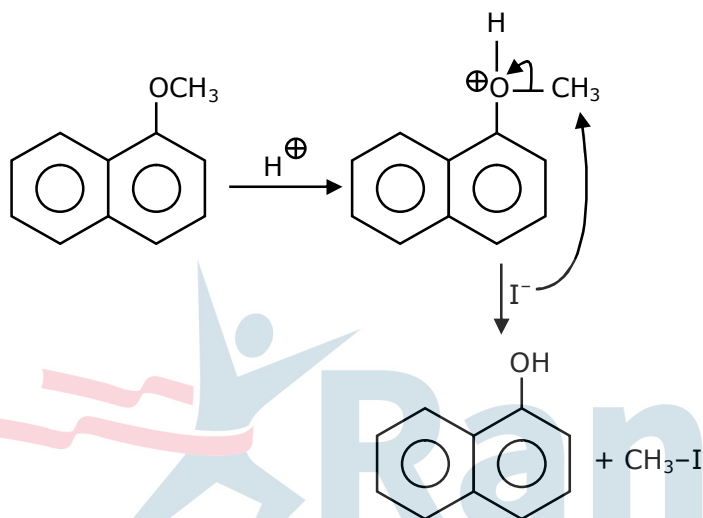
Ans. (4)

Sol. (a) Antifertility drug \longrightarrow Norethindrone
 (b) Antibiotic \longrightarrow Salvarsan
 (c) Tranquilizer \longrightarrow Meprobamate
 (d) Artificial sweetener \longrightarrow Alitame

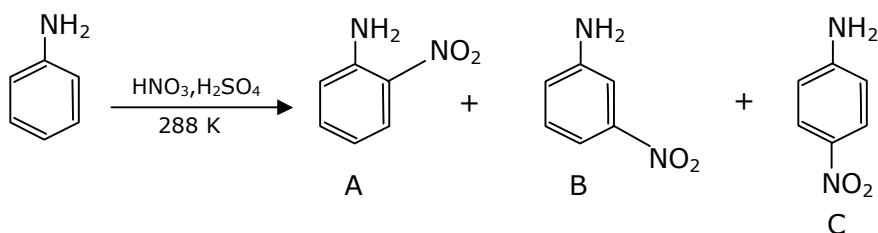
7. Main Products formed during a reaction of 1-methoxy naphthalene with hydroiodic acid are :



Ans. (4)
Sol.



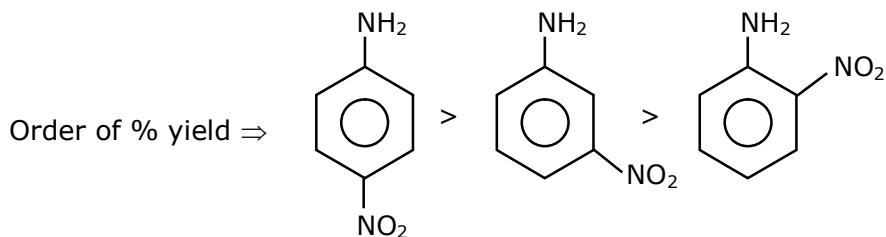
8.



Consider the given reaction, percentage yield of :

- (1) $\text{A} > \text{C} > \text{B}$ (2) $\text{B} > \text{C} > \text{A}$ (3) $\text{C} > \text{B} > \text{A}$ (4) $\text{C} > \text{A} > \text{B}$

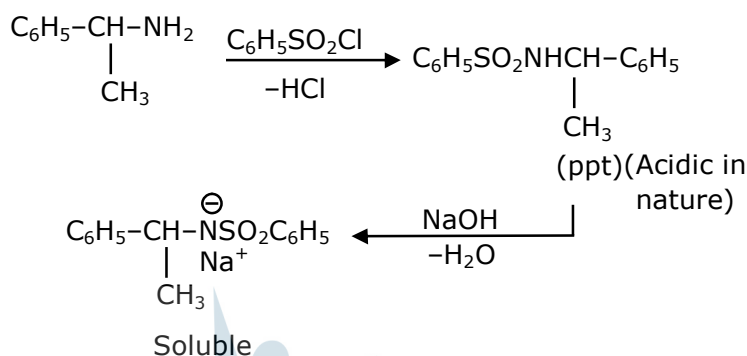
Ans. (3)
Sol.



