Hydrocarbons

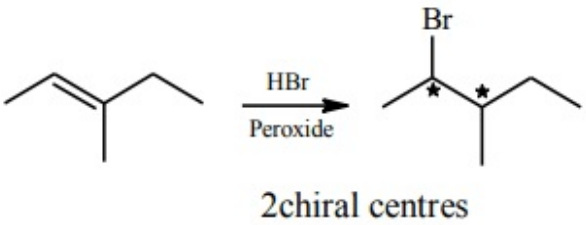
Question1

3-Methylhex-2-ene on reaction with HBr in presence of peroxide forms an addition product (A). The number of possible stereoisomers for 'A' is_____

[27-Jan-2024 Shift 1]

Answer: 4

Solution:



2chiral centres

No. of stereoisomers = 4

Question2

Among the following, total number of meta directing functional groups is (Integer based)

$-OCH_3, -NO_2, -CN, -CH_3 - NHCOCH_3,$

$-COR, -OH, -COOH, -Cl$

[27-Jan-2024 Shift 1]

Options:

Answer: 4

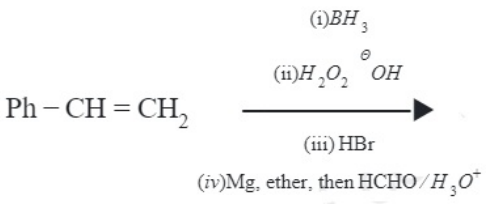
Solution:

$-NO_2, -C \equiv N, -COR, -COOH$

are meta directing.

Question3

The final product A, formed in the following reaction sequence is:



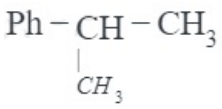
[27-Jan-2024 Shift 2]

Options:

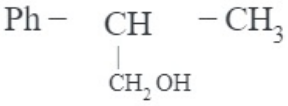
A.

$Ph - CH_2 - CH_2 - CH_3$

B.



C.

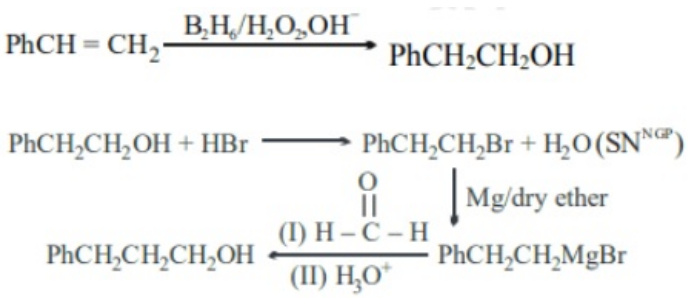


D.

$Ph - CH_2 - CH_2 - CH_2 - OH$

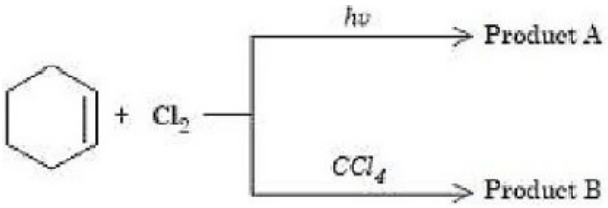
Answer: D

Solution:



Question4

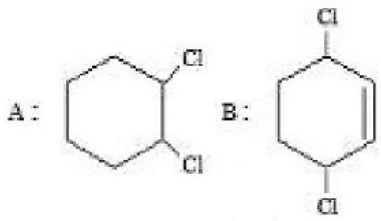
Identify product A and product B :



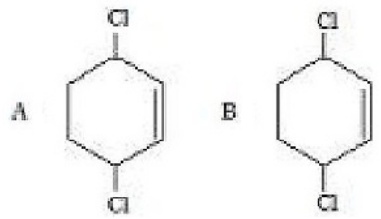
[29-Jan-2024 Shift 1]

Options:

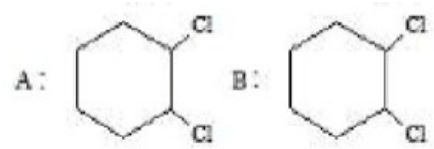
A.



