Hydrocarbons

Question1

Given below are two statements:

Statement I: Propene on treatment with diborane gives an addition product with the formula $((CH_3)_2 - CH)_3B$. .

Statement II: Oxidation of $((CH_3)_2 - CH)_3B$. with hydrogen peroxide in presence of NaOH gives propan-2ol.

In the light of the above statements, choose the most appropriate answer from the options given below:

[NEET 2024 Re]

Options:

A.

Statement I is correct but Statement II is incorrect

B.

Statement I is incorrect but Statement II is correct

C.

Both Statement I and Statement II are correct

D.

Both Statement I and Statement II are incorrect

Answer: B

Solution:

$$CH_3CH=CH_2 + (H-BH_2)_2 \rightarrow CH_3-CH_2-CH_2-BH_2 \xrightarrow{CH_3CH=CH_2} (CH_3-CH_2-CH_2)_2BH$$

$$\xrightarrow{CH_3CH=CH_2} (CH_3-CH_2-CH_2)_3B \xrightarrow{H_2O_2/\bar{O}H} \underset{\text{Propan 1 ol(Major)}}{CH_3-CH_2-CH_2-OH}$$

- $((CH_3)_2CH)_3B \xrightarrow{H_2O_2/\bar{O}H} \underset{\text{Propan-2-ol}}{CH_3-\underset{\underset{OH}{|}}{CH}-CH_3}$

Statement I is incorrect but Statement II is correct.

Question2

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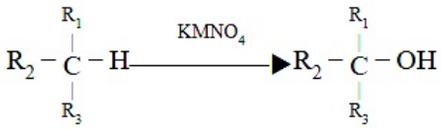
The alkane that can be oxidized to the corresponding alcohol by $KMnO_4$ as per the equation



is, when:

[NEET 2024 Re]

Options:

A.

$R_1 = H; R_2 = H; R_3 = H$

B.

$R_1 = CH_3; R_2 = CH_3; R_3 = CH_3$

C.

$R_1 = CH_3; R_2 = H; R_3 = H$

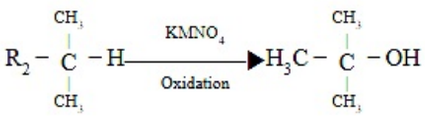
D.

$R_1 = CH_3; R_2 = CH_3; R_3 = H$

Answer: B

Solution:

Generally alkanes resist oxidation but alkane with tertiary H atom(s) can be oxidised to corresponding alcohols by $KMnO_4$



$\therefore R_1 \Rightarrow CH_3 \;\; R_2 \Rightarrow CH_3 \;\; R_3 \Rightarrow CH_3$

Question3

Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is :

[NEET 2023]

Options:

A.

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B.

30

C.

18

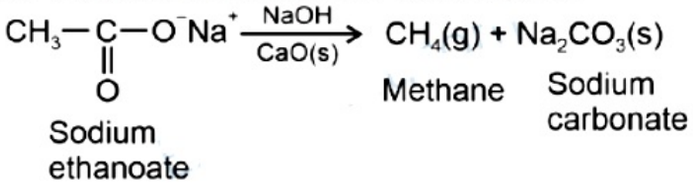
D.

16

Answer: A

Solution:

This reaction is called soda lime decarboxylation



Molar mass of $CH_4 = 16g/mol$

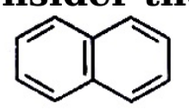
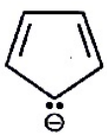
Weight of 2 moles of

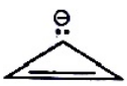
$CH_4 = 16 \times 2$

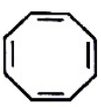
$= 32g$

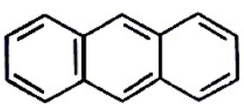
Question4

Consider the following compounds/species:

i.  ii. 

iii.  iv. 

v.  vi. 

vii. 

The number of compounds/species which obey Huckel's rule is

[NEET 2023]

Options:

A.

6

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B.

2

C.

5

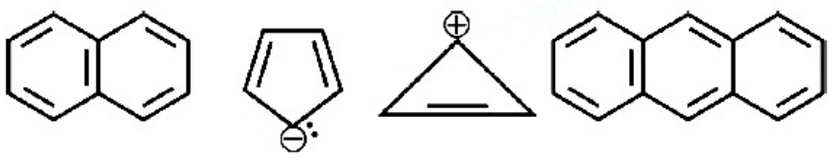
D.

4

Answer: D

Solution:

Criteria for Huckel's rule:
(i) Planarity
(ii) Complete delocalisation of π electrons
(iii) Presence of (4n+2)π electrons in ring where n is an integer (n=0,1,2,...)
The compounds which follow Huckel's rule are:



Question5

Compound X on reaction with O_3 followed by Zn / H_2O gives formaldehyde and 2-methyl propanal as products. The compound X is [NEET-2022]

Options:

A. 3-Methylbut-1-ene

B. 2-Methylbut-1-ene

C. 2-Methylbut-2-ene

D. Pent-2-ene

Answer: A

Solution:

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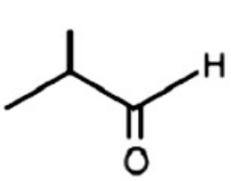
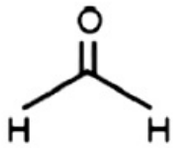
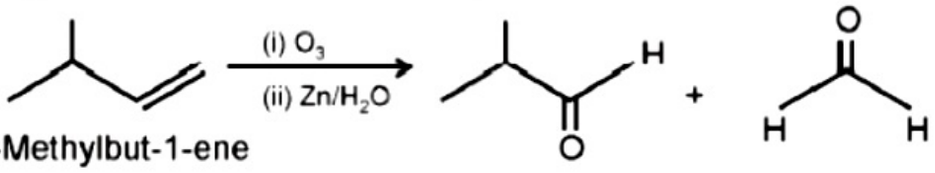


2-Methylpropanal



Formaldehyde

The given reaction is the reductive ozonolysis of an alkene. The alkene will be



3-Methylbut-1-ene

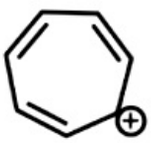
Question6

Which compound amongst the following is not an aromatic compound? [NEET-2022]

Options:

A.

B.



C.

D.

Answer: D

Solution:

Solution

Planar, cyclic, conjugated species containing (4n + 2)π electrons will be aromatic in nature (n is an integer)

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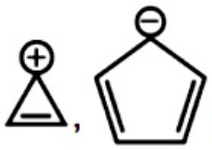
-  , and  are aromatic species
-  is not an aromatic compound

---

Question7

The decreasing order of boiling points of the following alkanes is :
(a) heptane
(b) butane
(c) 2-methylbutane
(d) 2-methylpropane
(e) hexane
Choose the correct answer from the options given below :
[NEET Re-2022]

Options:

A. (a) > (e) > (c) > (b) > (d)

B. (a) > (c) > (e) > (d) > (b)

C. (c) > (d) > (a) > (e) > (b)

D. (a) > (e) > (b) > (c) > (d)

Answer: A

Solution:

Solution

Boiling point of alkanes α molar mass.

Straight chain alkanes have more boiling pointthan branched alkanes.

Heptane has high molar mass and2-methylpropane has low molar mass and is branched.

Question8

The incorrect method for the synthesis of alkenes is :
[NEET Re-2022]

Options:

A. treating vicinal dihalides with Zn metal

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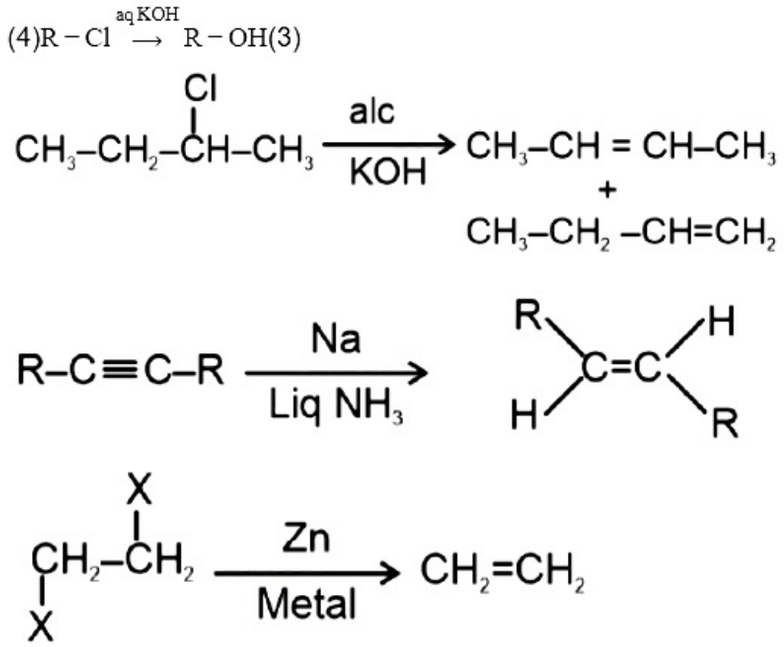
B. treatment of alkynes with Na in liquid NH3

C. heating alkyl halides with alcoholic KOH

D. treating alkyl halides in aqueous KOH solution

Answer: D

Solution:

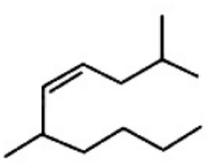


Question9

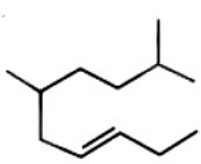
The correct structure of 2, 6-Dimethyl-dec-4-ene is [NEET 2021]

Options:

A.



B.



C.

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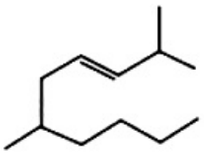
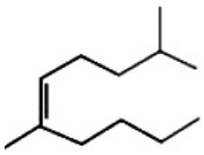


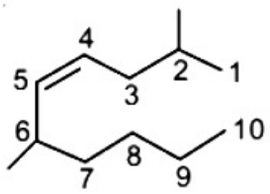
D.



Answer: A

Solution:

Solution:



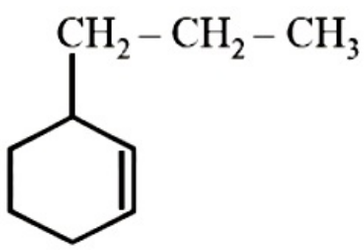
2, 6-Dimethyldec-4-ene

Question10

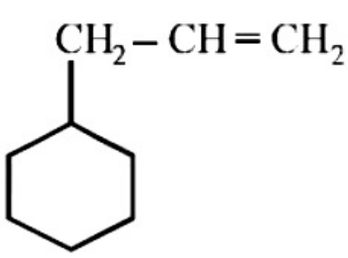
An alkene on ozonolysis gives methanal as one of the product. Its structure is
(2020)

Options:

A.



B.



C.

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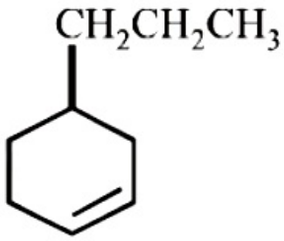
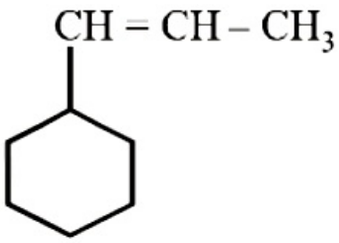


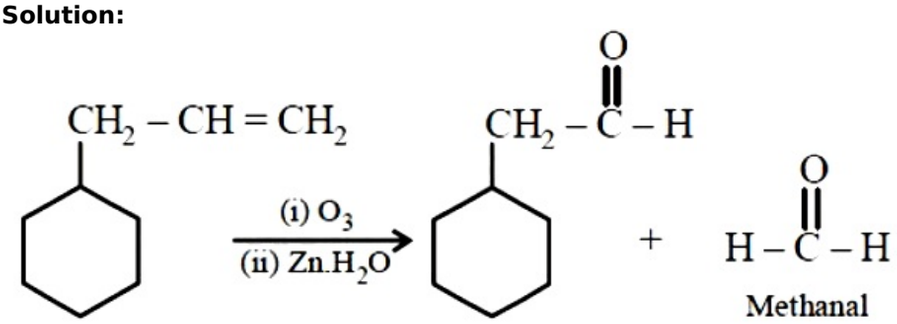
D.