9. An organic compound "A" on treatment with benzene sulphonyl chloride gives compound B. B is soluble in dil. NaOH solution. Compound A is :

- (1) $C_6H_5-N-(CH_3)_2$ (2) $C_6H_5-NHCH_2CH_3$
 (3) $C_6H_5-\underset{\substack{| \\ CH_3}}{CH}-NH_2$ (4) $C_6H_5-CH_2NHCH_3$

Ans. (3)
Sol.



10. The first ionization energy of magnesium is smaller as compared to that of elements X and Y, but higher than that of Z. The elements X, Y and Z, respectively are :

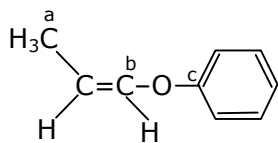
- (1) argon, lithium and sodium
 (2) chlorine, lithium and sodium
 (3) neon, sodium and chlorine
 (4) argon, chlorine and sodium

Ans. (4)

Sol. Order of I.E.

3rd period $\rightarrow Na < Al < Mg < Si < S < P < Cl < Ar$

11. In the following molecule,



Hybridisation of Carbon a, b and c respectively are :

- (1) sp^3, sp^2, sp^2 (2) sp^3, sp^2, sp (3) sp^3, sp, sp (4) sp^3, sp, sp^2

Ans. (1)

Sol. a $\rightarrow sp^3$
 b $\rightarrow sp^2$
 c $\rightarrow sp^2$

12. In the reaction of hypobromite with amide, the carbonyl carbon is lost as :
(1) HCO_3^- (2) CO_3^{2-} (3) CO_2 (4) CO

Ans. (2)
Sol. CO_3^{2-}

13. The oxidation states of nitrogen in NO, NO_2 , N_2O and NO_3^- are in the order of :
(1) $\text{NO}_2 > \text{NO}_3^- > \text{NO} > \text{N}_2\text{O}$ (2) $\text{N}_2\text{O} > \text{NO}_2 > \text{NO} > \text{NO}_3^-$
(3) $\text{NO}_3^- > \text{NO}_2 > \text{NO} > \text{N}_2\text{O}$ (4) $\text{NO} > \text{NO}_2 > \text{N}_2\text{O} > \text{NO}_3^-$

Ans. (3)
Sol. O.S. of 'N'
NO \rightarrow +2
 $\text{NO}_2 \rightarrow$ +4
 $\text{N}_2\text{O} \rightarrow$ +1
 $\text{NO}_3^- \rightarrow$ +5

Decreasing order of ox. state of 'N' is as follows
 $\text{NO}_3^- > \text{NO}_2 > \text{NO} > \text{N}_2\text{O}$

14. Match List-I and List-II :

List-I	List-II
(a) Be	(i) treatment of cancer
(b) Mg	(ii) extraction of metals
(c) Ca	(iii) incendiary bombs and signals
(d) Ra	(iv) windows of X-ray tubes
	(v) bearings for motor engines

Choose the most appropriate answer from the option given below :

Options :

- (1) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(v)
(2) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
(3) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
(4) (a)-(iii), (b)-(iv), (c)-(v), (d)-(ii)

Ans. (3)

Sol. Fact (NCERT)

Due to radioactive nature Ra - is used in treatment of cancer.

15. Deficiency of vitamin K causes:
(1) Cheilosis
(2) Increase in blood clotting time
(3) Increase in fragility of RBC's
(4) Decrease in blood clotting time

Ans. (2)

Sol. Deficiency of vitamin "K" causes \uparrow in blood clotting time.