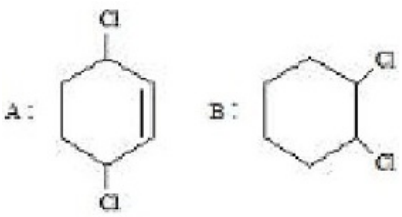
B.



C.

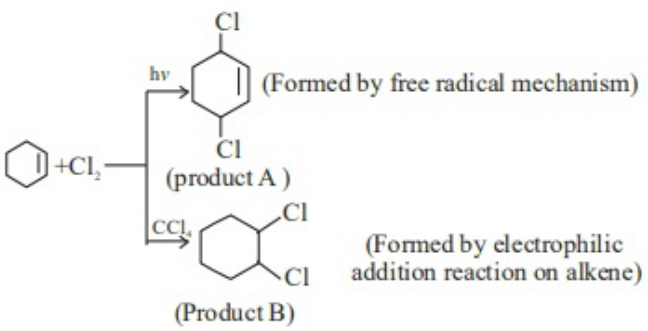


D.



Answer: D

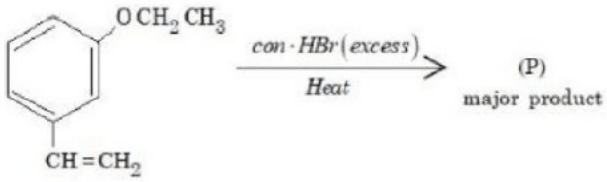
Solution:



Hence correct Ans. (4)

Question5

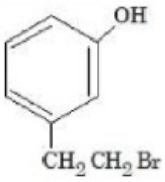
The major product (P) in the following reaction is



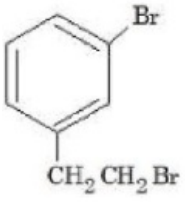
[29-Jan-2024 Shift 1]

Options:

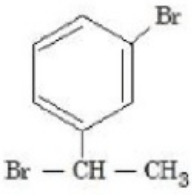
A.



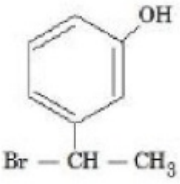
B.



C.

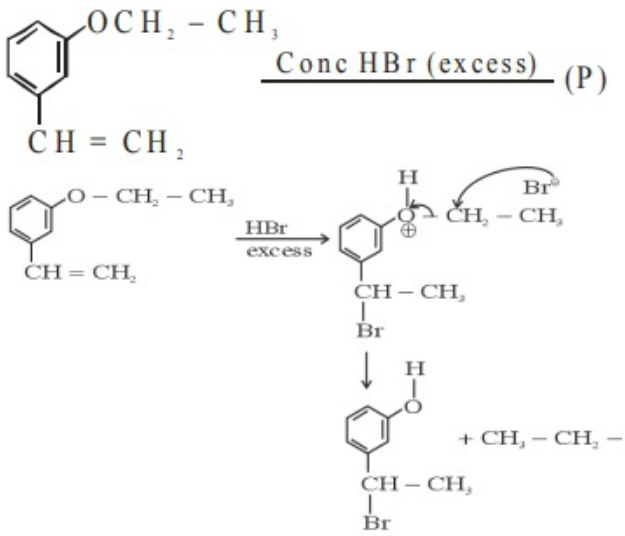


D.



Answer: D

Solution:



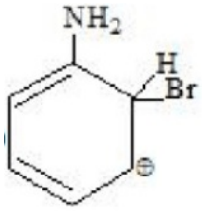
Question6

The arenium ion which is not involved in the bromination of Aniline is .

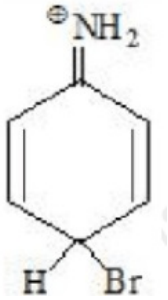
[29-Jan-2024 Shift 1]

Options:

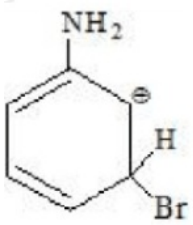
A.



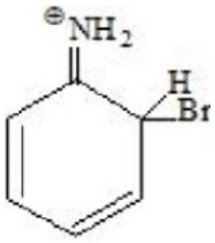
B.



C.



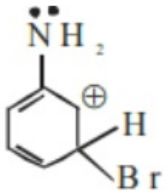
D.