Answer: B

Solution:

Solution:



Question11

An alkene A on reaction with O_3 and $Zn - H_2O$ gives propanone and ethanal in equimolar ratio. Addition of HCl to alkene A gives B as the major product. The R
(NEET 2019)

Options:

A. $H_3C - \underset{Cl}{CH} - \overset{CH_3}{\underset{CH_3}{C}}H$

B. $Cl - CH_2 - CH_2 - \overset{CH_3}{\underset{CH_3}{C}}H$

C. $H_3C - CH_2 - \overset{CH_2Cl}{C}H - CH_3$

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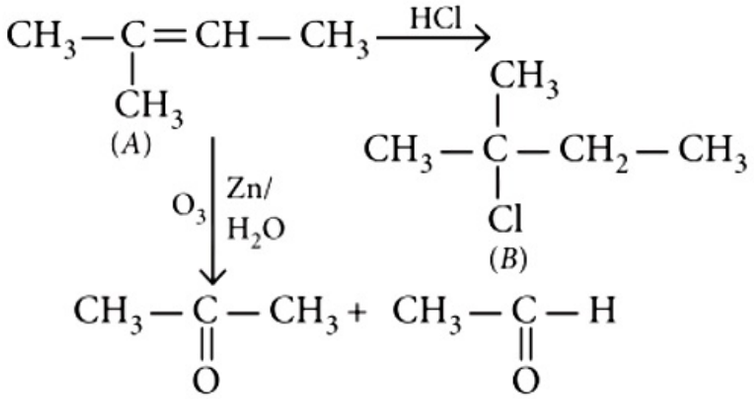
D. $H_3C - CH_2 - \overset{\overset{CH_3}{|}}{\underset{\underset{Cl}{|}}{C}} - CH_3$

Answer: D

Solution:

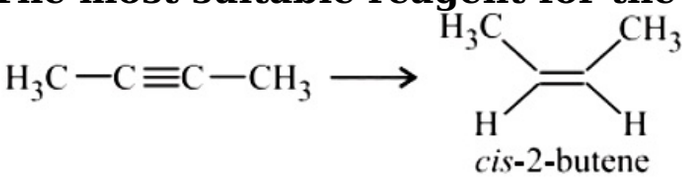
Solution:



Addition of HCl to an alkene (A) will take place according to Markownikoff's rule.

Question12

The most suitable reagent for the following conversion, is



(NEET 2019)

Options:

A. $Hg^{2+}/H^+, H_2O$

B. Na/ liquid NH_3

C. H_2, Pd/C, quinoline

D. Zn/HCl

Answer: C

Question13

Among the following the reaction that proceeds through an electrophilic

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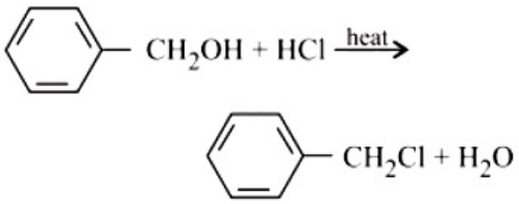
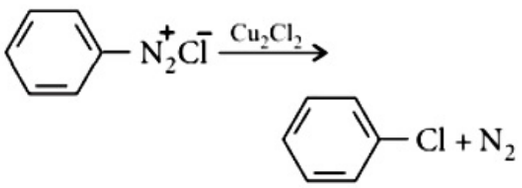
substitution is
(NEET 2019)

Options:

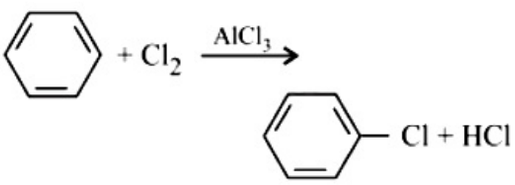
A.



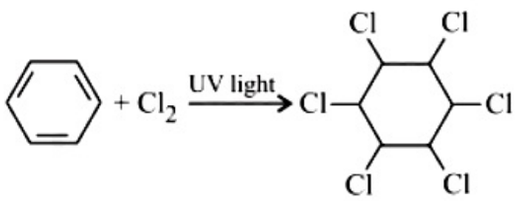
B.



C.



D.



Answer: C

Solution:

Solution:

The attacking species in the reaction given in option (c) is an electrophile i.e., $\overset{\delta+}{Cl}$. Therefore, it is an electrophilic substitution reaction.

Question14

The alkane that gives only one monochloro product on chlorination with Cl_2 in presence of diffused sunlight is
(Odisha NEET 2019)

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Options:

A. 2,2 -dimethylbutane

B. neopentane

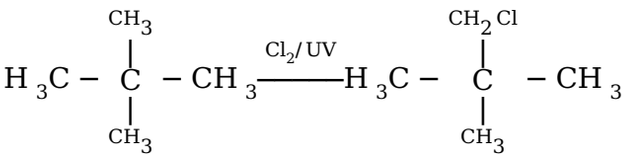
C. n -pentane

D. isopentane.

Answer: B

Solution:

In chlorination of alkanes, hydrogen is replaced by chlorine. In neo-pentane, only one type of hydrogen is present, hence replacement of any hydrogen atom will give the same product.



Question15

In the following reaction, $H_3C - C \equiv CH \xrightarrow[873K]{\text{red hot iron tube}} A$ the number of sigma(σ) bonds present in the product A, is (Odisha NEET 2019)

Options:

A. 21

B. 9

C. 24

D. 18

Answer: A

Solution:

$$CH_3 - C \equiv CH \xrightarrow[873K]{\text{red hot iron tube}}$$

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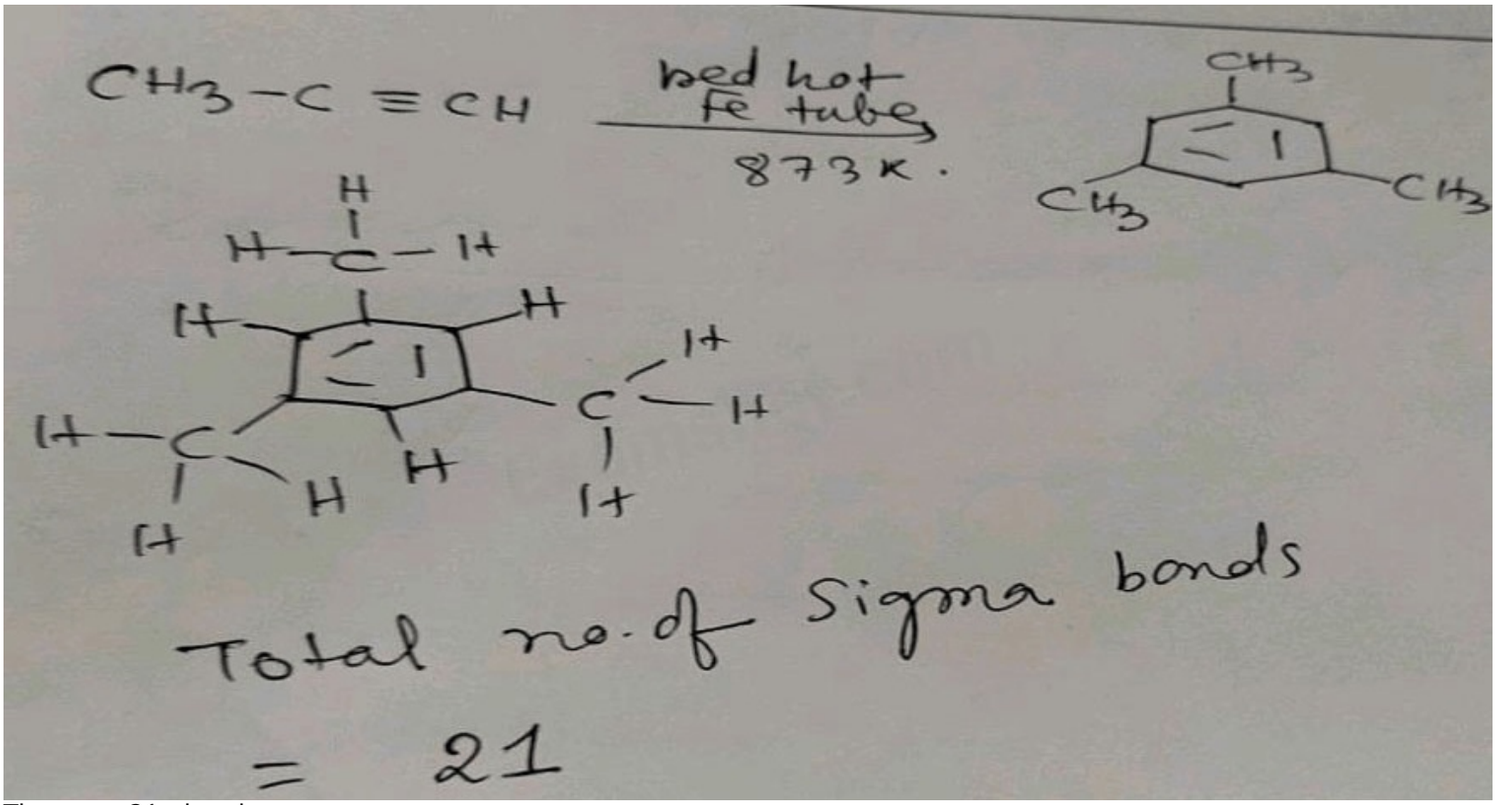

There are 21σ bonds.

Question16

Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is
(NEET 2018)

Options:

A. $CH \equiv CH$

B. $CH_2 = CH_2$

C. $CH_3 - CH_3$

D. CH_4

Answer: D

Solution:

$$\underset{(A)}{CH_4} \xrightarrow{Br_2/h\nu} CH_3Br \xrightarrow[\text{Wurtz reaction}]{\text{Na/dry ether}} \underset{\text{(Less than 4 carbon atoms)}}{CH_3-CH_3}$$

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Question17

Which one is the correct order of acidity?
(NEET 2017)

Options:

A.

$CH \equiv CH > CH_3 - C \equiv CH > CH_2 = CH_2 > CH_3 - CH_3$

B.

$CH \equiv CH > CH_2 = CH_2 > CH_3 - C \equiv CH > CH_3 - CH_3$

C.

$CH_3 - CH_3 > CH_2 = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

D.

$CH_2 = CH_2 > CH_3 - CH = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

Answer: A

Solution:

Solution:
Alkanes, alkenes and alkynes follow the following trend in their acidic behaviour :

$\overset{sp}{H}C \equiv \overset{sp}{C}H > H_2\overset{sp^2}{C} = \overset{sp^2}{C}H_2 > CH_3 - CH_3$

This is because sp -hybridised carbon is more electronegative than sp^2 -hybridised carbon which is further more electronegative than sp^3 hybridised carbon. Hence, in ethyne proton can be released more easily than ethene and ethane.
Among alkynes the order of acidity is :

$HC \equiv CH > CH_3 - C \equiv CH > CH_3 - C \equiv C - CH_3$

This is due to $+I$ effect of $-CH_3$ group.

Question18

Predict the correct intermediate and product in the following reaction :

$$H_3C - C \equiv CH \xrightarrow[HgSO_4]{H_2O,\ H_2SO_4} \underset{(A)}{\text{Intermediate}} \rightarrow \underset{(B)}{\text{Product}}$$

(NEET 2017)

Options:

A.

$A : H_3C - \underset{\underset{OH}{|}}{C} = CH_2,\ B : H_3C - \underset{\underset{SO_4}{|}}{C} = CH_2$

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B.

$A: H_3C-\underset{\underset{O}{\|}}{C}-CH_3,\ B: H_3C-C\equiv CH$

C.

$A: H_3C-\underset{\underset{OH}{|}}{C}=CH_2,\ B: H_3C-\underset{\underset{O}{\|}}{C}-CH_3$

D.

