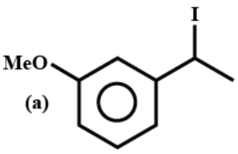
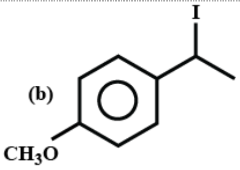
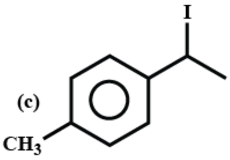
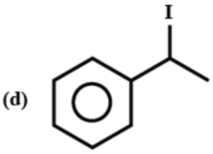
**#1612236**

**Topic:** Optical Isomerism









Rate of $S_N1$ reaction for the following compounds is:

A $a > b > c > d$

B $b > c > a > d$

C $b > c > d > a$`

D $d > c > b > a$

**Solution**

Solution:- (C) $b > c > d > a$

The $Sn1$ reactivity is proportional to stability of carbocations formed in the rate determining step.

**#1612237**

**Topic:** Preparation of some addition polymers

In a given polymers which is a condensation polymer?

A Teflon

B Neoprene

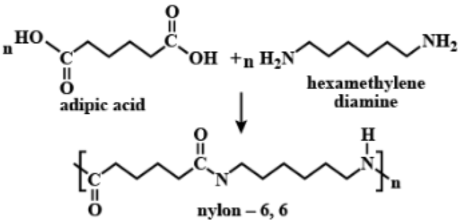
C Buna-S

D Nylon-6,6

**Solution**

Solution:- (D) Nylon-$6, 6$

Except Nylon-$6, 6$ all other given polymers are addition polymers.



**#1612239**

**Topic:** Chemical reactions of amines

$CH_3 - \underset{CH}{\overset{OH}{|}} - CH_2 - CH_2 - NH_2 \xrightarrow[Triethylamine]{Ethyl\ formate} Product$

The major product of the given reaction is:

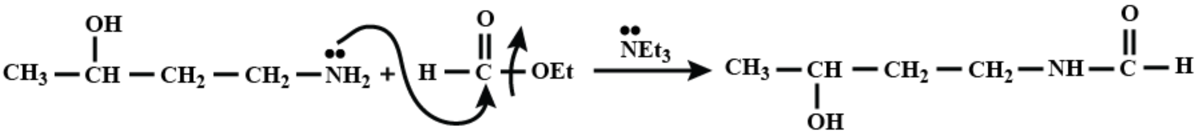
A $CH_3 - CH = CH - CH_2 - NH_2$

B $CH_3 - CH|^{OH} - CH = CH_2$

C $CH_3 - CH|^{O-C|_O-H} - CH_2 - CH_2 - NH_2$

D $CH_3 - CH|^{OH} - CH_2 - CH_2 - NH - \overset{O}{\underset{C}{||}} - H$

**Solution**



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**#1612241**
**Topic:** Methods of preparation of amines

N-Ethylphthalimide $\longrightarrow$ Ethylamine

Reagent for the conversion of this reaction is:

A $H_2O$

B $NaBH_4$

$\boxed{C}$ $NH_2 - NH_2$

D $CaH_2$

---

**#1612242**
**Topic:** Disaccharides and polysaccharides

Which type of Linkage is present in amylopectin?

A $\alpha - D - Glucose, C_1 - C_4$ & $C_2 - C_6$

$\boxed{B}$ $\alpha - D - Glucose, C_1 - C_4$ & $C_1 - C_6$

C $\beta - D - Glucose, C_1 - C_4$ & $C_2 - C_6$

D $\beta - D - Glucose, C_1 - C_4$ & $C_1 - C_6$

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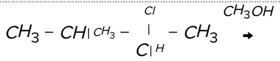
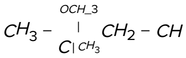
**#1612252**
**Topic:** Chemical reactions of haloalkanes - Substitution reactions



$CH_3 - CH|{}_{CH_3} - \overset{Cl}{\underset{C|{}^{H}}{|}} - CH_3 \xrightarrow{CH_3OH}$

Major product is:

