
# 18th March 2021 | Shift - 2

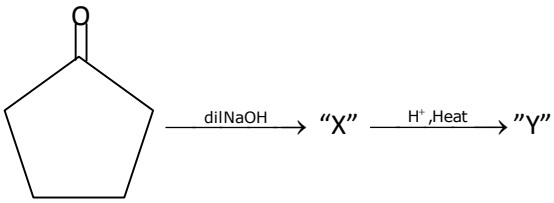
# CHEMISTRY

JEE I NEET I Foundation

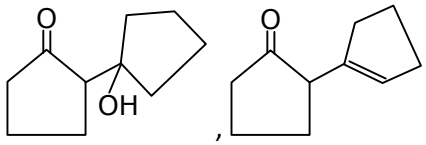
MOTION™

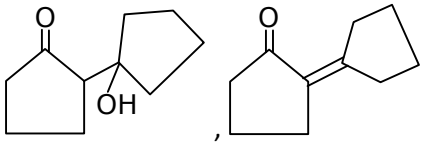
25000+
SELECTIONS SINCE 2007

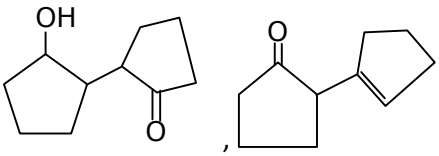
## SECTION - A

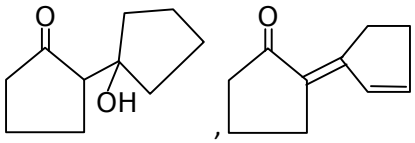
**1.** 


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

(1) 

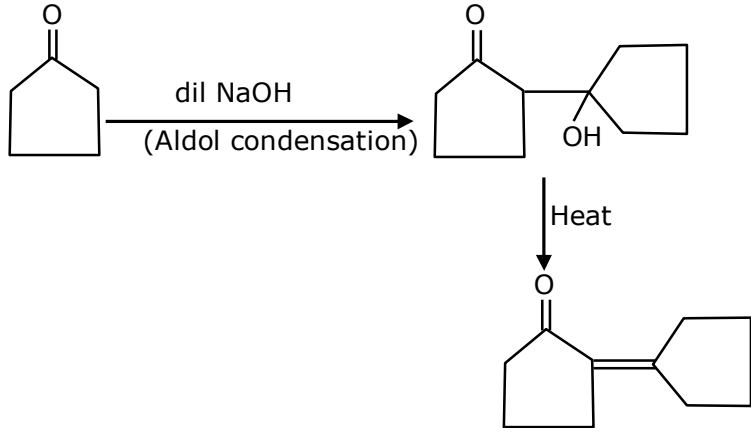
(2) 

(3) 

(4) 

**Ans.** **(2)**

**Sol.**




**2.** The charges on the colloidal CdS sol and $TiO_2$ sol are, respectively :

(1) positive and negative (2) negative and negative

(3) negative and positive (4) positive and positive

**Ans.** **(3)**

**Sol.** CdS $\rightarrow$ Sulphide sol. $\rightarrow$ Negative sol.

$TiO_2$ $\rightarrow$ Oxide sol. $\rightarrow$ 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)**

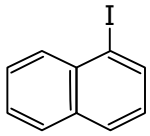
**Sol.** (a) Antifertility drug $\longrightarrow$ Norethindrone

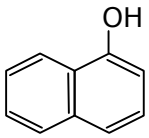
(b) Antibiotic $\longrightarrow$ Salvarsan

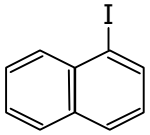
(c) Tranquilizer $\longrightarrow$ Meprobamate

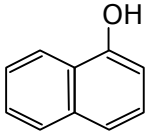
(d) Artificial sweetener $\longrightarrow$ Alitame