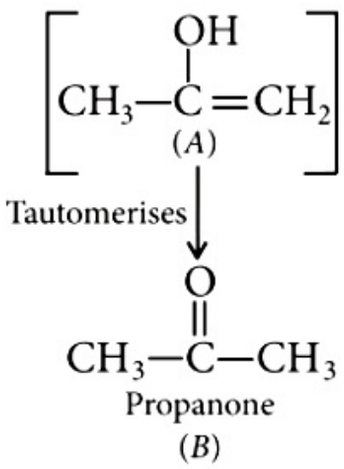
$A: H_3C-\underset{\underset{SO_4}{|}}{C}=CH_2,\ B: H_3C-\underset{\underset{O}{\|}}{C}-CH_3$

Answer: C

Solution:

In case of unsymmetrical alkynes addition of H_2O occurs in accordance with Markownikoff's rule.

$$CH_3-C\equiv CH + H-OH \xrightarrow[333K]{H_2SO_4,\ HgSO_4}$$



Question19

With respect to the conformers of ethane, which of the following statements is true?
(NEET 2017)

©

Options:

A. Bond angle changes but bond length remains same.

B. Both bond angle and bond length change.

C. Both bond angle and bond length remain same.

D. Bond angle remains same but bond length changes.

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Answer: C

Solution:

Conformers of ethane have different dihedral angles.

Question20

Which of the following can be used as the halide component for Friedel-Crafts reaction?
(NEET- II 2016)

Options:

A. Chlorobenzene

B. Bromobenzene

C. Chloroethene

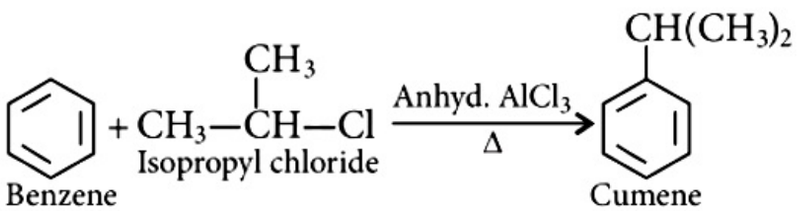
D. Isopropyl chloride

Answer: D

Solution:

Solution:

Friedel-Crafts reaction:



Chlorobenzene, bromobenzene and chloroethene are not suitable halide components as $C-X$ bond acquires some double bond character due to resonance of lone pair of electrons with π -bond.

Question21

In which of the following molecules, all atoms are coplanar?
(NEET-II 2016)

Options:

A.

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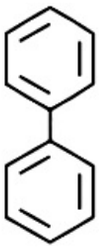
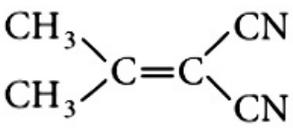
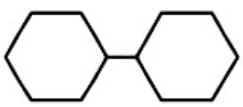


B.

C.



D.



Answer: A

Solution:

Solution:
Biphenyl is coplanar as all C-atoms are sp^2 hybridised.

Question22

In pyrrole the electron density is maximum on (NEET-II 2016)

Options:

A. 2 and 3

B. 3 and 4

C. 2 and 4

D. 2 and 5

Answer: D

Solution:

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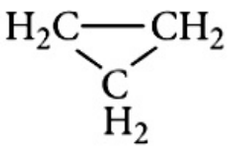
Pyrrole has maximum electron density on 2 and 5. It generally reacts with electrophiles at the C − 2 or C − 5 due to the highest degree of stability of the protonated intermediate.
Attack at position 3 or 4 yields a carbocation that is a hybrid of structures (I) and (II). Attack at position 2 or 5 yields a carbocation that is a hybrid not only of structures (III) and (IV) (analogous to I and II) but also of structure (V).
The extra stabilization conferred by (V) makes this ion the more stable one.
Also, attack at position 2 or 5 is faster because the developing positive charge is accommodated by three atoms of the ring instead of only two.

Question23

Which of the following compounds shall not produce propene by reaction with HBr followed by elimination or direct only elimination reaction?
(NEET-II 2016)

Options:

A.



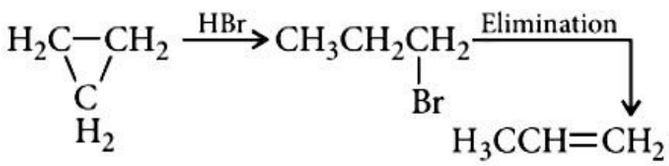
B. $H_3C - C - CH_2OH$

C. $H_2C = C = O$

D. $H_3C - \overset{H_2\mu}{\underset{|}{C}} - CH_2Br$

Answer: C

Solution:



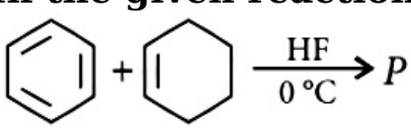
$CH_3CH_2CH_2OH \xrightarrow[\text{Elimination}]{HBr} H_3C - CH = CH_2$

$CH_2 = C = O \xrightarrow{HBr} H_2C = \overset{Br}{\underset{|}{C}} - OH \rightleftharpoons H_3C - \overset{O}{\underset{||}{C}} - Br$

$CH_3CH_2CH_2Br \xrightarrow[\text{Elimination}]{} CH_3CH = CH_2$

Question24

In the given reaction,



the product P is

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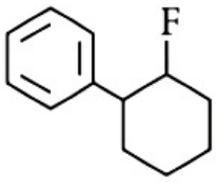
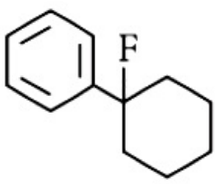
(NEET-II 2016)

Options:

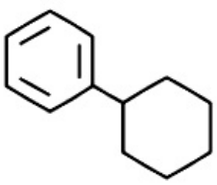
A.



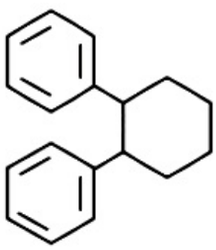
B.



C.

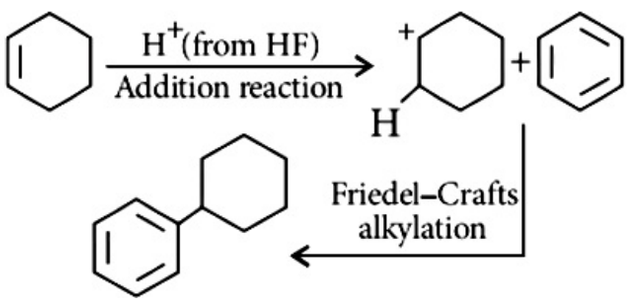


D.



Answer: C

Solution:



Question25

The compound that will react most readily with gaseous bromine has

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the formula
(NEET-II 2016)

Options:

A. C_3H_6

B. C_2H_2

C. C_4H_{10}

D. C_2H_4

Answer: A

Question26

The correct statement regarding the comparison of staggered and eclipsed conformations of ethane, is
(NEET-I 2016)

Options:

A. the eclipsed conformation of ethane is more stable than staggered conformation even though the eclipsed conformation has torsional strain

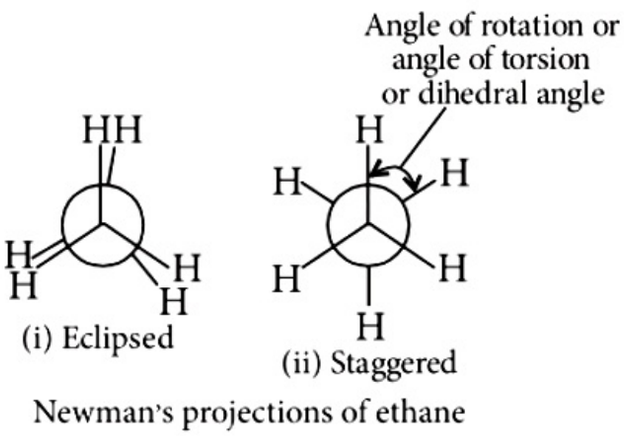
B. the staggered conformation of ethane is more stable than eclipsed conformation, because staggered conformation has no torsional strain

C. the staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has torsional strain

D. the eclipsed conformation of ethane is more stable than staggered conformation, because eclipsed conformation has no torsional strain.

Answer: B

Solution:



Newman's projections of ethane

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Magnitude of torsional strain depends upon the angle of rotation about $C-C$ bond. Staggered form has the least torsional strain and the eclipsed form has the maximum torsional strain. So, the staggered conformation of ethane is more stable than the eclipsed conformation.

Question27

Consider the nitration of benzene using mixed conc. H_2SO_4 and HNO_3. If a large amount of $KHSO_4$ is added to the mixture, the rate of nitration will be
(NEET- I 2016)

©

Options:

A. unchanged

B. doubled

C. faster

D. slower.

Answer: D

Solution:

Solution:
Mechanism of nitration is:
$HNO_3 + 2H_2SO_4 \rightarrow NO_2^+ + 2HSO_4^- + H_3O^+$
If a large amount of $KHSO_4$ is added then conc. of HSO_4^- ions increases and the reaction will be shifted in backward direction hence, the rate of nitration will be slower.

Question28

The pair of electrons in the given carbanion, $CH_3C \equiv C^-$, is present in which of the following orbitals?
(NEET- I 2016)

©

Options:

A. sp^2

B. sp

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C. 2p

D. sp^3

Answer: B

Solution:

$$\overset{sp}{CH_3} - \overset{sp}{C} \equiv C^-$$

Thus, pair of electrons is present in sp -hybridised orbital.

Question29

In the reaction

$$H - C \equiv CH \xrightarrow[(ii)\ CH_3CH_2Br]{(i)\ NaNH_2/liq.\ NH_3} X \xrightarrow[(ii)\ CH_3CH_2Br]{(i)\ NaNH_2/liq.\ NH_3} Y$$

X and Y are
(NEET-I 2016)

Options:

A. X = 2 -butyne, Y = 2 -hexyne

B. X = 1 -butyne, Y = 2 -hexyne

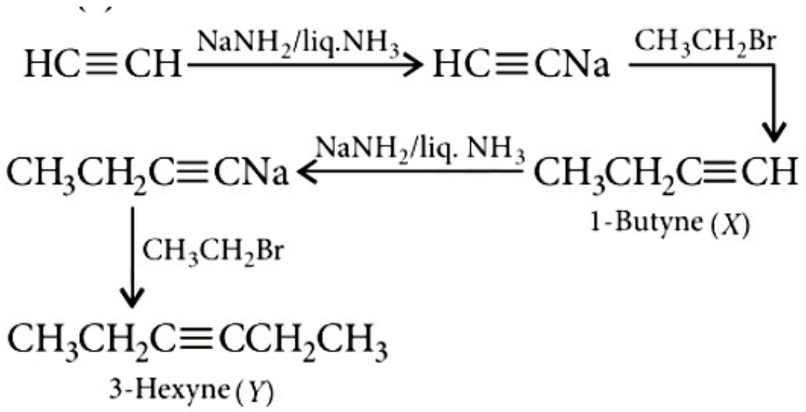
C. X = 1 -butyne, Y = 3 -hexyne

D. X = 2 -butyne, Y = 3 -hexyne.

Answer: C

Solution:

Solution:



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Question30

2,3-Dimethyl-2-butene can be prepared by heating which of the following compounds with a strong acid?
(2015)

Options:

A. $(CH_3)_3C - CH = CH_2$

B.

$(CH_3)_2C = CH - CH_2 - CH_3$

C.