A $CH_3 - CH_2|{}_{CH_3}$

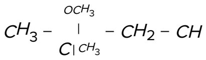
$\boxed{B}$ 

$CH_3 - \overset{OCH\_3}{\underset{C|{}_{CH_3}}{|}} CH_2 - CH$

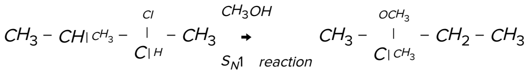
C $CH_3 - C|{}_{CH_3} = CH - CH_3$

D $CH_3 - CH|{}_{CH_3} - CH = CH_2$

**Solution**

Solution:- (B) 

$CH_3 - \overset{OCH_3}{\underset{C|{}_{CH_3}}{|}} - CH_2 - CH$



$CH_3 - CH|{}_{CH_3} - \overset{Cl}{\underset{C|{}^{H}}{|}} - CH_3 \xrightarrow[S_N1 \quad reaction]{CH_3OH} CH_3 - \overset{OCH_3}{\underset{C|{}_{CH_3}}{|}} - CH_2 - CH_3$

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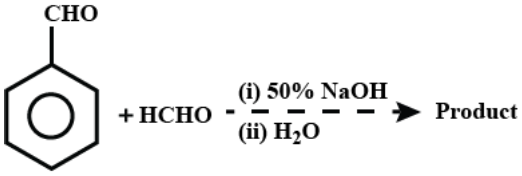
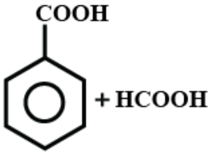
**#1612255**
**Topic:** Chemical properties of aldehydes and ketones

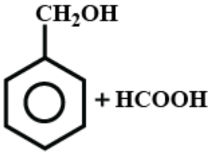


Find the product of the given reaction.

A

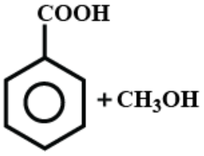


[✓ B]



C $CH_3OH + HCOOH$

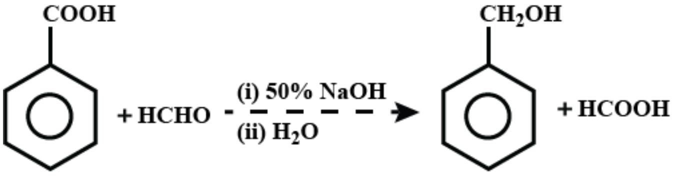
D



**Solution**

Solution:- (B)

Malor product is obtained through cross Cannizzaro reaction.



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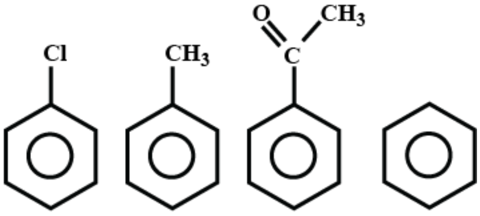
**#1612261**

**Topic:** Types of organic reactions



The correct rate of reaction of given compounds towards electrophilic aromatic substitution reaction is:

[✓ A] $(b) > (d) > (a) > (c)$

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

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

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

**Solution**

Solution:- (A) $(b) > (d) > (a) > (c)$

The rate of reaction of given compounds towards electrophilic substitution reaction depends upon the electron density if benzene nucleus.

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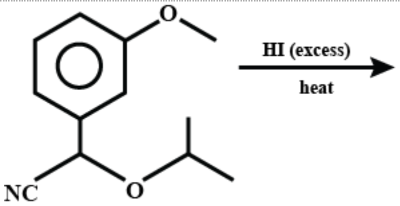
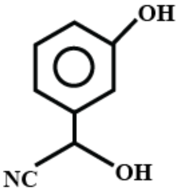
**#1612263**

**Topic:** Chemical reactions of ethers

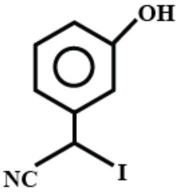


Major product is:

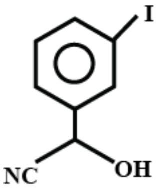
A



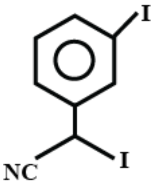
[✓ B]



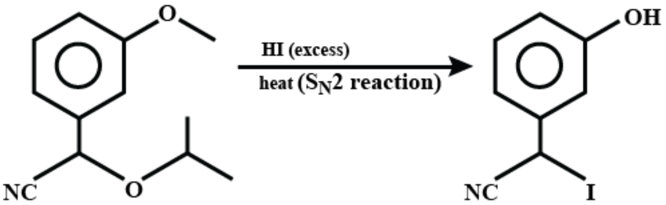
C



D



**Solution**



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**#1612265**

**Topic:** Chemical reactions occurring in atmosphere

In which layer of atmosphere there is cloud formation & in which layer we live respectively?