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

(1)  and $CH_3I$

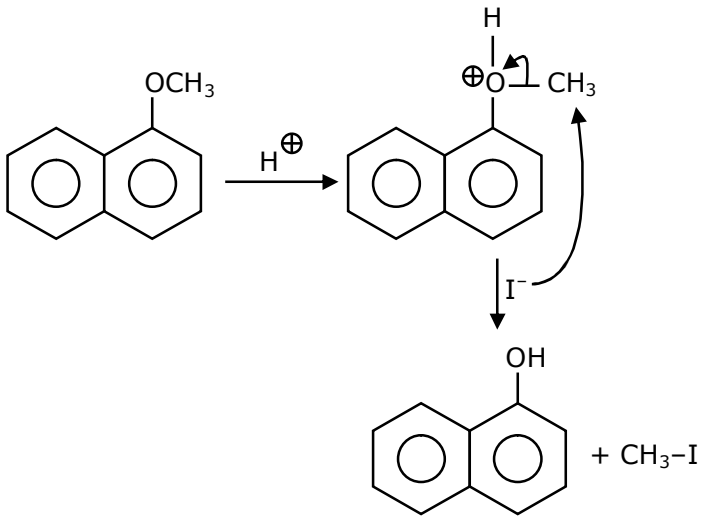
(2)  and $CH_3OH$

(3)  and $CH_3OH$

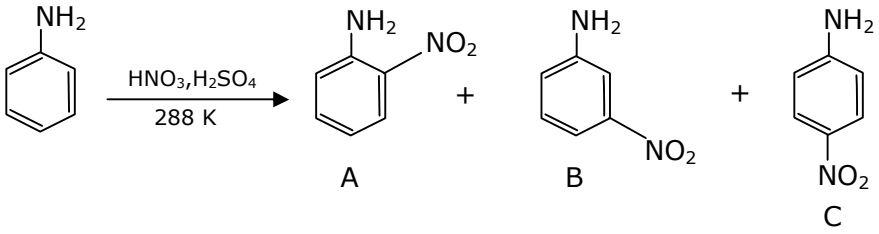
(4)  and $CH_3I$

**Ans. (4)**

**Sol.**




**8.**

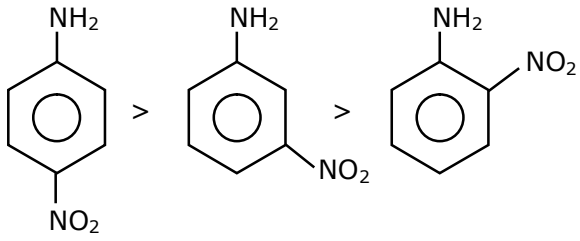



Consider the given reaction, percentage yield of :

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

**Ans. (3)**

**Sol.**

Order of % yield ⇒ 

**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) $C_6H_5–\underset{\displaystyle CH_3}{\underset{|}{CH}}–NH_2$

(4) $C_6H_5–CH_2\,NH\,CH_3$

**Ans.** **(3)**

**Sol.**

$$C_6H_5–\underset{\displaystyle CH_3}{\underset{|}{CH}}–NH_2 \xrightarrow[-HCl]{C_6H_5SO_2Cl} C_6H_5SO_2NH\underset{\displaystyle CH_3}{\underset{|}{CH}}–C_6H_5$$

(ppt)(Acidic in nature)

$$C_6H_5–\underset{\displaystyle CH_3}{\underset{|}{CH}}–\overset{\ominus}{N}SO_2C_6H_5\ Na^+ \xleftarrow[-H_2O]{NaOH}$$

Soluble

**10.** The first ionization energy of magnesium is smaller as compound 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

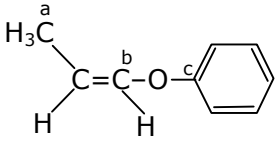
(4) argon, chlorine and sodium

**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 $\longrightarrow$ $sp^3$

b $\longrightarrow$ $sp^2$

c $\longrightarrow$ $sp^2$

**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) $NO_2 > NO_3^- > NO > N_2O$ (2) $N_2O > NO_2 > NO > NO_3^-$

(3) $NO_3^- > NO_2 > NO > N_2O$ (4) $NO > NO_2 > N_2O > NO_3^-$

**Ans.** **(3)**

**Sol.** O.S. of 'N'

$NO \rightarrow +2$

$NO_2 \rightarrow +4$

$N_2O \rightarrow +1$

$NO_3^- \rightarrow +5$

Decreasing order of ox. state of 'N' is as follows

$NO_3^- > NO_2 > NO > N_2O$

**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 ↑ 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

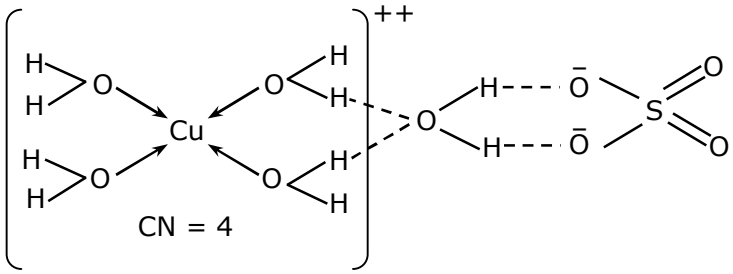
**Ans.** **(2)**

**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 $CuSO_4.5H_2O$, 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 ?

(A) $Mn^{2+} \rightarrow Mn^{4+}$

(B) $I_2 \rightarrow I^-$

(C) $PbS \rightarrow PbSO_4$

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

$2Fe^{2+} + H_2O_2 \longrightarrow 2Fe^{3+} + 2OH^-$

$Mn^{2+} + H_2O_2 \longrightarrow Mn^{4+} + 2OH^-$

(2) Reducing action in basic medium

$I_2 + H_2O_2 + 2OH^- \longrightarrow 2I^- + 2H_2O + O_2$

$2MnO_4^- + 3H_2O_2 \longrightarrow 2MnO_2 + 3O_2 + 2H_2O + 2OH^-$

## SECTION - B

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

Assume that solubility is much less than 0.01 M)