$(CH_3)_2CH - CH_2 - CH = CH_2$

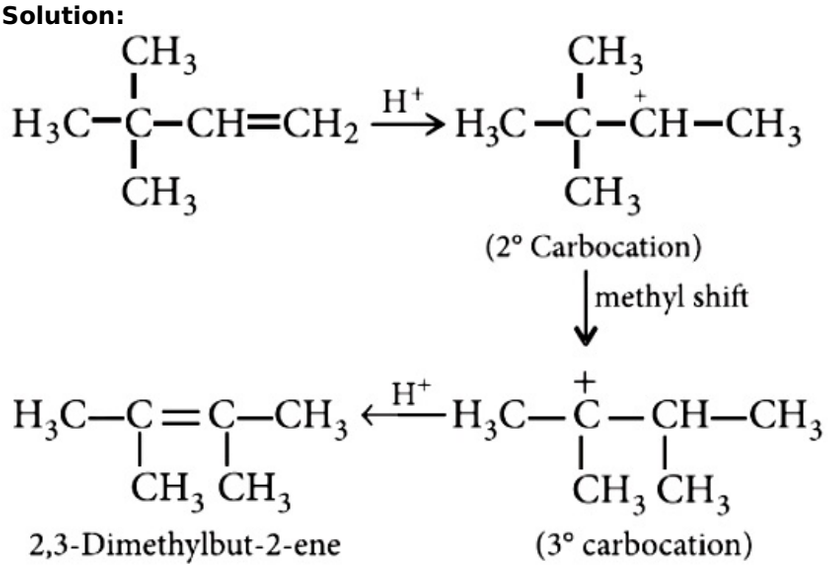
D.

$(CH_3)_2CH - \underset{\displaystyle CH_3}{\overset{\displaystyle C}{|}} H - CH = CH_2$

Answer: A

Solution:

Solution:



Question31

In the reaction with HCl, an alkene reacts in accordance with the Markovnikov's rule to give a product 1-chloro-lmethylcyclohexane. The possible alkene is
(2015 Cancelled)

Options:

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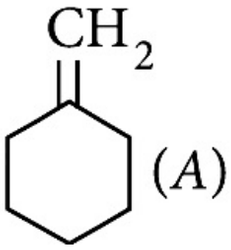
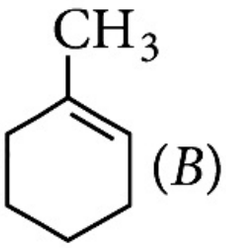
A.



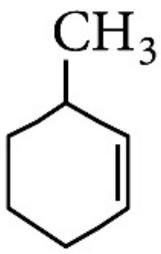
B.



C.

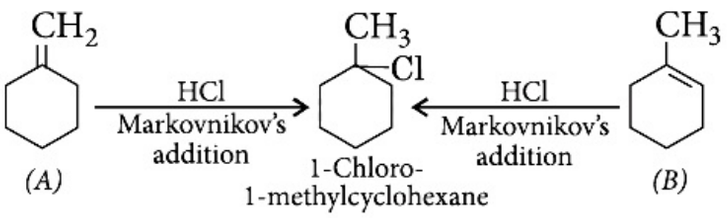
(A) and (B)

D.



Answer: C

Solution:



Question32

Given :
The enthalpy of hydrogenation of these compounds will be in the order as
(2015 Cancelled)

Options:

A. II > III > I

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B. II > I > III

C. I > II > III

D. III > II > I

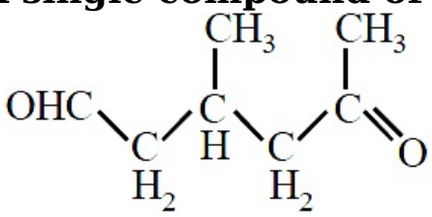
Answer: D

Solution:

Enthalpy of hydrogenation is inversely proportional to the stability of alkenes.
Stability of alkenes : I > II > III
Enthalpy of hydrogenation : I < II < III

Question33

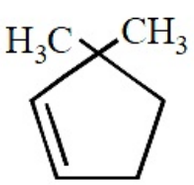
A single compound of the structure,



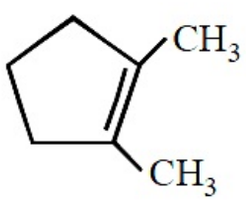
is obtainable from ozonolysis of which of the following cyclic compounds?
(2015 Cancelled)

Options:

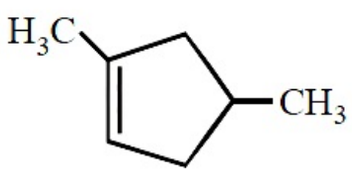
A.



B.



C.



D.

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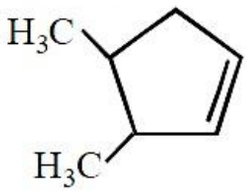
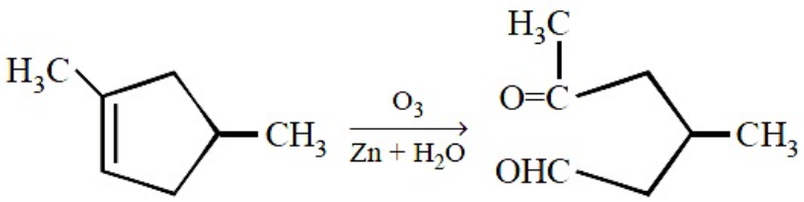


Answer: C

Solution:

Solution:



Question34

Which of the following organic compounds has same hybridization as its combustion product (CO_2) ?

(2014)

Options:

A. Ethane

B. Ethyne

C. Ethene

D. Ethanol

Answer: B

Solution:

$C_2H_2 + \frac{5}{2}O_2 \longrightarrow 2CO_2 + H_2O$

Both ethyne and CO_2 have sp-hybridisation.

$O = \overset{sp}{C} = O$ $\qquad$ $H\overset{sp}{C} \equiv \overset{sp}{C}H$

Question35

Identify Z in the sequence of reactions :

$CH_3CH_2CH = CH_2 \xrightarrow{HBr/H_2O_2} Y \xrightarrow{C_2H_5ONa} Z$

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(2014)

Options:

A.

$CH_3 - (CH_2)_3 - O - CH_2CH_3$

B. $(CH_3)_2CH - O - CH_2CH_3$

C. $CH_3(CH_2)_4 - O - CH_3$

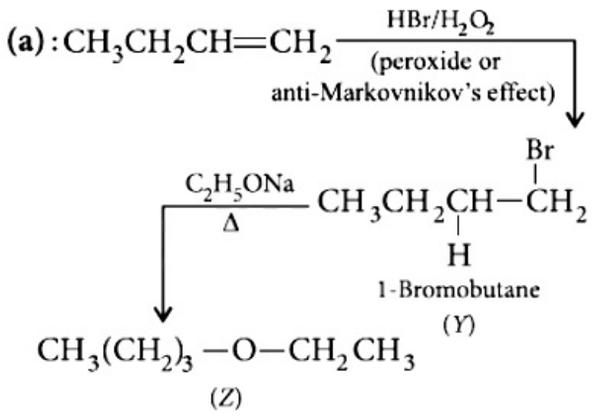
D.

$CH_3(CH_2) - CH(CH_3) - O - CH_2CH_3$

Answer: A

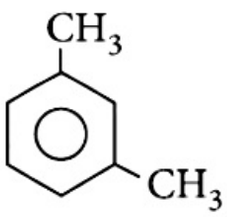
Solution:

Solution:



Question36

What products are formed when the following compound is treated with Br_2 in the presence of $FeBr_3$?



(2014)

Options:

A.

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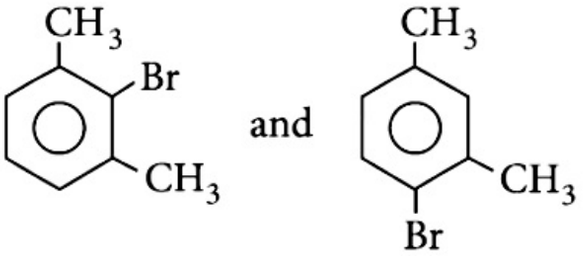
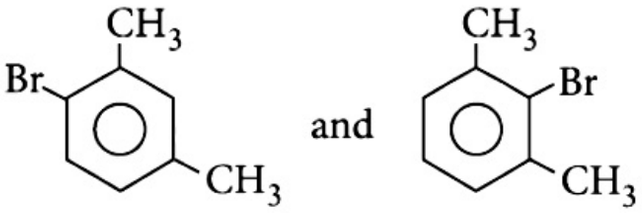
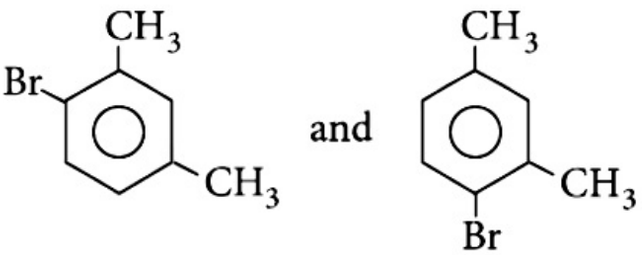


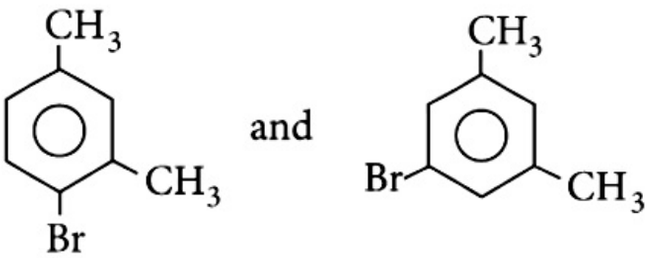
B.



C.



D.



Answer: C

Solution:

Solution:
$-CH_3$ group is o.p-directing. Because of crowding, no substitution occurs at the carbon atom between the two $-CH_3$ groups in m-Xylene,even though two $-CH_3$ groups activate that position

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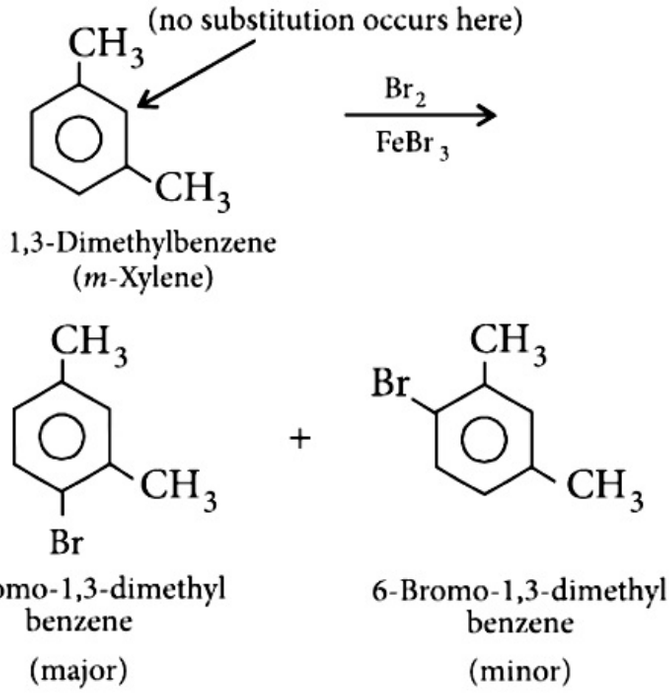

Question37

Which of the following compounds will not undergo Friedal-Craft's reaction easily (2013 NEET)

Options:

A. Nitrobenzene

B. Toluene

C. Cumene

D. Xylene

Answer: A

Solution:

Solution:
Nitrobenzene is strongly deactivated, hence will not undergo Friedel-Crafit's reaction.

Question38

Which of the following chemical system is non aromatic? (Karnataka NEET 2013)

Options:

A.

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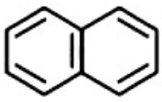
B.



C.

D.

Answer: D

Solution:

Solution:
The molecules which do not satisfy Huckel rule or $(4n + 2)\pi$ -electron rule are said to be non-aromatic. The compound (d) has total $4\pi e^-$. It does not follow $(4n + 2)$ rule. So, it is non-aromatic compound.

Question39

In the following reaction : $HC \equiv CH \xrightarrow[Hg^{2+}]{H_2SO_4} P'$ Product 'P' will not give (Karnataka NEET 2013)

©

Options:

A. Tollens' reagent test

B. Brady's reagent test

C. Victor Meyer test

D. Iodoform test.

Answer: C

Solution:

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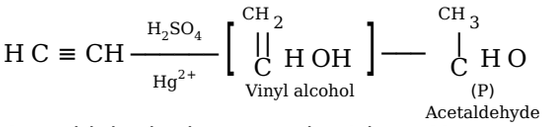


Acetaldehyde does not give Victor Meyer test.