16. Given below are two statements :
 Statement I : C_2H_5OH and $AgCN$ both can general nucleophile.
 Statement II : KCN and $AgCN$ both will generate nitrile nucleophile with all reaction condition.
 Choose the most appropriate option:
 (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 false.
 (4) Both statement I and statement II are true.

Ans. (2)

Sol. $\Rightarrow C_2H_5OH$ & $AgCN$ both can generate nucleophile
 $\Rightarrow AgCN$ & KCN both not generate nitrite nucleophile in all reaction condition.

17. Given below are two statements :
 Statement I : Non-biodegradable wastes are generated by the thermal power plants.
 Statement II : Bio-degradable detergents leads to eutrophication.
 In the light of the above statements, choose the most appropriate answer from the options given below.
 Options :
 (1) Statement I is false but statement II is true.
 (2) Both statement I and statement II are true.
 (3) Both statement I and statement II are false
 (4) Statement I is true but statement II is false.

Ans. (2)

Sol. Fact (NCERT-Based)

18. A hard substance melts at high temperature and is an insulator in both solid and in molten state. This solid is most likely to be a/an :
 (1) Metallic solid (2) Covalent solid
 (3) Ionic solid (4) Molecular solid

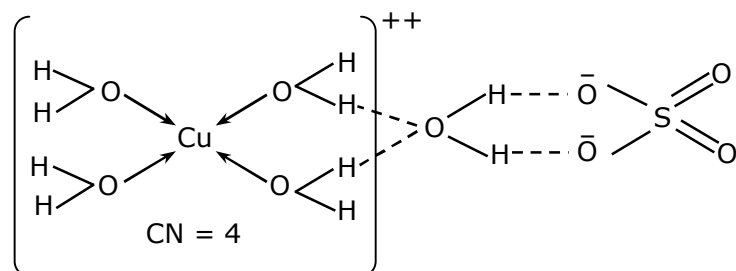
Ans. (2)

Sol. If substance is insulator in solid & molten both phase, then it can't be ionic or metallic solid.
 If melting pt. is higher, then it can't be molecular solid.
 \therefore It should be covalent network solid.

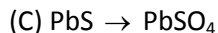
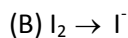
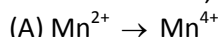
19. The secondary valency and the number of hydrogen bounded water molecule(s) in $CuSO_4 \cdot 5H_2O$, respectively, are :
 (1) 6 and 4 (2) 4 and 1 (3) 5 and 1 (4) 6 and 5

Ans. (2)

Sol.



20. In basic medium, H_2O_2 exhibits which of the following reactions ?



Choose the most appropriate answer from the options given below :

(1) (A), (C) only

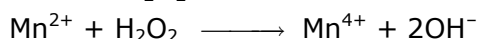
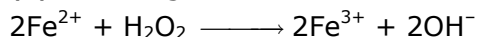
(2) (A) only

(3) (B) only

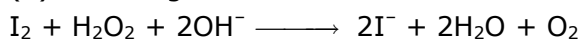
(4) (A), (B) only

Ans. (4)

Sol. (1) Oxidising action in basic medium



(2) Reducing action in basic medium



SECTION - B

1. The solubility of CdSO_4 in water is $8.0 \times 10^{-4} \text{ mol L}^{-1}$. Its solubility in 0.01 M H_2SO_4 solution is _____ $\times 10^{-6} \text{ mol L}^{-1}$. (Round off to the Nearest Integer).

Assume that solubility is much less than 0.01 M)

Ans. 64

Sol. $\text{CdSO}_4(\text{s}) \rightleftharpoons \text{Cd}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$

$$S = 8 \times 10^{-4} \quad K_{\text{sp}} = S^2 = 64 \times 10^{-8}$$



$$K_{\text{sp}}(\text{CdSO}_4) = 64 \times 10^{-8} = s(s + 10^{-2})$$

$$64 \times 10^{-8} \approx s \times 10^{-2} = 64 \times 10^{-6}$$

2. The molar conductivities at infinite dilution of barium chloride, sulphuric acid and hydrochloric acid are 280, 860 and 426 $\text{S cm}^2 \text{ mol}^{-1}$ respectively. The molar conductivity at infinite dilution of barium sulphate is _____ $\text{S cm}^2 \text{ mol}^{-1}$. (Round off to the Nearest Integer).