**Ans.** **64**

**Sol.** $CdSO_4(s) \rightleftharpoons Cd^{+2}(aq) + SO_4^{2-}(aq)$

$S \qquad S$

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

$CdSO_4(s) \rightleftharpoons Cd^{+2} + SO_4^{2-}$

$S \qquad S + 10^{-2}$

$K_{sp}(CdSO_4) = 64 \times 10^{-8} = s(s + 10^{-2})$

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

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

**Ans.** **288**

**Sol.** $\lambda_M^\infty(BaCl_2) = 280$

$\lambda_M^\infty(H_2SO_4) = 860$

$\lambda_M^\infty(HCl) = 426$

$\lambda_M^\infty(BaSO_4) = ??$

$= \lambda_M^\infty(H_2SO_4) + \lambda_M^\infty(BaCl_2) - 2 \times \lambda_M^\infty(HCl)$

$= 860 + 280 - 2 \times 426$

$= 288$

**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 = 23]

**Ans.** **10**

**Sol.** $t_{99.9\%} = ??$

$\simeq 10 \times t_{1/2}$

$\simeq 10\,\text{min}$

Derivation

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

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

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

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

**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 J $\text{mol}^{-1}$ $K^{-1}$, ln 10 = 2.3

$\log_{10} 2 = 0.30$, 1 atm = 1 bar]

[antilog (– 0.3) = 0.501]

**Ans.** **2**

**Sol.** Using formula

$\Delta G^\circ = -RT\ln K_P$

$25200 = -2.3 \times 8.3 \times 400 \log (K_P)$

$K_P = 10^{-3.3} = 10^{-3} \times 0.501$

$= 5.01 \times 10^{-4}\ \text{Bar}^{-1}$

$= 5.01 \times 10^{-5}\ \text{Pa}^{-1}$

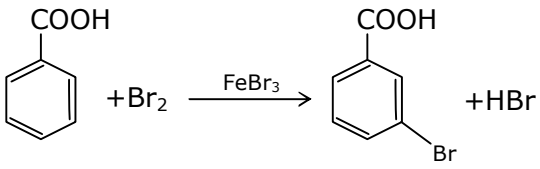
$$= \frac{K_C}{8.3 \times 400}$$

$K_C = 1.66 \times 10^{-5}\ \text{m}^3/\text{mole}$

$= 1.66 \times 10^{-2}$ L/mol

Ans. 2

**5.**

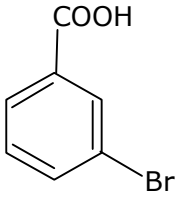



Consider the above reaction where 6.1 g of benzoic acid is used to get 7.8 g of m-bromo benzoic acid. The percentage yield of the product is _____

(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**

**Sol.** $PhCOOH + Br_2 \xrightarrow{FeBr_3}$  $+ HBr$



6.1 7.8

$$\frac{\text{moles of PhCOOH}}{1} = \frac{\text{Moles of } C_6H_4COOHBr}{1}$$

$$\text{Moles of } C_6H_4COOHBr = \frac{6.1}{122} = \frac{1}{20}\text{mol}$$

$$\text{mass of } C_6H_4COOHBr = 201 \times \frac{1}{20}\text{gm}$$

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

$= 77.612\%$

$\simeq$ 78 Nearest Integer

**6.** A solute A dimerizes in water. The boiling point of a 2 molal solution of A is 100.52ºC. 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 = 100ºC]

**Ans.** **1**

**Sol.** $2A \longrightarrow A_2$

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

$m = 2$; $T_b$ 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.)
$SF_4$, $BF_4^-$, $ClF_3$, $AsF_3$, $PCl_5$, $BrF_5$, $XeF_4$, $SF_6$

**Ans.** **(2)**

**Sol.** $ClF_3$ and $XeF_4$ have two lp-in their central atom

**8.** 10.0 mL of $Na_2CO_3$ solution is titrated against 0.2 M HCl solution. The following litre 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 $Na_2CO_3$ solution is _____ mM.
(Round off to the Nearest Integer)

**Ans.** **50**

**Sol.** $Na_2CO_3 + HCl \longrightarrow$
10ml 0.2M
M = ?? 5ml
$M_{eq.}$ of $Na_2CO_3$ = $M_{eq.}$ of HCl
$M \times 10 \times 2 = 0.2 \times 5 \times 1$
$M = 5 \times 10^{-2} M = 50 \times 10^{-3} M = 50$ mM
Ans 50

**9.** In Tollen's test for aldehyde, the overall number of electron(s) transferred to the Tollen's reagent formula $[Ag(NH_3)_2]^+$ per aldehyde group to form silver mirror is _____
(Round off to the Nearest Integer)

**Ans.** **(2)**

**Sol.** $R - CHO \xrightarrow{2\left[Ag(NH_3)_2\right]^+ OH^\ominus} RCOOH + 2Ag + 2NH_3 + H_2O$

$2Ag^+ \xrightarrow{2e^-} 2Ag$

**10.** A xenon compound 'A' upon partial hydrolysis gives $XeO_2F_2$. The number of lone pair of electrons presents in compound A is _____. (Round off to the Nearest Integer).

**Ans.** **(19)**

**Sol.** Partial Hydro $\begin{cases} XeF_6 + H_2O \longrightarrow XeOF_4 + 2HF \\ XeF_6 + 2H_2O \longrightarrow XeO_2F_2 + 4HF \end{cases}$

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

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