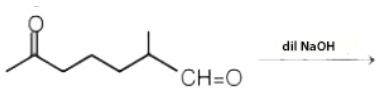
#1611359

Topic: Chemical properties of aldehydes and ketones



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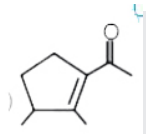
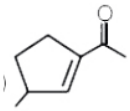
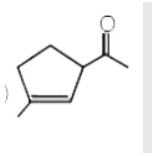
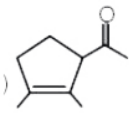
A 

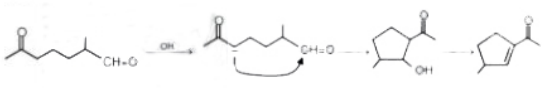
B 

C 

D 

Solution

It is example of intramolecular aldol condensation



#1611363

Topic: Introduction to water

Maximum concentration of copper in drinking water is:

A 5 ppm

B 3 ppm

C 0.3 ppm

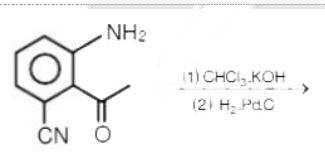
D 0.05 ppm

Solution

Maximum prescribed concentration of copper metal in drinking water is 3 ppm

#1611366

Topic: Chemical reactions of amines



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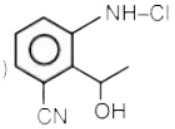
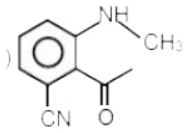
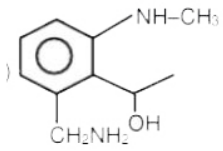
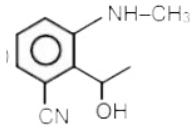
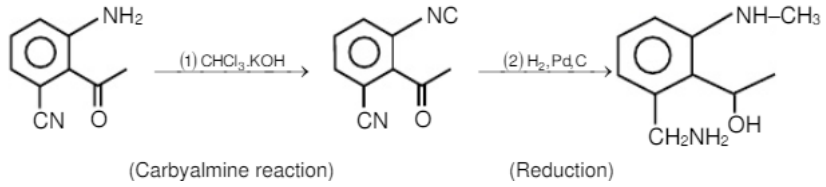
A 

B 

C 

D 

Solution



#1611372

Topic: Monosaccharides

Glucose and fructose can he distinguished by:

A Barford's tests

B Fehling solution

C Bendict solution

D Seliwanoff's test

Solution

Seliwanpff's test: Seliwanoff's reagent is (0.5%) resorcinol is $3N\ HCl$. It gives red solution with fructose and sucrose but no change in colour with glucose

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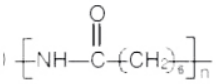
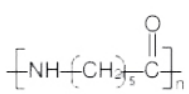
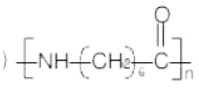
#1611376

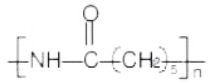
Topic: Preparation of some addition polymers

Which is the correct structure of Nylon-6?

A 

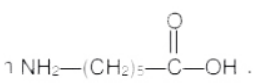
B 

C 

D 

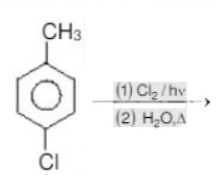
Solution

Nylon-6 will be derived from the ϵ-caprolactum which contain 6 carbon atoms.

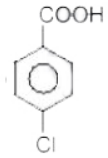


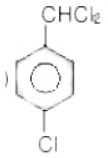
#1611381

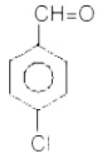
Topic: Chemical reactions of haloarenes

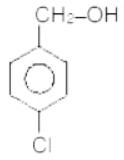


Product is:

A 

B 

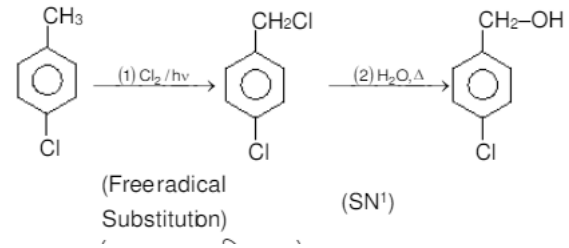
C 

D 

Solution

In the given reaction first the given compound undergo substitution reaction by undergoing free radical mechanism.