[✓ A] Troposphere & troposphere

B Troposphere & stratosphere

C Stratosphere & stratosphere

D stratosphere & troposphere

**Hint**

Fact.

---

**#1612278**

**Topic:** Study of d-Block elements

In $S_c^{3+}$, $T_i^{2+}$, $T_i^{3+}$, $V^{2+}$, increasing order of spin only magnetic moment is:

A $S_c^{3+} < T_i^{2+} < T_i^{3+} < V^{2+}$

[✓ B] $S_c^{3+} < T_i^{3+} < T_i^{2+} < V^{2+}$

C $T_i^{2+} < S_c^{3+} < T_i^{3+} < V^{2+}$

D $S_c^{3+} < T_i^{2+} < V^{2+} < T_i^{3+}$

**Solution**

Solution:- (B) $Sc^{3+} < Ti^{+3} < Ti^{+2} < V^{2+}$

$\mu = \sqrt{n(n+2)}$ B.M

For magnetic moment to be higher, number of unpaired electron must be higher

$Sc^{3+} \Rightarrow 3d^0 \quad \mu = 0$

$Ti^{2+} \Rightarrow 3d^2 \quad \sqrt{8}$ B.M

$Ti^{3+} \Rightarrow 3d^1 \quad \sqrt{3}$ B.M

$V^{2+} \Rightarrow 3d^3 \quad \sqrt{15}$ B.M

---

**#1612282**

**Topic:** Spontaneous and non-spontaneous process

In which case, process will be spontaneous at all temperatures?

[✓ A] $\Delta H < 0, \ \Delta S > 0$

B $\Delta H > 0, \ \Delta S > 0$

C $\Delta H < 0, \ \Delta S < 0$

D $\Delta H > 0, \ \Delta S < 0$

**Solution**

Solution:- (A) $\Delta H < 0$ and $\Delta S > 0$

For spontaneous process $\Delta G = \Delta H - T\Delta S$

$\because \Delta H < 0$

$\Delta S > 0$

---

**#1612291**

**Topic:** Crystal field theory

In the given complexes

$[Co(NH_3)_5(H_2O)]^{3+}$...1

$[Co(NH_3)_5Cl]^{2+}$....2

$[Co(NH_3)_6]^{3+}$.....3

The decreasing order of $\lambda$ absorbed is:

A $(iii) > (ii) > (i)$

B $(iii) > (i) > (ii)$

[✓ C] $(ii) > (i) > (iii)$

D $(ii) > (iii) > (i)$

**Solution**

Solution:- (C) $(ii) > (i) > (iii)$

$\lambda$ absorbed depends on strength of ligand. For stronger ligand, $\delta_0$ will be higher , $\lambda$ will be lesser.

$NH_3 > H_2O > Cl^-$ decreasing order of strength of ligand.

---

**#1612294**

**Topic:** Beryllium, calcium and magnesium

Which alloy is used in the manufacturing of Aeroplane?

[✓ A] $Mg - Al$

B $Mg - Sn$

C $Mg - Pb$

D $Mg - Sb$

**Solution**

Solution:- (A) $Mg - Al$

$Mg - Al$ alloy is used in manufacturing of Aeroplane.

**#1612298**
**Topic:** Adsorption

Adsorption of a gas follows the equation $\frac{x}{m} = kP^{1/2}$

Then the effect of pressure & temperature on physical adsorption of gas on solid is:

[✓ A] increase with pressure increase, decrease with temperature increase

B increase with both temperature & pressure increase

C decrease with pressure increase, increase with temperature increase

D decrease with both temperature & pressure increase.