Question40

Which of the following reagents will be able to distinguish between 1-butyne and 2-butyne?
(2012 Mains)

Options:

A. $NaNH_2$

B. HCl

C. O_2

D. Br_2

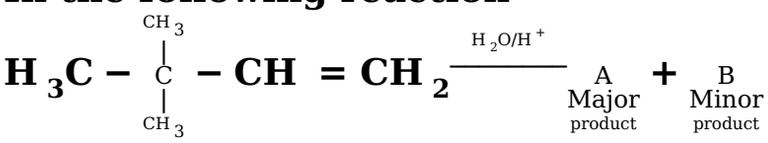
Answer: A

Solution:

Solution:
Terminal alkynes (1-alkynes) react with NaNH, to form sodium acetylide and evolve hydrogen but 2-alkynes do not.

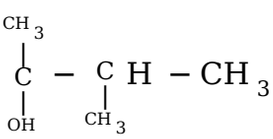
Question41

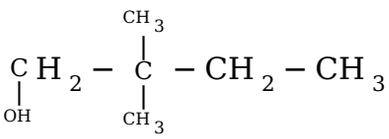
In the following reaction



The major product is
(2012)

Options:

A. 

B. 

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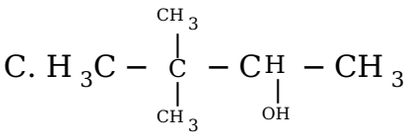
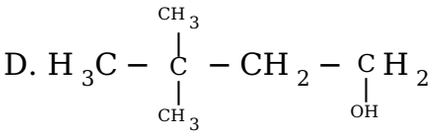
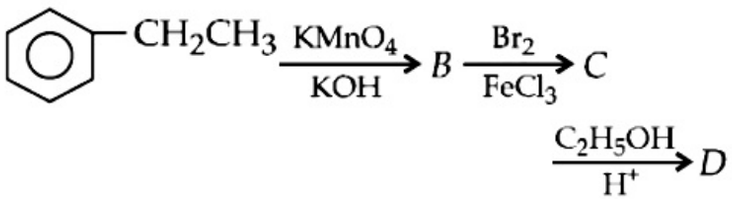
C. 

D. 

Answer: A

Question42

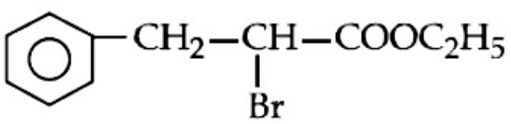
In a set of reactions, ethylbenzene yielded a product D.



D would be
(2010)

Options:

A.



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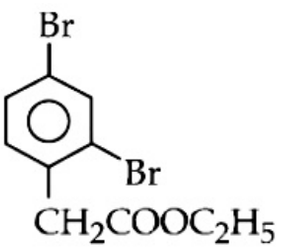
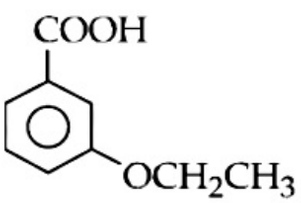


C.



D.

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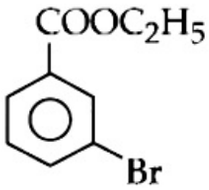
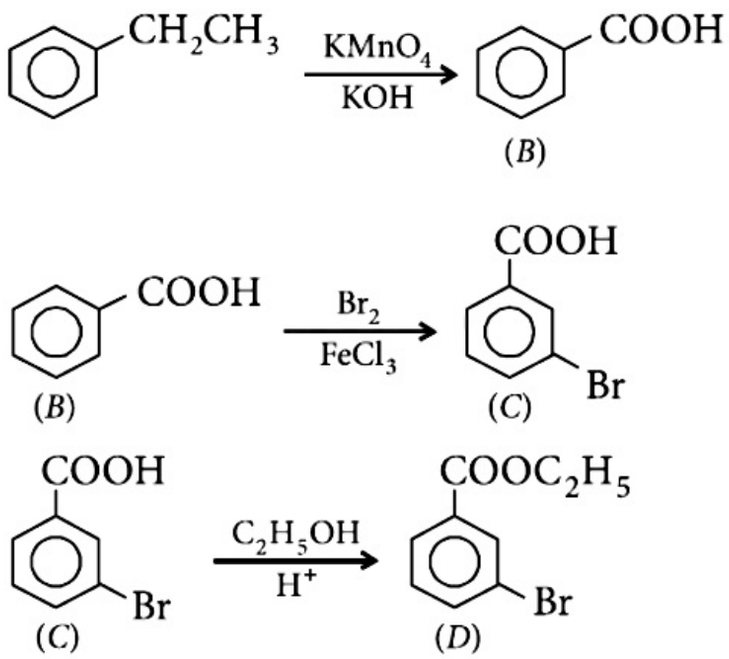


Answer: D

Solution:

Solution:



Question43

The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives X and reaction in presence of light gives Y. Thus, X and Y are (2010)

Options:

A. X - Benzal chloride,
Y = o-chlorotoluene

B. X = m-chlorotoluene,
Y = p-chlorotoluene

C. X-o- and p-chlorotoluene,
Y = Trichloromethyl benzene

D. X = Benzyl chloride,
Y = m-chlorotoluene

Answer: C

Solution:

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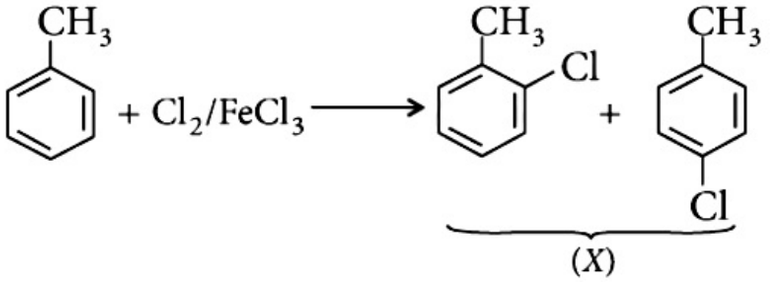
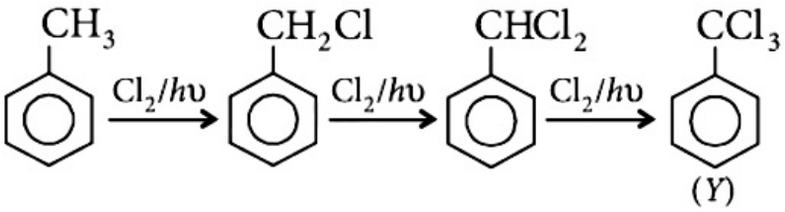
The reaction of Cl_2, in presence of $FeCl_3$, with benzene yields a ring substitution product.



In presence of sunlight, free radical reaction takes place.



Question44

Liquid hydrocarbons can be converted to a mixture of gaseous hydrocarbons by
(2010)

©

Options:

A. oxidation

B. cracking

C. distillation under reduced pressure

D. hydrolysis

Answer: B

Solution:

Solution:
Cracking : The process of cracking converts higher alkanes into smaller alkanes and alkenes. This process can be used for production of natural gas

---

Question45

In the following the most stable conformation of n -butane is
(2010)

Options:

A.

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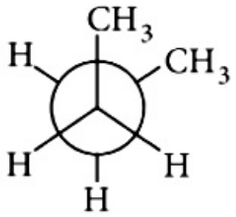
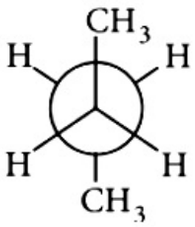


B.



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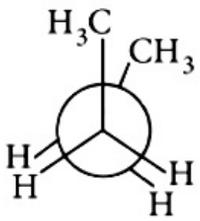
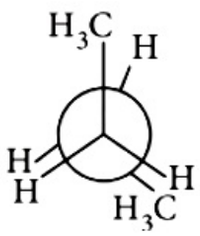


D.



Answer: B

Solution:

Solution:
The anti-conformation is the most stable conformation of n -butane. In this, the bulky methyl groups are as far apart as possible thereby keeping steric repulsion at a minimum.

Question46

Which of the following conformers for ethylene glycol is most stable? (Mains 2010)

Options:

A.

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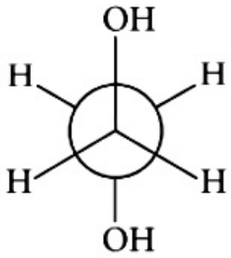
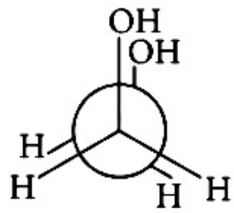
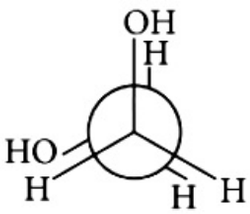


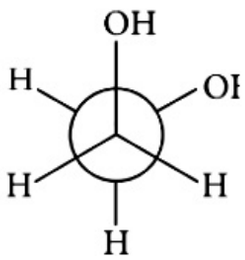
B.



C.



D.



Answer: D

Solution:

Solution:
The conformation (d) is most stable because of intermolecular H-bonding.

Question47

Benzene reacts with CH_3Cl in the presence of anhydrous $AlCl_3$, to form (2009)

Options:

A. chlorobenzene

B. benzyl chloride

C. xylene

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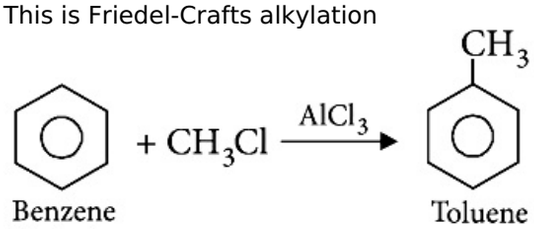
D. toluene

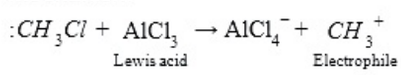
Answer: D

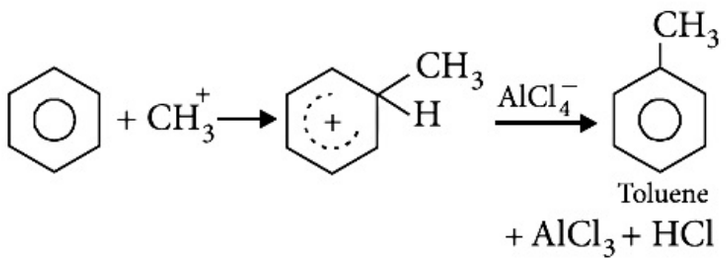
Solution:

This is Friedel-Crafts alkylation



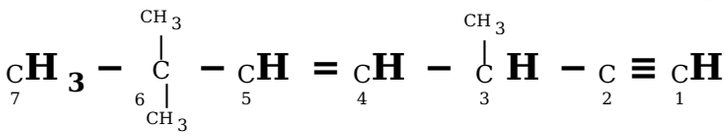
Mechanism





Question48

The state of hybridisation of C_2, C_3, C_5 and C_6 of the hydrocarbon,



is in the following sequence (2009)

Options:

A. sp^3, sp^2, sp^2 and sp

B. sp, sp^2, sp^2 and sp^3

C. sp, sp^2, sp^3 and sp^2

D. sp, sp^3, sp^2 and sp^3

Answer: D

Solution:

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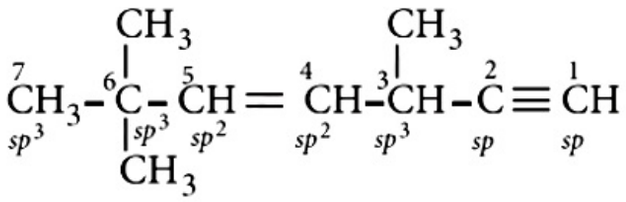


$\therefore$ $C_2 - sp$, $C_3 - sp^3$, $C_5 - sp^2$ and $C_6 - sp^3$

Question49

Which of the following compounds will exhibit cis-trans (geometrical) isomerism?
(2009)

Options:

A. Butanol

B. 2 -Butyne

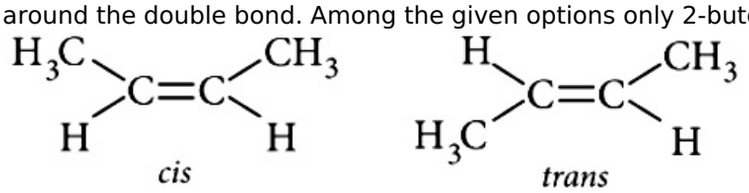
C. 2 -Butenol

D. 2 -Butene

Answer: D

Solution:

Solution:
Cis-trans isomerism is exhibited by compounds having C = C, C = N and N = N groups, due to restricted rotation around the double bond. Among the given options only 2-butene exhibits geometrical isomerism.