Ans. 288

Sol. $\lambda_{\text{M}}^{\infty}(\text{BaCl}_2) = 280$

$$\lambda_{\text{M}}^{\infty}(\text{H}_2\text{SO}_4) = 860$$

$$\lambda_{\text{M}}^{\infty}(\text{HCl}) = 426$$

$$\lambda_{\text{M}}^{\infty}(\text{BaSO}_4) = ??$$

$$= \lambda_{\text{M}}^{\infty}(\text{H}_2\text{SO}_4) + \lambda_{\text{M}}^{\infty}(\text{BaCl}_2) - 2 \times \lambda_{\text{M}}^{\infty}(\text{HCl})$$

$$= 860 + 280 - 2 \times 426$$

$$= 288$$

3. A reaction has a half life of 1 min. The time required for 99.9% completion of the reaction is _____ min.
(Round off to the nearest integer)
[Use : $\ln 2 = 0.69$; $\ln 10 = 2.3$]

Ans. 10

Sol. $t_{99.9\%} = ??$
 $\approx 10 \times t_{1/2}$
 $\approx 10 \text{ min}$

Derivation

$$t_{99.9\%} = \frac{1}{K} \ln \left\{ \frac{100}{0.1} \right\} = \frac{1}{K} \ln(1000)$$

$$= \frac{3}{K} \ln(10) = 3 \frac{(t_{1/2})}{\ln(2)} \times \ln(10)$$

$$= 3 \times (1 \text{ min}) \times \frac{\ln(10)}{\ln(2)}$$

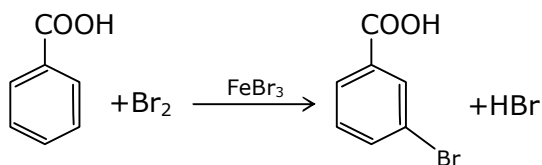
$$= \frac{3}{\log(2)} = \frac{3}{0.3} \approx 10 \text{ min}$$

4. The gas phase reaction
 $2A(g) \rightleftharpoons A_2(g)$
 at 400 K has $\Delta G^\circ = + 25.2 \text{ kJ mol}^{-1}$
 The equilibrium K_C for this reaction is _____ $\times 10^{-2}$. (Round off to the Nearest Integer).
 [Use : $R = 8.3 \text{ J mol}^{-1} \text{ K}^{-1}$, $\ln 10 = 2.3$
 $\log_{10} 2 = 0.30$, $1 \text{ atm} = 1 \text{ bar}$]
 [antilog $(-0.3) = 0.501$]

Ans. 2

Sol. Using formula
 $\Delta G^\circ = -RT \ln K_P$
 $25200 = -2.3 \times 8.3 \times 400 \log(K_P)$
 $K_P = 10^{-3.3} = 10^{-3} \times 0.501$
 $= 5.01 \times 10^{-4} \text{ Bar}^{-1}$
 $= 5.01 \times 10^{-5} \text{ Pa}^{-1}$
 $= \frac{K_C}{8.3 \times 400}$
 $K_C = 1.66 \times 10^{-5} \text{ m}^3/\text{mole}$
 $= 1.66 \times 10^{-2} \text{ L/mol}$
 Ans. 2

5.