**Solution**

Solution:- (A) Increase with pressure increase, decrease with temperature increase

Physical adoption increase on increasing pressure but decreases on increasing temperature.

---

**#1612303**
**Topic:** Carbon

In $C$, $Si$, $Ge$ and $Sn$ the decreasing order of catenation is:

A $C > Sn > Si = Ge$

[✓ B] $C > Si > Sn = Ge$

C $Si > Sn > C > Ge$

D $Ge > Sn > Si > C$

**Solution**

Solution:- (A) $C > Si > Ge \simeq Sn$

The decreasing order of catenation:$C > Si > Ge \simeq Sn$

---

**#1612307**
**Topic:** Refining

(a) Mond process (1) Ni

(b) Van-Arkel (2) Zr

(c) Liquation (3) Ga

(d)Zone refining (4) Sn

Correct option is:

A $a-(1)\ b-(2)\ c-(2)\ d-(4)$

[✓ B] $a-(1)\ b-(2)\ c-(4)\ d-(3)$

C $a-(3)\ b-(2)\ c-(4)\ d-(1)$

D $a-(2)\ b-(3)\ c-(4)\ d-(1)$

**Solution**

Solution:- (B) $a-(1)\ b-(2)\ c-(4)\ d-(3)$

(a) Mond process $\Rightarrow$ Ni

(b) Van-Arkel $\Rightarrow$ Zr

(c) Liquation $\Rightarrow$ Sn

(d)Zone refining $\Rightarrow$ Ga

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**#1612313**
**Topic:** Vapour Pressure of Liquid Solutions and Raoult's Law

$0.6g$ urea is added to $360g$ water. Calculate lowering in vapor pressure for this solution

(Given: Vapour pressure of $H_2O$ is $35mm$ of $Hg$)

A $0.027mm$ of $Hg$

B $0.035 mm$ of $Hg$

[✓ C] $0.017 mm$ of $Hg$

D $0.040 mm$ of $Hg$

**Solution**

Solution:- (C) $0.017 mm$ of $Hg$

$$\frac{P^0 - Ps}{P^0} = \frac{n}{n + N}$$

Lowering in V.P.= $P^0 \times \frac{n}{n + N}$

$$= 35 \times \frac{\frac{0.6}{60}}{\frac{0.6}{60} + \frac{360}{18}} = 0.017 mm \text{ of Hg}$$

---

**#1612328**

**Topic:** Percentage composition, empirical and molecular formula

$10 ml$ of hydrocarbon requires $55 ml$ of oxygen for complete combustion producing $40 ml$ of $CO_2$. The formula of the hydrocarbon is :

[✓ A] $C_4H_6$

B $C_5H_{10}$

C $C_4H_8$

D $C_4H_{10}$

**Solution**

Solution:- (A) $C_4H_6$

$$C_xH_y + (x + \frac{y}{4})O_2 \longrightarrow XCO_2 + \frac{y}{2}H_2O$$

$10 ml$ $55 ml$ $40 ml$

$\because \frac{10}{1} = \frac{40}{x}$ $\therefore x = 4$

$\because \frac{10}{1} = \frac{55}{(x + \frac{y}{4})} \Rightarrow \frac{10}{1} = \frac{55}{(4 + \frac{y}{4})} \Rightarrow y = 6$

Hydrocarbon is $C_4H_6$.

---

**#1612329**

**Topic:** Conductance of electrolytic solutions

$S_1 \rightarrow$ Conductivity increases on decreasing concentration of electroyte

$S_1 \rightarrow$ Molar Conductivity increases on decreasing concentration of electroyte

A $S_1$ is true, $S_2$ is False

B Both $S_1$ & $S_2$ are true

C Both $S_1$ & $S_2$ are false

[✓ D] $S_1$ is false, $S_2$ is true

**Solution**

Solution:- (D) $S_1$ is false, $S_2$ is true

Conductivity decreases on decreasing concentration of electroyte.

Molar conductivity increases on decreasing concentration of electroyte.

---

**#1612330**

**Topic:** Isomerism in coordination compounds

In which of the following complex, cis-trans isomerism is possible?