Question50

In the hydrocarbon,
$\overset{6}{C}H_3 - \overset{5}{C}H = \overset{4}{C}H - \overset{3}{C}H_2 - \overset{2}{C} \equiv \overset{1}{C}H$
The state of hybridization of carbons 1, 3 and 5 are in the following sequence
(2008)

Options:

A. sp, sp^2, sp^3

B. sp^3, sp^2, sp

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C. sp^2, sp, sp^3

D. sp, sp^3, sp^2

Answer: D

Solution:

$$\overset{sp^3}{\underset{6}{CH_3}} - \overset{sp^2}{\underset{5}{CH}} = \overset{sp^2}{\underset{4}{CH}} - \overset{sp^3}{\underset{3}{CH_2}} - \overset{sp}{\underset{2}{C}} \equiv \overset{sp}{\underset{1}{CH}}$$

The state of hybridisation of carbon in 1, 3 and 5 position are sp, sp^3, sp^2

Question51

$$H_3C - \underset{CH_3}{\overset{|}{C}}H - CH = CH_2 + HBr \rightarrow A$$

A(predominantly) is (2008)

Options:

A. $CH_3 - \underset{Br}{\overset{|}{C}}H - \underset{CH_3}{\overset{|}{C}}H - CH_3$

B. $CH_3 - \underset{CH_3}{\overset{|}{C}}H - \underset{Br}{\overset{|}{C}}H - CH_3$

C. $CH_3 - \underset{CH_3}{\overset{|}{C}}H - CH_2 - CH_2Br$

D. $CH_3 - \underset{CH_3}{\overset{\overset{Br}{|}}{C}} - CH_2CH_3$

Answer: D

Solution:

Solution:

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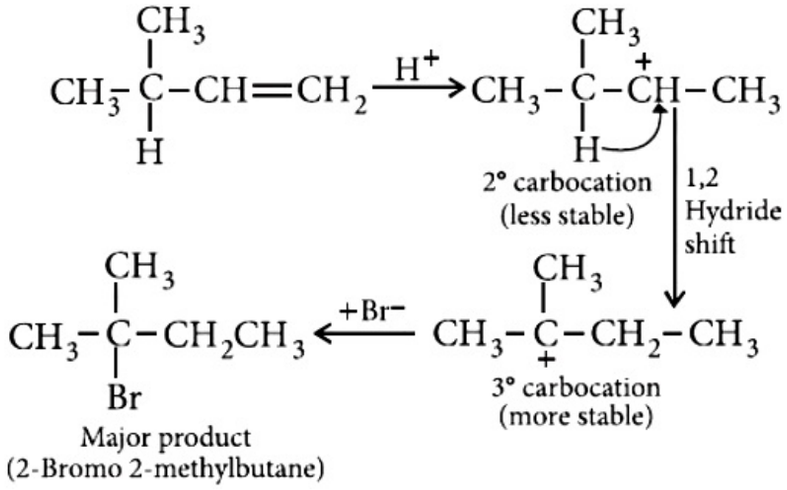


Question52

Which of the compound with molecular formula C_5H_{10} yields acetone on ozonolysis?
(2007)

Options:

A. 3-Methyl-1-butene

B. Cyclopentane

C. 2-Methyl-1-butene

D. 2-Methyl-2-buten

Answer: D

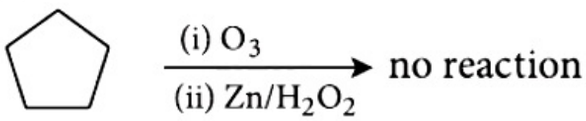
Solution:

Solution:

(a) $H_3C-C(H)(CH_3)-CH=CH_2 \xrightarrow[(ii)\ Zn/H_2O_2]{(i)\ O_3} H_3C-CH(CH_3)-CH=O + CH_2O$

3 – Methy; –1 – butene — 2 – Methylpropanal — Formaldehyde

(b)



(C) $H_3C-CH_2-C(CH_3)=CH_2 \xrightarrow[(ii)\ Zn/H_2O_2]{(i)\ O_3} H_3C-CH_2-C(CH_3)=O + CH_2O$

2 – Methyl – 1 – butene — Ethylmethylketone — Formaldehyde

(d) $H_3C-C(CH_3)=CH-CH_3 \xrightarrow[(ii)\ Zn/H_2O_2]{(i)\ O_3} H_3C-C(=O)-CH_3 + CH_3CHO$

2 – Methyl – 2 – butene — Acetone — Acetaldehyde

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Question53

Predict the product C obtained in the following reaction of 1-butyne.

$CH_3CH_2 - C \equiv CH + HCl \xrightarrow{HI} B \xrightarrow{} C$

(2007)

Options:

A. $CH_3 - CH_2 - CH_2 - \underset{Cl}{\overset{I}{C}} - H$

B. $CH_3 - CH_2 - \overset{I}{C}H - CH_2Cl$

C. $CH_3CH_2 - \underset{Cl}{\overset{I}{C}} - CH_3$

D. $CH_3 - \underset{Cl}{CH} - CH_2CH_2I$

Answer: C

Solution:

Solution:

$$CH_3 - CH_2 - C \equiv CH + HCl \longrightarrow \underset{(B)}{CH_3 - CH_2 - \underset{Cl}{C} = CH_2} \xrightarrow{HI} \underset{(C)}{CH_3 - CH_2 - \underset{Cl}{\overset{I}{C}} - CH_3}$$

According to Markownikoff's rule, during hydro-halogenation to unsymmetrical alkene, the negative part of the addendum adds to less hydrogenated (i.e. more substituted) carbon atom.

Question54

Which one of the following alkenes will react faster with H_2 under catalytic hydrogenation conditions?(R= alkyl substituent)
(2005)

Options:

A.

B.

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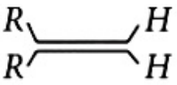
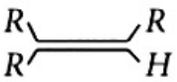
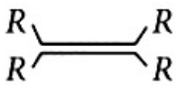


C.



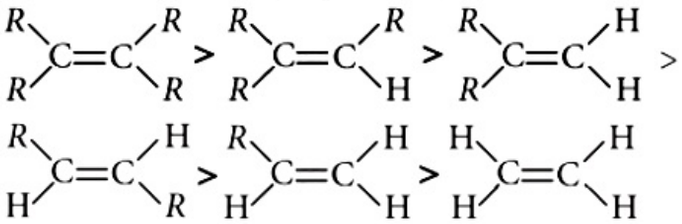
D.



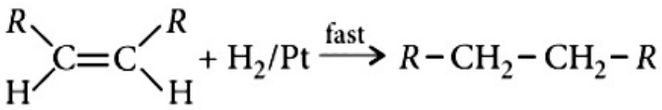
Answer: A

Solution:

Solution:
The relative rates of hydrogenation decrease with the increase of steric hindrance. In order of stability of alkene, most stable the alkene, slowly it gives the product.



Hence, alkene which will react faster with H_2 is that which is most unstable.



Question55

Products of the following reaction:

$CH_3C \equiv CCH_2CH_3 \xrightarrow[\text{(ii) hydrolysis}]{\text{(i) } O_3}$ are

(2005)

Options:

A. $CH_3COOH + CO_2$

B.

$CH_3COOH + HOOCCH_2CH_3$

C. $CH_3CHO + CH_3CH_2CHO$

D. $CH_3COOH + CH_3COCH_3$

Answer: B

Solution:

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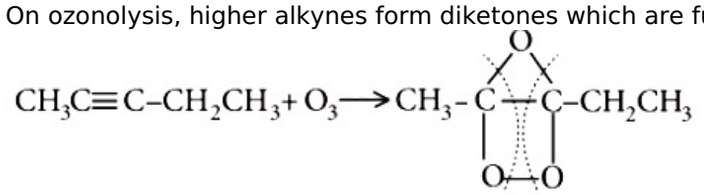
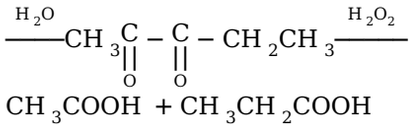
On ozonolysis, higher alkynes form diketones which are further oxidised to dicarboxylic acid.





Question56

Using anhydrous $AlCl_3$ as catalyst, which one of the following reactions produces ethylbenzene (PhEt) ?
(2004)

©

Options:

A. $H_3C - CH_2OH + C_6H_6$

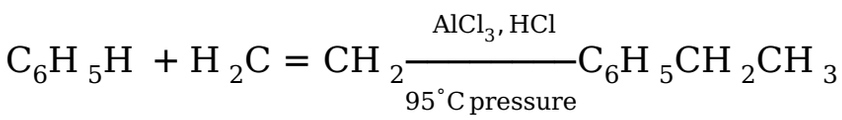
B. $CH_3 - CH = CH_2 + C_6H_6$

C. $H_2C = CH_2 + C_6H_6$

D. $H_3C - CH_3 + C_6H_6$

Answer: C

Solution:



Question57

Reaction of H Br with propene in the presence of peroxide gives
(2004)

©

Options:

A. isopropyl bromide

B. 3 -bromopropane

C. allyl bromide

D. n - propyl bromide.

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Answer: D

Solution:

The formation of n -propyl bromide in presence of peroxide can be explained as follow:
Step 1 : Peroxide undergoes fission to give free radicals.

$$R-O-O-R \longrightarrow 2R-\overset{\bullet}{O}$$

Step 2 : HBr combines with free radical to form bromine free radical.

$$R-\overset{\bullet}{O}+HBr \longrightarrow R-OH+\overset{\bullet}{Br}$$

Step 3 : $\overset{\bullet}{Br}$ attacks the double bond of the alkene to form a more stable free radical.
Step 4: More stable free radical attacks on H Br.

$$CH_3\overset{\bullet}{C}HCH_2Br + HBr \longrightarrow \underset{\mu n\text{ -propyl bromide}}{CH_3CH_2CH_2Br} + \overset{\bullet}{Br}$$

Step 5 : $\overset{\bullet}{Br}+Br \longrightarrow \overset{\bullet}{Br}_2$

Question58

The compound $CH_3-\overset{CH_3}{\underset{|}{C}}=CH-CH_3$ on reaction with $NaIO_4$ in the presence of $KMnO_4$ gives
(2003)

Options:

A. CH_3COCH_3

B. $CH_3COCH_3 + CH_3COOH$

C. $CH_3COCH_3 + CH_3CHO$

D. $CH_3CHO + CO_2$

Answer: B

Solution:

$$CH_3-\overset{CH_3}{\underset{|}{C}}=CH-CH_3 \xrightarrow[KMO_4]{NaIO_4} CH_3-\underset{\underset{+}{CH_3COOH}}{\overset{CH_3}{\underset{|}{C}}}=O$$

Question59

Which one of the following is a free-radical substitution reaction?
(2003)

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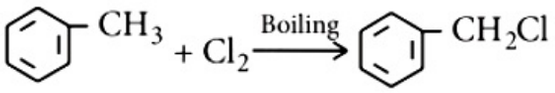
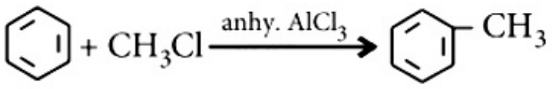
Options:

A.



B.