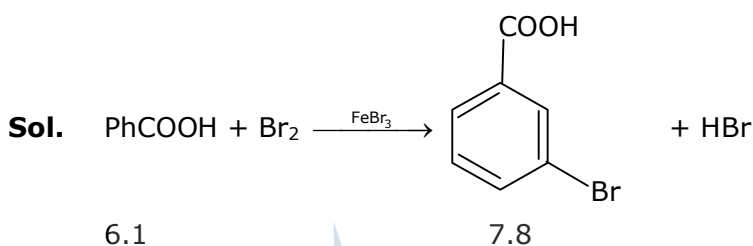


Consider the above reaction where 6.1 g of benzoic acid is used to get 7.8 g of m-bromo benzoic acid. The percentage yield of the product is _____

(Round off to the Nearest integer)

[Given : Atomic masses : C : 12.0 u, H : 1.0 u, O : 16.0 u, Br : 80.0 u]

Ans. 78



$$\frac{\text{moles of PhCOOH}}{1} = \frac{\text{Moles of C}_6\text{H}_4\text{COOHBr}}{1}$$

$$\text{Moles of C}_6\text{H}_4\text{COOHBr} = \frac{6.1}{122} = \frac{1}{20} \text{ mol}$$

$$\text{mass of C}_6\text{H}_4\text{COOHBr} = 201 \times \frac{1}{20} \text{ gm}$$

$$\% \text{ yield} = \frac{7.8}{201/20} \times 100$$

$$= 77.612\%$$

$$\approx 78 \text{ Nearest Integer}$$

6. A solute A dimerizes in water. The boiling point of a 2 molal solution of A is 100.52°C. The percentage association of A is _____. (Round off to the Nearest integer.)

[Use : K_b for water = 0.52 K kg mol⁻¹

Boiling point of water = 100°C]

Ans. 1



$$N = \frac{1}{2}$$

$$m = 2; T_b \text{ soln.} = 100.52$$

$$\Delta T_b = 0.52$$

$$= i \times K_b \times m$$

$$0.52 = i \times 0.52 \times 2$$

$$i = \frac{1}{2} = 1 + 1 + \left(\frac{1}{2} - 1\right)\alpha$$

$$\frac{\alpha}{2} = \frac{1}{2}$$

$$\alpha = 1$$

7. The number of species below that have two lone pairs of electrons in their central atom is _____.
(Round off to the Nearest Integer.)

SF₄, BF₄⁻, ClF₃, AsF₃, PCl₅, BrF₅, XeF₄, SF₆

Ans. (2)

Sol. ClF₃ and XeF₄ have two lp-in their central atom

8. 10.0 mL of Na₂CO₃ solution is titrated against 0.2 M HCl solution. The following titre values were obtained in 5 readings.

4.8 mL, 4.9 mL, 5.0 mL, 5.0 mL and 5.0 mL

Based on these readings, and convention of titrimetric estimation the concentration of Na₂CO₃ solution is _____ mM.

(Round off to the Nearest Integer)

Ans. 50

Sol. Na₂CO₃ + HCl →

10ml 0.2M

M = ?? 5ml

M_{eq.} of Na₂CO₃ = M_{eq.} of HCl

M × 10 × 2 = 0.2 × 5 × 1

M = 5 × 10⁻²M = 50 × 10⁻³M = 50 mM

Ans 50

9. In Tollen's test for aldehyde, the overall number of electron(s) transferred to the Tollen's reagent formula [Ag(NH₃)₂]⁺ per aldehyde group to form silver mirror is _____

(Round off to the Nearest Integer)

Ans. (2)

Sol. R - CHO $\xrightarrow{2[Ag(NH_3)_2]^+ OH^-}$ RCOOH + 2Ag + 2NH₃ + H₂O

2Ag⁺ $\xrightarrow{2e^-}$ 2Ag

10. A xenon compound 'A' upon partial hydrolysis gives XeO₂F₂. The number of lone pair of electrons presents in compound A is _____. (Round off to the Nearest Integer).

Ans. (19)

Sol. Partial Hydro $\left\{ \begin{array}{l} XeF_6 + H_2O \longrightarrow XeOF_4 + 2HF \\ XeF_6 + 2H_2O \longrightarrow XeO_2F_2 + 4HF \end{array} \right.$

Complete hydrolysis $\{ XeF_6 + 3H_2O \longrightarrow XeO_3 + 6HF$