Answer: C

Solution:

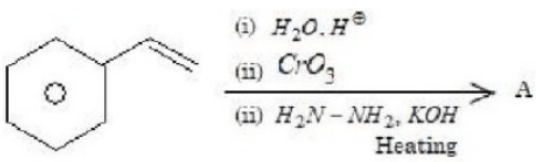
Since $-\ddot{N}H_2$ group is o/p directing hence arenium ion will not be formed by attack at meta position i.e.



Hence Answer is (3)

Question7

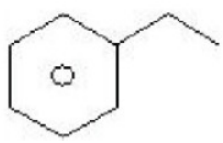
The final product A formed in the following multistep reaction sequence is



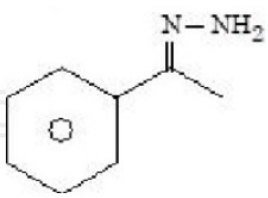
[29-Jan-2024 Shift 1]

Options:

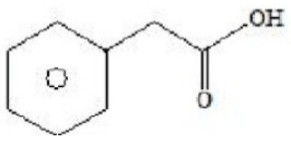
A.



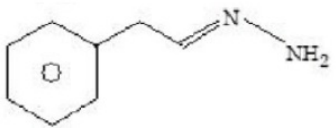
B.



C.

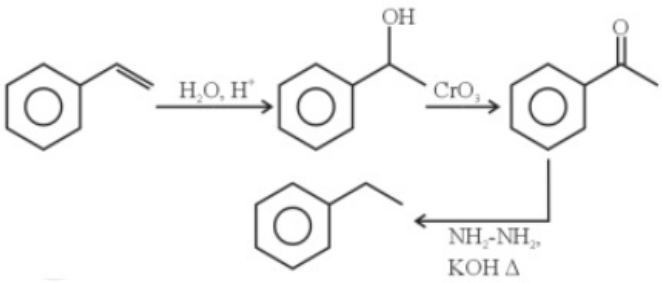


D.

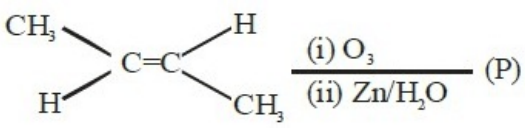


Answer: A

Solution:



Question8

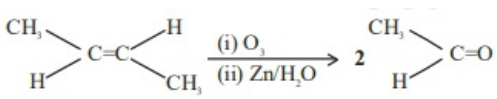


Consider the given reaction. The total number of oxygen atoms present per molecule of the product (P) is___

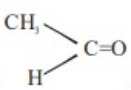
[29-Jan-2024 Shift 1]

Answer: 1

Solution:



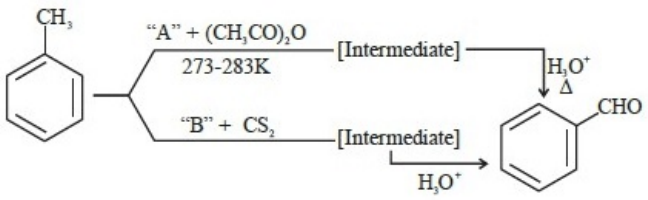
Hence total number of oxygen atom present per



molecule is 1.

Question9

In the given reactions identify the reagent A and reagent B



[30-Jan-2024 Shift 1]

Options:

A.

$A - CrO_3$

$B - CrO_3$

B.

$A - CrO_3$

$B - CrO_2Cl_2$

C.

$A - CrO_2Cl_2$

$B - CrO_2Cl_2$

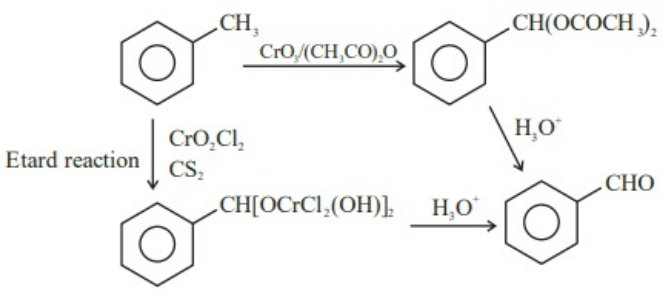
D.