This compound then undergo hydrolysis to form $4-chloro\ benzyl\ alcohol$



#1611382

Topic: Chemical reactions of haloarenes

Polysubstitution is drawback of which reaction?

A Fiedel craft alkylation

B Friedel craft Acrylation

C Nitration on aromatic ring

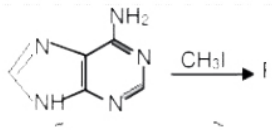
D Chlorination on aromatic ring

Solution

Friedel craft alkylation, the alkylated product obtained is more activated then reactant hence undergoes polysubstitution

#1611384

Topic: Chemical reactions of amines



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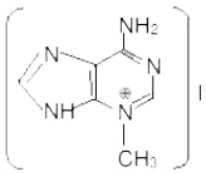
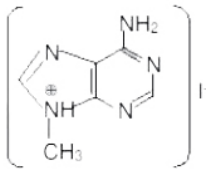
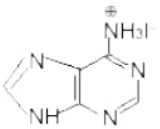
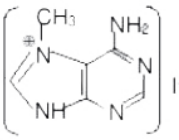
A 

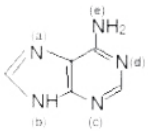
B 

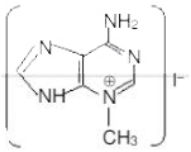
C 

D 

Solution

lone pair on N marked as (c) is most nucleophilic and form the compound as given in the reaction along with CH_3I





#1611385

Topic: Methods of preparation of haloalkanes

Which of the following alkenes wil give anti-Markownikoff's product as major product?

A $Cl-CH=CH_2$

B $CH_2-O-CH=CH_2$

C $NH_2-CH=CH_2$

D $CF_3-CH=CH_2$

Solution

CF_3 is a very strong $-I$ group hence it will favour anti-Markownikoff's product

$CF_3-CH=CH_2 \xrightarrow{HX} CF_3-CH_2-CH_2^+ \longrightarrow CF_3-CH_2-CH_2X$ (anti-Markownikoff's product)

#1611386

Topic: Chemical properties of aldehydes and ketones

Enol content is maximum in:

A $CH_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-CH_3$

B $CH_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-NH_3$

C $CH_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-OCH_3$

D $CH_3-\overset{O}{\overset{\|}{C}}-CH_3$

Solution

Enol content is maximum in the given

$CH_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-CH_3$

#1611387

Topic: Expressing concentration of solutions

$0.27g$ of fatty acid is dissolved in $100ml$ of solvent. $10ml$ such solution is taken and placed over the round plate. Distance from the center to the edge of the round plate is $10cm$. Now the solvent is evaporated and only fatty acid has remained. The density of fatty acid is $0.9g/cc$. Determine the height of fatty acid. ($\pi = 3$)

A $10^{-4}cm$

B $10^{-6}cm$

C $10^{-8}cm$

D $10^{-2}cm$

Solution

Mass of fatty acid $= 0;027g$

Density of fatty acid $= 0.9g/cc$

Volume of the fatty acid $= \dfrac{0.027}{0.9} = 0.03cm^3$

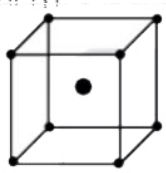
Area of plate $= \pi r^2 = 3 \times 10^2 = 300cm^2$

Volume of fatty acid =area of plate $\times$ height of fatty acid layer

$= 0.03cm^3 = 300 \times h \Rightarrow h = \dfrac{0.03}{300}cm = 10^{-4}cm$

#1611389

Topic: Close packing in crystals



When radius of central atom is double with respect to corner atoms, then find out % packing efficiency.