[✓ A] $[Pt(en)_2Cl_2]^{2+}$

B $[Cr(en)_2(Ox)]^+$

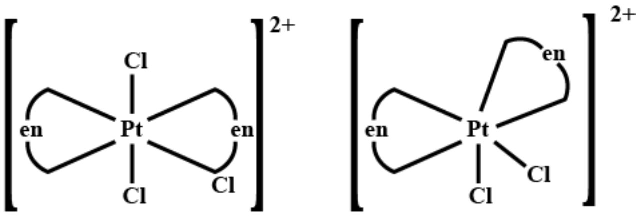
C $[Pt(en)Cl_2]$

D $[Pt(en)_2]^{2+}$

**Solution**

Solution:- (A) $[Pt(en)_2Cl_2]^{2+}$

all other do not show geometrical isomerism.



trans

cis

---

**#1612331**

**Topic:** Molecular orbital theory

In the conversion of $O_2 \longrightarrow O_2^-$ the incoming electron goes to the orbital:

$\boxed{\text{A}}$ $\pi^*2px$

B $\pi_{2px}$

C $\sigma^*_{2pz}$

D $\sigma_{2pz}$

**Solution**

Solution:- (A) $\pi^*2px$

$O_2 \Rightarrow (\sigma 1s)^2(\sigma^*1s)^2(\sigma 2s)^2(\sigma^*2s)^2(\sigma 2pz)^2(\pi^2 2px = \pi^2 2py)(\pi^{*1}2px = \pi^{*1}2py)$

In $O_2^-$ last electron will enter in $\pi^*2px$ or $\pi^*2py$ orbital

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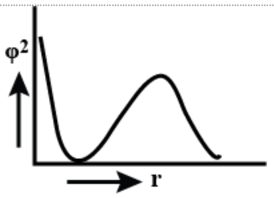
**#1612333**

**Topic:** Quantum mechanical model of atom



Give graph is of which orbital?

A $2p$

B $1s$

$\boxed{\text{C}}$ $2s$

D $3s$

**Solution**

Solution:- (C) $2s$

By the graph since $\Psi^2$is not zero at $r = 0$ it must be s orbital

also $n - \ell - 1 = 1$

$n = 2(\because \ell = 0)$

it is 2s orbital

---

**#1612339**

**Topic:** Le Chatelier's Principle

(i)For a weak monobasic acid $K_a = 10^{-5}$ vand $pH = 5$ then degree of dissociation of acid is $50\%$

(ii) $[H_2SO_4] = 0.1M$ $V = 400ml$

$[NaOH] = 0.1M$ $V = 400ml$

om mixing these solutions pH is approximately $1.3$

(iii) Ionic product of water depends on temperature

(iv) Le-chatelier's principle is not applicable fro common ion effect

Select the correct options:

[✓ A] $(i), (ii), (iii)$

B $(ii), (iii)$

C $(i), (ii), (iv)$

D $(ii), (iv)$

**Solution**

Solution:- (A) $(i), (ii), (iii)$

$K_a = 10^{-5}$ $[H^+] = 10^{-5}M = c\alpha$

$K_a = \frac{C\alpha^2}{(1-\alpha)} = \frac{c\alpha.\alpha}{1-\alpha}$

$10^{-5} = 10^{-5}.\frac{\alpha}{(1-\alpha)}$ $\alpha = \frac{1}{2}50\%$

(ii) millimoles of $H^+ = 0.1 \times 400 \times 2 = 80$

millimoles of $OH^- = 0.1 \times 400 = 40$

$[H^+] = \frac{40}{800} = \frac{1}{20} = 5 \times 10 - 2pH = 1.3$

(iii) Ionic product of water $(K_w)$ increases with increase in temperature

(iv) Le-chatelier principle is applicable for common ion effect.

---

**#1612341**

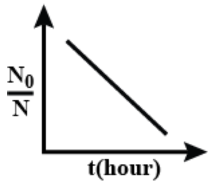
**Topic:** Nuclear chemistry

Growth of a bacteria is represented as $N(t) = N_0e^{\lambda t}$

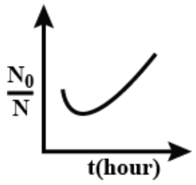
After one hour a drug is given which decrease bacterial growth as $\frac{dN}{dt} = -5N^2$

Which of the following graph is correct?