$A - CrO_2Cl_2$

$B - CrO_3$

Answer: B

Solution:



Question10

Compound A formed in the following reaction reacts with B gives the

product C. Find out A and B.

$$CH_3-C\equiv CH+Na\rightarrow \mathbf{A}\xrightarrow{\mathbf{B}} \underset{(C)}{CH_3-C\equiv C-CH_2-\underset{CH_3}{\underset{|}{CH_2}}}+NaBr$$

[30-Jan-2024 Shift 1]

Options:

A.

$A = CH_3-C\equiv \bar{C}\overset{+}{N}a,\ B = CH_3-CH_2-CH_2-Br$

B.

$A = CH_3-CH=CH_2,\ B = CH_3-CH_2-CH_2-Br$

C.

$A = CH_3-CH_2-CH_3,\ B = CH_3-C\equiv CH$

D.

$A = CH_3-C\equiv \bar{C}\overset{+}{N}a,\ B = CH_3-CH_2-CH_3$

Answer: A

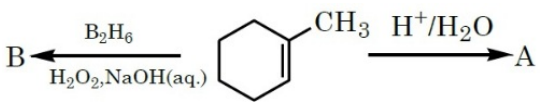
Solution:

$$CH_3-C\equiv CH\xrightarrow{Na} CH_3-C\equiv C^-Na^+\xrightarrow{CH_3CH_2CH_2-Br}$$

$$NaBr+CH_3-C\equiv C-CH_2CH_2CH_3$$

Question11

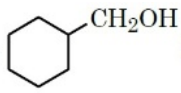
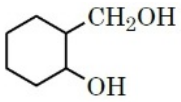
Product A and B formed in the following set of reactions are:



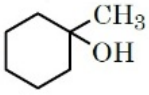
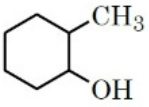
[30-Jan-2024 Shift 2]

Options:

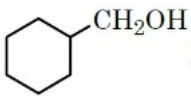
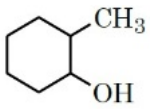
A.

A =  B = 

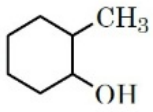
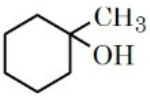
B.

A =  B = 

C.

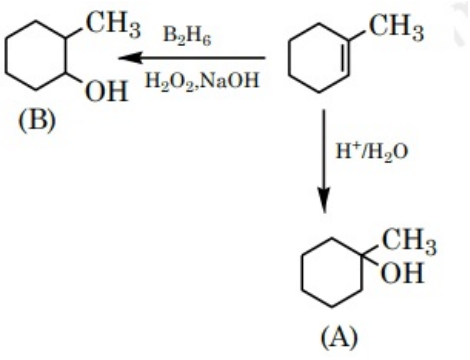
A =  B = 

D.

A =  B = 

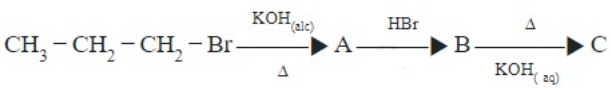
Answer: B

Solution:



Question12

The product (C) in the below mentioned reaction is:



[31-Jan-2024 Shift 1]

Options:

A.

Propan-1-ol

B.

Propene

C.

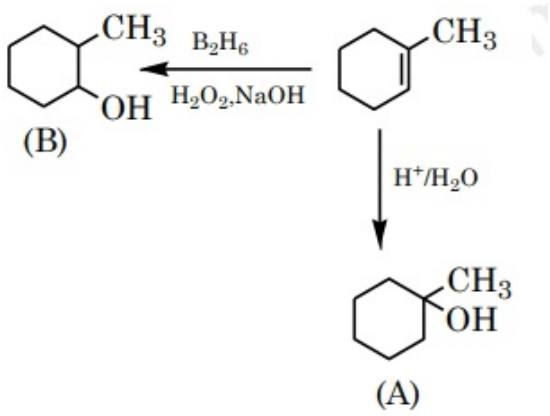
Propyne

D.