A 79%

B 90%

C 60%

D 65%

Solution

$\sqrt{3}a = 2r + 2(2r) = 6r$

$a = \frac{6r}{\sqrt{3}} = 2\sqrt{3}r$

$P.F = \frac{\frac{4}{3}\pi r^3 + \frac{4}{3}\pi(2r)^3}{a^3} = \frac{\frac{4}{3}\pi(r^3 + 8r^3)}{(2\sqrt{3}r)^3} = \frac{4\pi \times 9r^3}{3 \times 8 \times 3\sqrt{3}r^3} = \frac{\pi}{2\sqrt{3}} = 0.906$

% of packing efficiency $= 0.906 \times 100 = 90.6\%$

#1611390

Topic: Developments leading to quantum or wave mechanical model of atom

If the wavelength of particle of momentum P is equal to λ, then what will be its wavelength for momentum 1.5P?

A $\frac{2}{3}\lambda$

B $\frac{4}{3}\lambda$

C $\frac{3}{2}\lambda$

D λ

Solution

$\lambda = \frac{h}{P} \ldots . (1)$

$\lambda' = \frac{h'}{P} \ldots . (2)$

$\frac{(2)}{(1)} \Rightarrow \frac{\lambda'}{\lambda} = \frac{P}{P'} = \frac{P}{1.5P} \Rightarrow \lambda' = \frac{2}{3}\lambda$

#1611392

Topic: Integrated rate law equations

$A \xrightarrow{K_1} B \xrightarrow{K_2} C$, if all reaction are 1st order and $\frac{d[B]}{d[t]} = 0$. Determine $[B]$.

A $(K_1 + K_2)[A]$

B $(K_1 - K_2)[A]$

C $(K_1 \times K_2)[A]$

D $\frac{K_1}{K_2} \times [A]$

Solution

$\frac{d[B]}{d[t]} = K_1[A] - K_2[B]$

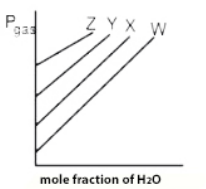
$\frac{d[B]}{d[t]} = 0 \Rightarrow [B] = \frac{K_1}{K_2}[A]$

#1611395

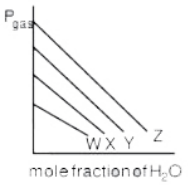
Topic: Solutions of solids or gases in liquids

Henry's constant for the gasses W, X, Y and Z are $0.5, 2, 35$ and 40 bar respectively, then select the correct graph.

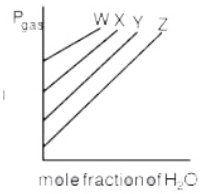
A



B



C



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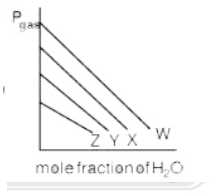


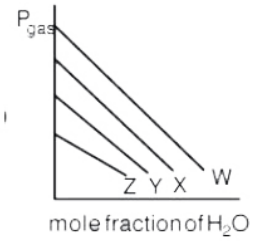
Solution

$P_{gas} = K_H . x_{gas}$

$P_{gas} = K_H . (1 - x_{H_2O})$

$P_{gas} = K_H - K_H . x_{H_2O}$

$C = y + mx$



#1611396

Topic: Refining

Which of the following metal is purified by using Monds process?

A Ni

B Zr

C Ti

D Cu

Solution

Ni is purified using Monds process. The reaction involved can be given as follow:

$Ni(s) + 4CO(g) \xrightarrow{50^oC} [Ni(CO)_4]$

Impure

$[Ni(CO)_4] \xrightarrow{200^oC - 250^oC} Ni(s) + 4CO(g)$

Pure

#1611397

Topic: Expressing concentration of solutions

Find out % strength of $11.2V$ H_2O_2.

A 34%

B 3.4%

C 1.7%

D 13.8%

Solution

$M = \frac{volume \quad strength}{11.2}$

$M = 1$

$\frac{M}{M.W} \times \frac{1000}{V} = 1$

$\frac{W}{V} \times 100 = \frac{M.W}{10}$

$\% \frac{W}{V} = \frac{34}{10} = 3.4\%$

#1611398

Topic: Molecular orbital theory

Which species is diamagnetic and have shortest bond length?