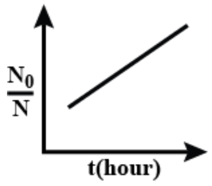
A



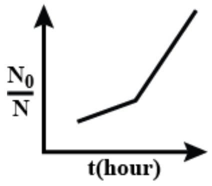
[✓ B]



C



D



**Solution**

Solution:- (B)

Initially (befor injecting drug) number of bacteria will increase. So $\frac{N_0}{N}$ will decrease but after injecting drug $N_t$ will decrease so $\frac{N_0}{N}$ will increase.

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**#1612342**
**Topic:** Nuclear chemistry

Two radioactive substance are having same initial number of nuclei. Disintegration constant of one substance is $10\lambda$, other one is $\lambda$. After how much time of number of nuclei becomes $\frac{1}{e}$?

[✓ A] $\frac{1}{9\lambda}$

B $\frac{1}{10\lambda}$

C $\frac{1}{11\lambda}$

D $\frac{1}{\lambda}$

**Solution**

Solution:- (A) $\frac{1}{9\lambda}$

$N_{t(I)} = N_0 e^{-10\lambda t}$

$N_{t(II)} = N_0 e^{-\lambda t}$

$\frac{N_{t(I)}}{N_{t(II)}} = \frac{1}{e} = \frac{N_0 e^{-10\lambda t}}{N_0 e^{-\lambda t}}$

$e_{-} = e^{-9\lambda t}$

$t = \frac{1}{9\lambda}$

---

**#1612343**
**Topic:** Sulphur, sulphur dioxide and sulphuric acid

Which of the follwoing does not have $S - S$ linkage ?

A $H_2S_2O_5$

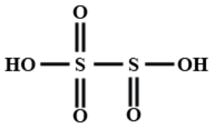
[✓ B] $H_2S_2O_7$

C $H_2S_2O_3$

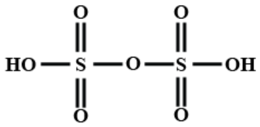
D $H_2S_2O_6$

**Solution**

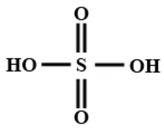
Solution:- $H_2S_2O_7$



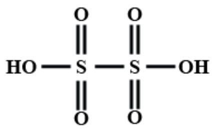
$(H_2S_2O_5)$



$(H_2S_2O_7)$



$(H_2S_2O_3)$



$(H_2S_2O_6)$

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**#1612345**
**Topic:** Behaviour of real gases - Deviations from ideal behaviour

For four gases vander-waal's constants a & b are given as following.

| Gas | a<br>$(p_aLi_t^2.\ mol_e^{-2}$ | b<br>$(Lit.\ mo_l^{-1}$ |
|---|---|---|
| A | 650 | 0.0051 |
| B | 155 | 0.0049 |
| C | 450 | 0.0051 |
| D | 155 | 0.049 |

Between gas A & C which has higher volume and between gas B & D which has higher compressibility?

A $A, B$

B $A, D$

[✓ C] $C, B$

D $C, D$

**Solution**

Soluton:- (C) $C, B$

For gases A & C , $'b'$ value is same so gas having higher value of $'a'$ i,e. higher force of attraction will have lesser volume. Gas C will have higher volume

$\therefore Z = 1 - \frac{a}{VRT} + \frac{Pb}{RT} \therefore$ gas $B$ will be more compressible

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**#1612347**

**Topic:** Isotopes, isobars, isotones and isoelectronics

In which of the following option all are isoelectronic?

[✓ A] $N^{3-}, O^{2-}, F^{-}, Na^{+}$

B $Na^{+}, N^{-3}, F^{-}, Li^{+}$

C $Li^{+}, N^{3-}, F^{-}, O^{2-}$

D $Li^{+}, Na^{+}, O^{2-}, F^{-}$

**Solution**

$N^{3-}, O^{2-}, F^{-}, Na^{+}$ are isoelectronic species each having 10 electrons.