Propan-2-ol

Answer: D

Solution:



Question13

Number of alkanes obtained on electrolysis of a mixture of CH_3COONa and C_2H_5COONa is___

[31-Jan-2024 Shift 1]

Options:

Answer: 3

Solution:

$$CH_3COONa \longrightarrow \dot{C}H_3$$

$$C_2H_5COONa \longrightarrow \dot{C}_2H_5$$

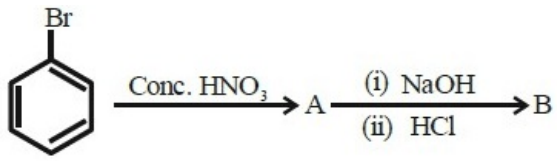
$$2\dot{C}_2H_5 \longrightarrow CH_3-CH_2-CH_2-CH_3$$

$$2\dot{C}H_3 \longrightarrow CH_3-CH_3$$

$$\dot{C}H_3 + \dot{C}_2H_5 \longrightarrow CH_3-CH_2-CH_3$$

Question14

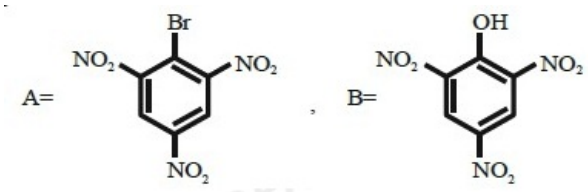
Identify A and B in the following reaction sequence.



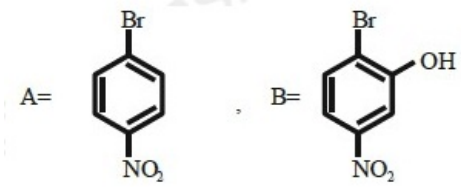
[31-Jan-2024 Shift 2]

Options:

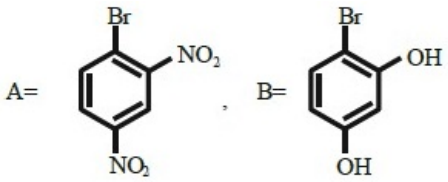
A.



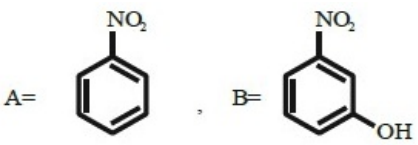
B.



C.

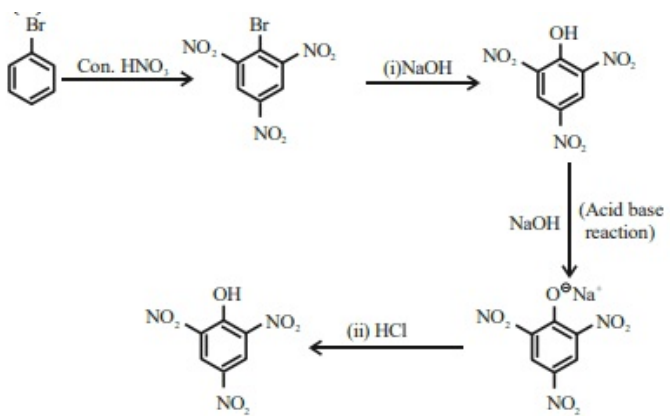


D.



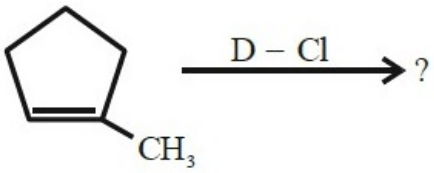
Answer: A

Solution:



Question15

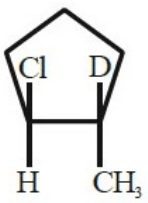
Major product of the following reaction is -



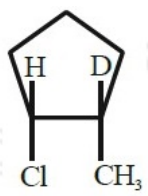
[31-Jan-2024 Shift 2]

Options:

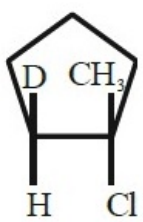
A.



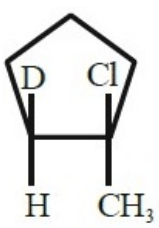
B.



C.