A C_2^{2-}

B N_2^{2-}

C O_2^{2-}

D O_2

Solution

$C_2^{2-} \rightarrow \sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, . \left[\pi 2P_x^2 = \pi 2P_y^2\right] \sigma 2P_z^2$

Bond order $= \frac{10-4}{2} = 3$ (diamagnetic)

$N_2^{-2} \rightarrow \sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, . \left[\pi 2P_x^2 = \pi 2P_y^2\right] \sigma 2P_z^2 \quad , \left[\pi^* 2P_x^1 = \pi^* P_y^1\right]$

Bond order $= \frac{10-6}{2} = 2$ (Paramagnetic)

$O_2^{-2} \rightarrow \sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, . \left[\pi 2P_x^2 = \pi 2P_y^2\right] \sigma 2P_{z^2} \quad , \left[\pi^* 2P_x^2 = \pi^* P_y^2\right]$

Bond order $= \frac{10-8}{2} = 1$ (diamagnetic)

$O_2 \rightarrow \sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, . \left[\pi 2P_x^2 = \pi 2P_y^2\right] \sigma 2P_z^2 \quad , \left[\pi^* 2P_x^1 = \pi^* P_y^1\right]$

Bond order $\frac{10-6}{2} = 2$ (Paramagnetic)

$B.O \propto \frac{1}{B.L}$

#1611401

Topic: Study of d-Block elements

What is the value of spin only magnetic moment of anionic and cationic part of complex $[Fe(H_2O)_6]_2\ [Fe(CN)_6]$?

A 4.9 B.M and Zero

B Zero and 4.9 B.M

C 2.9 B.M and 0

D 0 and 2.9 B.M

Solution

$[Fe(CN)_6]^{-4}$

$Fe^{+2} \longrightarrow 3d^6$

$CN^- \rightarrow$ S.F.L

$t_{2g}^{2,2,2}\ eg^{0,0}$

No. of unpaired $e^- = 0$

$B.M = 0$

$[Fe(H_2O)_6]^{+2}$

$Fe^{+2} \longrightarrow 3d^6$

$H_2O \rightarrow$ W.FL

$t_{2g}^{2,1,1}\ eg^{1,1}$

No. of unpaired electrons $e^- = 4$

$\mu = \sqrt{4 \times 6} = \sqrt{24} B.M = 4.9 B.M$

#1611402

Topic: Organometallic compounds

Which compound to use for treatment of tumor?

A $Cis\ [PdCl_2(NH_3)_2]$

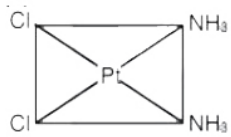
B $Trans\ [PdCl_2(NH_3)_2]$

C $Cis\ [PtCl_2(NH_3)_2]$

D $Trans\ [PtCl_2(NH_3)_2]$

Solution

The given compound is cis plating which is used in the treatment of cancer or tumor.



#1611403

Topic: Percentage composition, empirical and molecular formula

Find out mole % of C in CH_4.

A 80%

B 20%

C 25%

D 75%

Solution

CH_4

$n_C = 1$ mole

$n_H = 4$ moles

$$\% C = \frac{n_C}{n_C + n_H} \times 100 = \frac{1}{1+4} \times 100 = 20\%$$

#1611404

Topic: Dipole moment

Which of the following is covalent in nature? $(X = !l, Br, I)$

A BeX_2

B CaX_2

C MgX_2

D SrX_2

Solution

According to Fajan's rule when the size of cation decreases, then covalent character increase. So BeX_2 is covalent in nature.

#1611405
Topic: Inter-halogen compounds and polyhalide ions

Which of the following compound have sp^3d^2 hybridisation?

A BrF_2^-

B ICl_4^-

C ICl_2^-

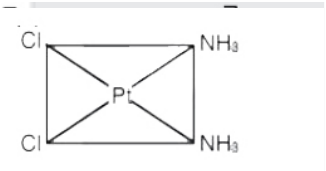
D IF_7

Solution

$BrF_{2^-} \rightarrow sp^3d$

$ICl_{2^-} \rightarrow sp^3d$

$IF_7 \rightarrow sp^3d^3$



#1611412
Topic: Electrode potential

$Fe^{2+} + Ag^+ \rightarrow Fe^{3+} + Ag$

If E^o of $Ag^+/Ag = x$

E^o of $Fe^{2+}/Fe = y$

E^o of $Fe^{3+}/Fe = z$

Determine std, EMF of given cell reaction.