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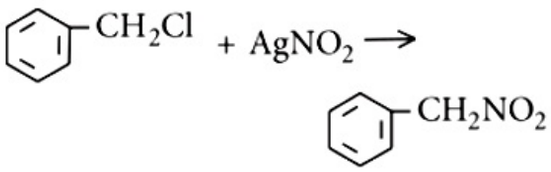


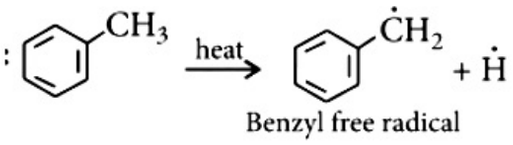
D.

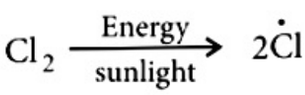
$CH_3CH\,O + H\,CN \rightarrow CH_3CH\,(OH\,)CN$

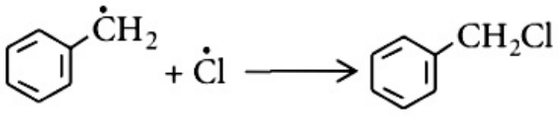
Answer: A

Solution:

Solution:







Question60

The correct order of reactivity towards the electrophilic substitution of the compounds aniline (I), benzene (II) and nitrobenzene (III) is (2003)

Options:

A. III > II > I

B. II > III > I

C. I < II > III

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D. I > II > III

Answer: D

Solution:

$-NH_2$ group is electron donating hence increases electron density on ring. Benzene is also electron rich due to delocalisation of electrons. $-NO_2$ group is electron withdrawing hence, decreases electron density on ring. Thus, correct order for electrophilic substitution is I > II > III

Question61

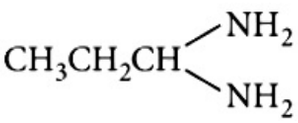
When $CH_3CH_2CHCl_2$ is treated with $NaNH_2$, the product formed is (2002)

Options:

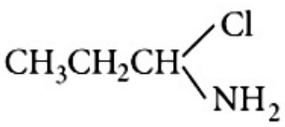
A. $CH_3 - CH = CH_2$

B. $CH_3 - C \equiv CH$

C.



D.



Answer: B

Solution:

$$CH_3CH_2CHCl_2 \xrightarrow{NaNH_2} CH_3C \equiv CH$$

This is the method of preparation of alkyne.
In this reaction, the alkyl dihalide is treated with reducing agents like alc. KOH or sodamide to form alkyne as a product.

Question62

In preparation of alkene from alcohol using Al_2O_3 which is the effective factor? (2001)

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Options:

A. Porosity of Al_2O_3

B. Temperature

C. Concentration

D. Surface area of Al_2O_3

Answer: B

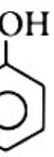
Solution:

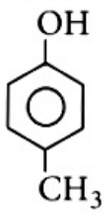
Solution:
Alcohols may be dehydrated to the corresponding olefins. The order of ease of dehydration is 3° alcohol > 2° alcohol > 1° alcohol.

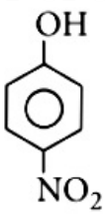
$$CH_3CH_2OH \xrightarrow[-H_2O]{Al_2O_3,\ 620K} CH_2 = CH_2$$

Question63

The correct acidic order of the following is

I. 

II. 

III. 

(2001)

Options:

A. I > II > III

B. III > I > II

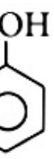
C. II > III > I

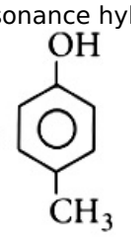
D. I > III > II

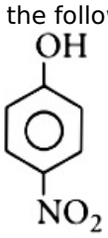
Answer: B

Solution:

Solution:
Phenol exists as a resonance hybrid of the following structures.

I. 

II. 

III. 

Thus, due to resonance the oxygen atom of the -OH group acquires a positive charge and hence attracts electron pair of the $O-H$ bond leading to the release of hydrogen atom as proton.

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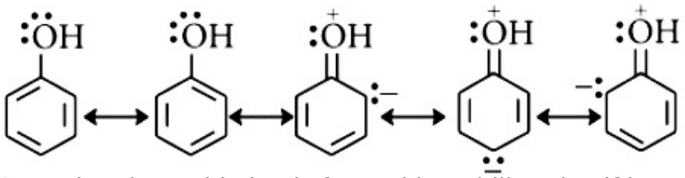
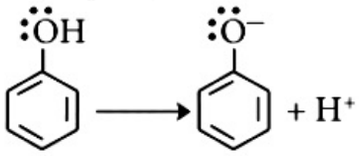


Once the phenoxide ion is formed it stabilises itself by resonance which is more stable than the parent phenol as there is no charge separation.



Phenoxide ion

Effect of substituent : Presence of electron withdrawing groups ($-NO_2$, $-X$, $-CN$) increase the acidity of phenols while the presence of electron releasing groups ($-NH_2$, $-CH_3$) decrease the acidity of phenols. This explains the following order of acidity :
p -nitrophenol > phenol > p -cresol.

Question64

Increasing order of electrophilic substitution for following compounds (2000)

Options:

A. IV < I < II < III

B. III < II < I< IV

C. I < IV < III < II

D. II < III < I < IV

Answer: A

Solution:

Solution:
Due to $-I$ effect of F atom, CF_3 in benzene ring deactivates the ring and does not favour electrophilic substitution. While $-CH_3$ and $-OCH_3$ are $+I$ group which favor's electrophilic substitution in the benzene ring at 'ortho' and 'para' positions. The $+I$ effect of $-OCH_3$ is more than $-CH_3$, therefore the correct order for electrophilic substitution is

---

Question65

In Friedel-Crafts reaction, toluene can be prepared by (2000)

Options:

A. $C_6H_6 + CH_3Cl$

B. $C_6H_5Cl + CH_4$

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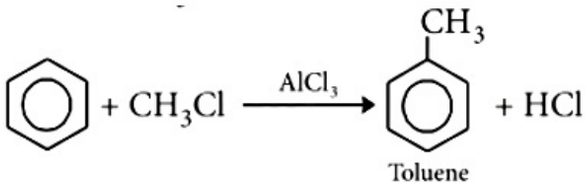
C. $C_6H_6 + CH_2Cl_2$

D. $C_6H_6 + CH_3COCl$

Answer: A

Solution:

Solution:
In Friedel-Crafts reaction toluene is obtained by the action of CH_3Cl on benzene in presence of $AlCl_3$



Question66

Which reagent converts propene to 1 -propanol? (2000)

©

Options:

A. H_2O, H_2SO_4

B. B_2H_6, H_2O_2, OH^-

C. $Hg(OAc)_2$, $NaBH_4/H_2O$

D. Aq. KOH

Answer: B

Solution:

Solution:
Propene adds to diborane (B_2H_6) giving an addition product. The addition compound on oxidation gives 1 -propanol. Here addition of water takes place according to anti-Markownikoff's rule.

Question67

Which is maximum stable? (2000)

Options:

A. 1 -Butene

B. cis − 2 -Butene

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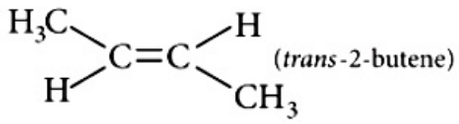
C. trans-2-Butene

D. All have same stability.

Answer: C

Solution:



This is most stable as the repulsion between two methyl groups is least.

Question68

2-Butene shows geometrical isomerism due to (2000)

Options:

A. restricted rotation about double bond

B. free rotation about double bond

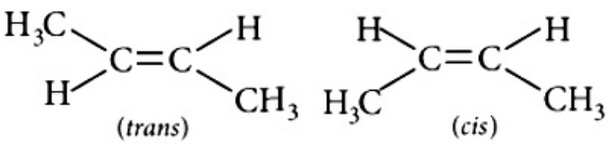
C. free rotation about single bond

D. chiral carbon.

Answer: A

Solution:

Solution:
Due to restricted rotation about double bond, 2 -butene shows geometrical isomerism.



Question69

Dihedral angle in staggered form of ethane is (2000)

Options:

A. 0˚

B. 120˚

C. 60˚

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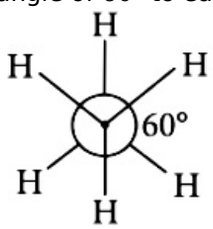
D. 180°

Answer: C

Solution:

Solution:
The staggered form of ethane has the following structure and the dihedral angle is 60°, which means °H´ atoms are at an angle of 60° to each other.



Question70

When acetylene is passed through dil. H_2SO_4 in the presence of $HgSO_4$, the compound formed is (1999)

Options:

A. acetic acid

B. ketone

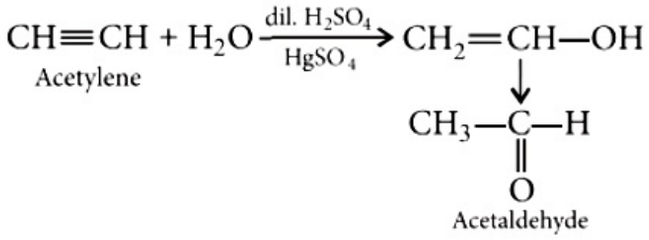
C. ether

D. acetaldehyde

Answer: D

Solution:

Solution:



Question71

In Friedel-Crafts alkylation, besides $AlCl_3$ the other reactants are (1999)

Options:

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A. $C_6H_6 + CH_3Cl$

B. $C_6H_6 + CH_4$

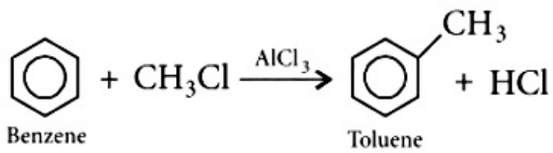
C. $C_6H_6 + NH_3$

D. $C_6H_6 + CH_3COCl$

Answer: A

Solution:

Solution:
In Friedel-Crafts reaction, an alkyl group is introduced into the benzene ring in presence of a Lewis acid ($AlCl_3$) catalyst. The reaction is

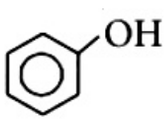


Question72

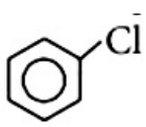
Which of the following compounds will be most easily attacked by an electrophile?
(1999,1998)

Options:

A.

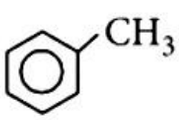


B.



C.

D.



Answer: A

Solution:

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$-OH$, $-Cl$ and $-CH_3$ groups in benzene are ortho-para directing groups. But among these -OH group is strongly activating while $-CH_3$ is weakly activating and $-Cl$ is deactivating. Thus, phenol will be most easily attacked by an electrophile.

Question73

Which one of these is not compatible with arenes? (1998)

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Options:

A. Electrophilic additions

B. Delocalisation of π -electrons

C. Greater stability

D. Resonance

Answer: A

Solution:

Solution:
Arenes undergo nucleophilic substitution reaction and are resistant to addition reactions, due to delocalisation of π -electrons. These are also stabilized by resonance.