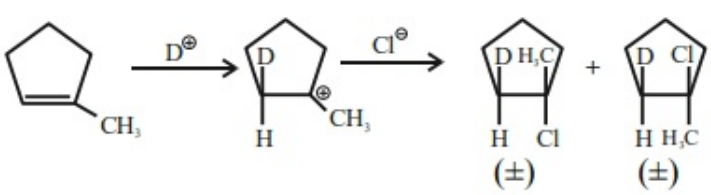


D.



Answer: 0

Solution:



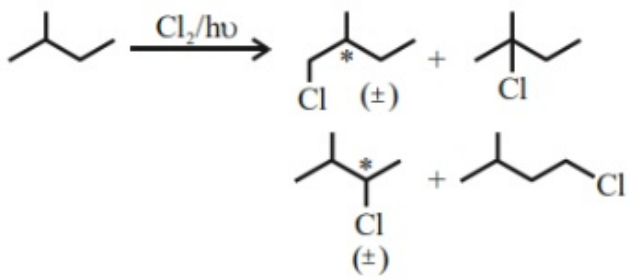
Question16

Number of isomeric products formed by monochlorination of 2-methylbutane in presence of sunlight is_____

[31-Jan-2024 Shift 2]

Answer: 6

Solution:



∴ Number of isomeric products = 6

Question17

Given below are two statements:

Statement (I) : The NH_2 group in Aniline is ortho and para directing and a powerful activating group.
Statement (II) : Aniline does not undergo FriedelCraft's reaction (alkylation and acylation).

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

[1-Feb-2024 Shift 1]

Options:

A.

Both Statement I and Statement II are correct

B.

Both Statement I and Statement II are incorrect

C.

Statement I is incorrect but Statement II is correct

D.

Statement I is correct but Statement II is incorrect

Answer: A

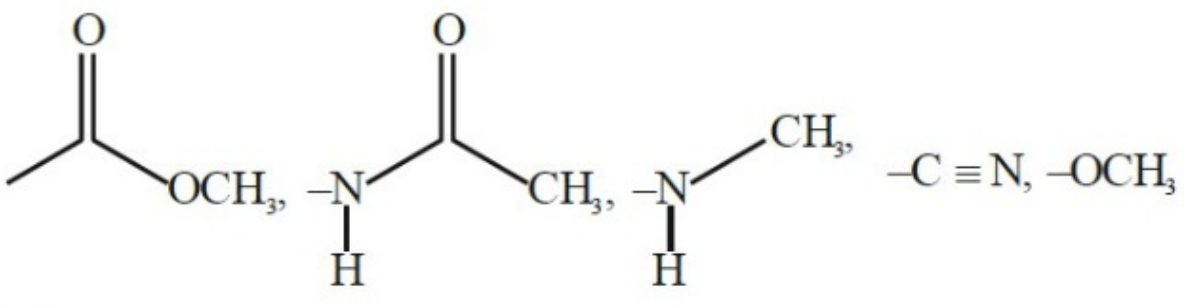
Solution:

The NH_2 group in Aniline is ortho and para directing and a powerful activating group as NH_2 has strong +M effect.

Aniline does not undergo Friedel-Craft's reaction (alkylation and acylation) as Aniline will form complex with $AlCl_3$ which will deactivate the benzene ring.

Question18

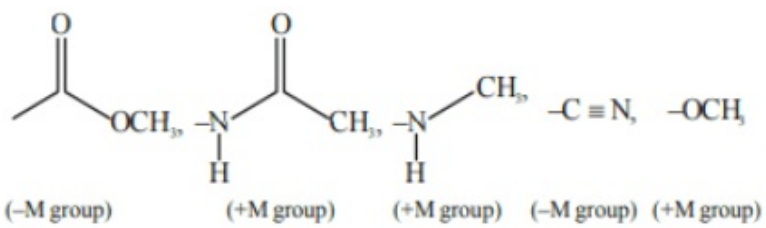
Total number of deactivating groups in aromatic electrophilic substitution reaction among the following is



[1-Feb-2024 Shift 1]

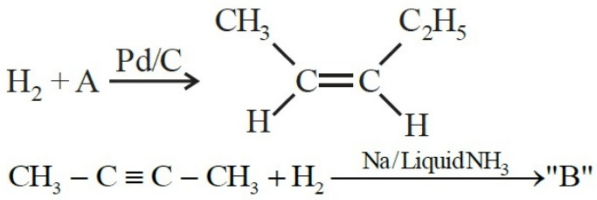
Answer: 2

Solution:



Question19

In the given reactions identify



[1-Feb-2024 Shift 2]

Options:

A.