A $x + 2y - 3z$

B $x - y$

C $x - z$

D $2x + y - 3z$

Solution

$Fe^{2+} \rightarrow Fe; \Delta G_1^o = -2F_y$

$Fe^{3+} \rightarrow Fe; \Delta G_2^o = -3F_z$

$\therefore Fe^{2+} \rightarrow Fe^{3+}$

$-FE^o = -2F_y + 3F_z \Rightarrow E^o = 2y - 3z$

For given cell reaction

$E_{cell}^o = x + 2y - 3z$

#1611416
Topic: Study of d-Block elements

Which of the following is incorrect about interstitial compounds?

A Very reactive

B High metallic conductivity

C Very hard

D High melting point

Solution

Interstital compound are almost inert so (A) is wrong statement.

#1611420
Topic: Elements

IUPAC symbol of atomic number 119.

A Uuh

B Uun

C Uue

D Uub

Solution

According to the rule of IUPAC element having atomic number more than 100 can be named by using numbers of its atomic number.

Here 1 is written as Un and 9 is written as en and the name end with ium.

Thus the name of the given compound will be $Ununennium$ and symbol will be Uue

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#1611425
Topic: Inter-halogen compounds and polyhalide ions

Which of the following correct about $[ICl_4]^-$ and ICl_5 compound?

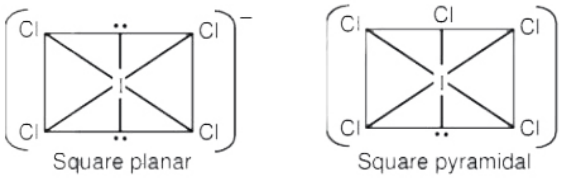
A Both are isostructural

B $[ICl_4]^-$ is square planar and ICl_5 is square pyramidal

C $[ICl_4]^-$ is square pyramidal and ICl_5 is square planar

D $[ICl_4]^-$ is tetrahedral and ICl_5 is pentagonal bipyramidal

Solution



#1611427
Topic: Measurement of delta U and delta H - Calorimetry

5 mole of ideal gas at $100K$ ($C_{v,m} = 28J/mol/K$). It is heated upto $200K$. Calculate ΔU and $\Delta(PV)$ for the process. ($R = 8J/mol - K$)

A $\Delta U = 28kJ; \Delta(PV) = 8KJ$

B $\Delta U = 14kJ; \Delta(PV) = 4KJ$

C $\Delta U = 14kJ; \Delta(PV) = 8KJ$

D $\Delta U = 28kJ; \Delta(PV) = 4KJ$

Solution

$$\Delta U = nC_v\Delta T = \frac{5 \times 28 \times 100}{1000} = 14KJ$$

$$\Delta(PV) = \frac{5 \times 8 \times 100}{1000} = 4KJ$$

#1611433
Topic: Law of mass action and law of chemical equilibrium

$S(s) + O_2(g) \rightleftharpoons SO_2(g); K_1 = 10^{52}$

$2S(s) + 3O_2(g) \rightleftharpoons SO_2(g); K_2 = 10^{129}$

Calculate the $K_{equilibrium}$ for

$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

A 10^{25}

B 10^{77}

C 10^{70}

D 10^{40}

Solution

Target equation $K_{eq} = \frac{[SO_3]^2}{[SO_2]^3 [O_2]}$

$K_1 = \frac{[SO_2]}{[O_2]} = 10^{52} \ldots . (1); \qquad K_2 = \frac{[SO_3]^2}{[O_2]^3} = 10^{129} \ldots . . (2)$

$K_1^2 = \frac{[SO_2]^2}{[O_2]^2} = 10^{104} \ldots . (3)$

$K_{eq} = \frac{K_2}{(K_1)^2} = \frac{10^{129}}{10^{104}} = 10^{25}$