Question74

2-Bromopentane is heated with potassium ethoxide in ethanol. The major product obtained is (1998)

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Options:

A. trans-2-pentene

B. 1 -pentene

C. 2 -ethoxy pentane

D. 2 - cis -pentene.

Answer: A

Solution:

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$$CH_3 - \underset{Br}{\overset{|}{C}}H - CH_2 - CH_2 - CH_3 + C_2H_5 - OK$$
$$\underset{2-\text{Bromopentane}}{}$$
$$\rightarrow CH_3 - \underset{\text{trans}-2-\text{Pentene}}{CH = CH} - CH_2 - CH_3 + KBr + C_2H_5 - OH$$

Question75

Which of the following reaction is expected to readily give a hydrocarbon product in good yields? (1997)

Options:

A. $CH_3CH_3 \xrightarrow[hv]{Cl_2}$

B. $(CH_3)_2CH\,Cl \xrightarrow{C_2H_5OH}$

C. $RCOOK \xrightarrow[Oxidation]{Electrolysis}$

D. $RCOOAg \xrightarrow{I_2}$

Answer: C

Solution:

When an aqueous solution of sodium or potassium salt of carboxylic acid is electrolysed, hydrocarbon is evolved at anode.

$$2RCOOK \xrightarrow[Oxidation]{Electrolysis} \underset{Anode}{2RCOO^-} + \underset{Cathode}{2K^+}$$

At anode: $2RCOO^- - 2e^- \rightarrow \underset{Alkane}{R - R} + 2CO_2$

Question76

In reaction,

$$CH_2 = CH_2 \xrightarrow[acid]{Hypochlorous} M \xrightarrow[CH_2OH]{R\ \ CH_2OH}$$

where, M = Molecule and R = Reagent. M and R are (1997)

Options:

A. CH_3CH_2OH and HCl

B. $CH_2 = CH_2$ and heat

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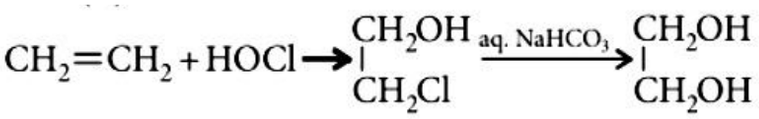
C. CH_3CH_2Cl and NaOH

D. $CH_2Cl - CH_2OH$ and aq. $NaHCO_3$.

Answer: D

Solution:



Therefore, M = $CH_2Cl - CH_2OH$ and R = aq · NaHCO$_3$

Question77

The cylindrical shape of an alkyne is due to (1997)

Options:

A. two sigma C − C and one πC − C bonds

B. one sigma C − C and two πC − C bonds

C. three sigma C − C bonds

D. three π C - C bonds.

Answer: B

Solution:

In alkyne, two carbon atoms constituting the triple bond are sp -hybridised. Carbon undergoes sp -hybridisation to form two sp -hybrid orbitals. The two 2p -orbitals remain unhybridised. Hybrid orbitals form one sigma bond while two π -bonds are formed by unhybridised orbitals.

Question78

In the commercial gasolines, the type of hydrocarbons which are more desirable is (1997)

Options:

A. linear unsaturated hydrocarbon

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B. toluene

C. branched hydrocarbon

D. straight-chain hydrocarbon.

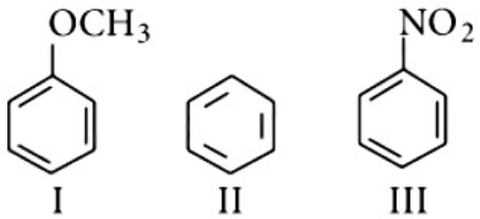
Answer: C

Solution:

Solution:
The branching of chain increases the octane number of a fuel. High octane number means better fuel.

Question79

Among the following compounds (I-III) the correct reaction with electrophile is



(1997)

Options:

A. I > II > III

B. I = II > III

C. II > III > I

D. III < I < II

Answer: A

Solution:

Solution:
In structure III, withdrawal of electrons by $-NO_2$ causes decrease in reaction rate while in structure I, there is electron releasing effect by $-OCH_3$ group which accelerates the reaction.

Question80

The most stable conformation of n -butane is
(1997)

Options:

A. gauche

B. staggered

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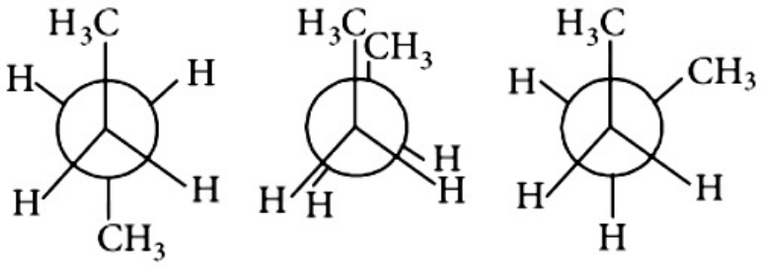
C. skew boat

D. eclipsed.

Answer: B

Solution:

$CH_3CH_2CH_2CH_3$ −n -butane
Newman projection for n -butane is



The staggered conformation has minimum repulsion between the hydrogen atoms attached tetrahedrally to the two carbon atoms. Thus, it is the most stable conformation.

Question81

Electrophile in the case of chlorination of benzene in the presence of $FeCl_3$ is
(1996)

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Options:

A. Cl

B. $FeCl_3$

C. Cl^+

D. Cl^-

Answer: C

Solution:

$Cl_2 + FeCl_3 \longrightarrow FeCl_4^- + Cl^+$

Question82

The reaction,
$CH_2 = CH - CH_3 + HBr \longrightarrow CH_3CHBr - CH_3$

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is
(1996)

Options:

A. electrophilic substitution

B. free radical addition

C. nucleophilic addition

D. electrophilic addition.

Answer: D

Solution:

In this reaction, HBr undergoes heterolytic fission as $H\,Br \longrightarrow H^{+} + Br^{-}$

$CH_2 = CH - CH_3 + H\,Br \longrightarrow CH_3 - \overset{+}{C}H - CH_3$

$\overset{Br^{-}}{\longrightarrow} CH_3 - CH\,Br - CH_3$

Question83

Which of the following has zero dipole moment?
(1996)

Options:

A. 1 -Butene

B. 2 -Methyl-1-propene

C. cis 2 -Butene

D. trans-2-Butene

Answer: D

Question84

The alkene $R - CH = CH_2$ reacts readily with B_2H_6 and the product on oxidation with alkaline hydrogen peroxides produces

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(1995)

Options:

A. $R-\underset{\underset{CH_3}{|}}{C}=O$

B. $R-\underset{\underset{OH}{|}}{C}H-\underset{\underset{OH}{|}}{C}H_2$

C. $R-CH_2-CHO$

D. $R-CH_2-CH_2-OH$

Answer: D

Solution:

$$6\left(\underset{\text{Alkene}}{R-CH=CH_2}\right)\xrightarrow[\text{Ether, } 0^\circ C]{B_2H_6}2(RCH_2CH_2)_3B$$
$$\xrightarrow[NaOH]{H_2O_2}3RCH_2CH_2OH+2H_3BO_3$$

Question85

One of the following which does not observe the anti - Markownikoff's addition of HBr, is
(1994)

Options:

A. pent-2-ene

B. propene

C. but-2-ene

D. but-1-ene.

Answer: C

Solution:

Solution:
In the case of but-2-ene ($CH_3-CH=CH-CH_3$) both double bonded carbons are identical. Therefore, it does not observe the anti-Markownikoff's addition of HBr.

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Question86

The reactive species in the nitration of benzene is
(1994)

Options:

A. NO_3

B. HNO_3

C. NO_2^+

D. NO_2^-

Answer: C

Solution:

Solution:
Nitronium ion (NO_2^+) is an electrophile that actually attacks the benzene ring.

Question87

$R-CH_2-CCl_2-R \xrightarrow{\text{Reagent}} R-C\equiv C-R$
The reagent is
(1993)

Options:

A. Na

B. HCl in H_2O

C. KOH in C_2H_5OH

D. Zn in alcohol.

Answer: C

Question88

Reduction of 2 -butyne with sodium in liquid ammonia gives predominantly
(1993)

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Options:

A. cis-2-butene

B. no reaction

C. trans-2-butene

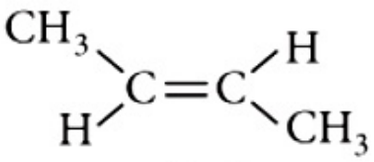
D. n - butane.

Answer: C

Solution:

Reduction of non-terminal alkynes with Na in liq. NH_3 at $195-200K$ gives trans-2-butene.

$$CH_3-C\equiv C-CH_3 \xrightarrow[195-200K]{Na \text{ in liq. } NH_3}$$



trans-But-2-ene

(Birch reduction)

Question89

A compound is treated with $NaNH_2$ to give sodium salt. Identify the compound.
(1993)

Options:

A. C_2H_2

B. C_6H_6

C. C_2H_6

D. C_2H_4

Answer: A

Solution:

Solution:
Alkynes react with strong bases like $NaNH_2$ to form sodium acetylide derivative known as acetylides.

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$H - C \equiv C - H + NaNH_2 \rightarrow H - C \equiv \overline{C}N\overset{+}{a} + 1/2H_2$

Question90

Reactivity of hydrogen atoms attached to different carbon atoms in alkanes has the order
(1993)

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Options:

A. tertiary > primary > secondary

B. primary > secondary > tertiary

C. both (a) and (b)

D. tertiary > secondary > primary.

Answer: D

Solution:

Solution:
The reactivity of H-atom depends upon the stability of free radicals, therefore reactivity of H -atom follows the order : $3^{\circ} > 2^{\circ} > 1^{\circ}$

Question91

Which is the correct symbol relating the two Kekule structures of benzene?
(1993)

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Options:

A. ⇌

B. →

C. ≡

D. ↔

Answer: D

Solution:

Benzene shows Kekule structures which are resonating structures and these structures are separated by a double headed arrow (↔)

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Question92

The restricted rotation about carbon carbon double bond in 2 -butene is due to
(1993)

Options:

A. overlap of one s and sp^2 -hybridized orbitals

B. overlap of two sp^2 -hybridized orbitals

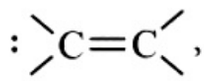
C. overlap of one p and one sp^2 -hybridized orbitals

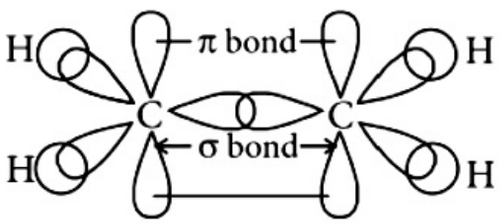
D. sideways overlap of two p -orbitals.

Answer: D

Solution:

Solution:





Restricted rotation is due to sideways overlap of two p -orbitals.

Question93

Select the true statement about benzene amongst the following
(1992)

Options:

A. because of unsaturation benzene easily undergoes addition

B. there are two types of C − C bonds in benzene molecule

C. there is cyclic delocalisation of π -electrons in benzene

D. monosubstitution of benzene gives three isomeric products.

Answer: C

Solution:

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Due to resonance all the $C-C$ bonds in the benzene possess same nature and the resonating structures are obtained because of the delocalisation of π -electrons.

Question94

Acetylenic hydrogens are acidic because (1989)

Options:

A. sigma electron density of $C-H$ bond in acetylene is nearer to carbon, which has 50% s -character

B. acetylene has only open hydrogen in each carbon

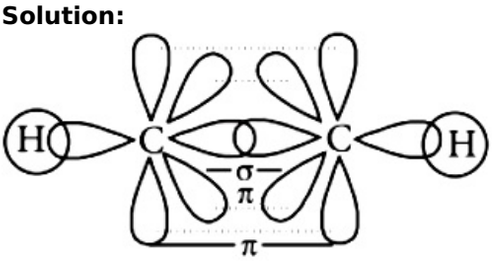
C. acetylene contains least number of hydrogens among the possible hydrocarbons having two carbons

D. acetylene belongs to the class of alkynes with molecular formula, C_nH_{2n-2}.

Answer: A

Solution:

Solution:



The formation of $C-H$ bond in acetylene involves sp -hybridised carbon atom. since s-electrons are closer to the nucleus than p -electrons, the electrons present in a bond having more s -character will be more closer to the nucleus. In alkynes s character is 50% the electrons constituting this bond are more strongly bonded by the carbon nucleus. Thus, acetylenic C-atom becomes more electronegative in comparison to sp^2, sp^3 and hence the hydrogen atom present on carbon atom ($\equiv C-H$) can be easily removed.

Question95

Which is the most suitable reagent among the following to distinguish compound (3) from rest of the compounds?

(1) $CH_3-C\equiv C-CH_3$

(2) $CH_3-CH_2-CH_2-CH_3$

(3) $CH_3-CH_2C\equiv CH$

(4) $CH_3-CH=CH_2$

(1989)

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Options:

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A. Bromine in carbon tetrachloride

B. Bromine in acetic acid

C. Alk. $KMnO_4$

D. Ammoniacal silver nitrate

Answer: D

Solution:

All the three reagents except ammoniacal $AgNO_3$ reacts with 1,2 and 4 compounds. The compound 3 possessing the terminal alkyne only reacts with ammoniacal $AgNO_3$ and thus can be distinguished from 1,2 and 4 compounds.

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