A : 2-Pentyne

B : trans −2− butene

B.

A :n-Pentane

B : trans -2 - butene

C.

A : 2 - Pentyne

B : Cis -2 - butene

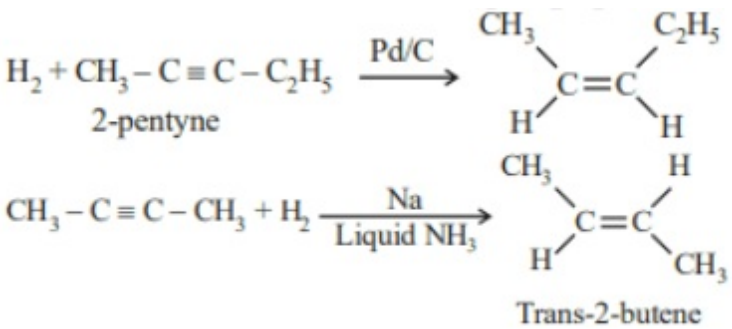
D.

A : n-Pentane

B : Cis −2− butene

Answer: A

Solution:



Question20

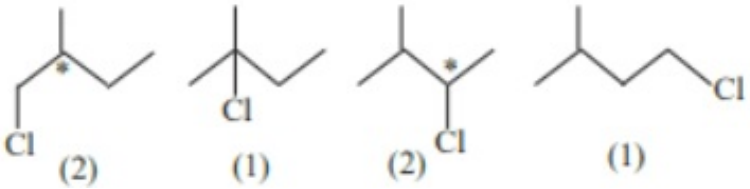
Total number of isomeric compounds (including stereoisomers) formed by monochlorination of 2-methylbutane is___

[1-Feb-2024 Shift 2]

Options:

Answer: 6

Solution:



Question21

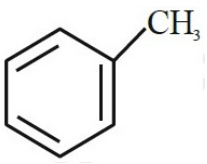
Which of the following compound will most easily be attacked by an electrophile?

[1-Feb-2024 Shift 1]

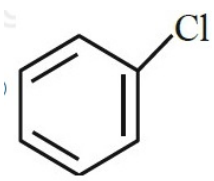
Options:

A.

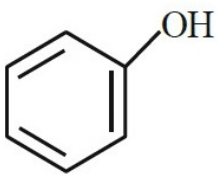
B.



C.



D.



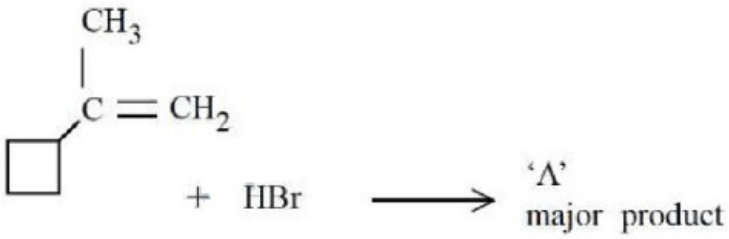
Answer: D

Solution:

Higher the electron density in the benzene ring more easily it will be attacked by an electrophile. Phenol has the highest electron density amongst all the given compound.

Question22

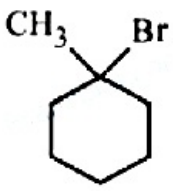
In the following given reaction ' A ' is



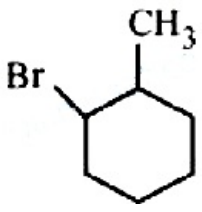
[24-Jan-2023 Shift 1]

Options:

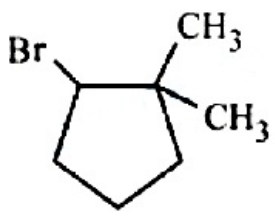
A.



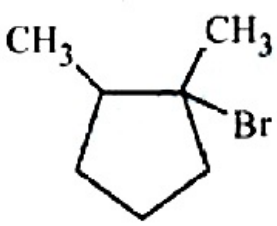
B.



C.

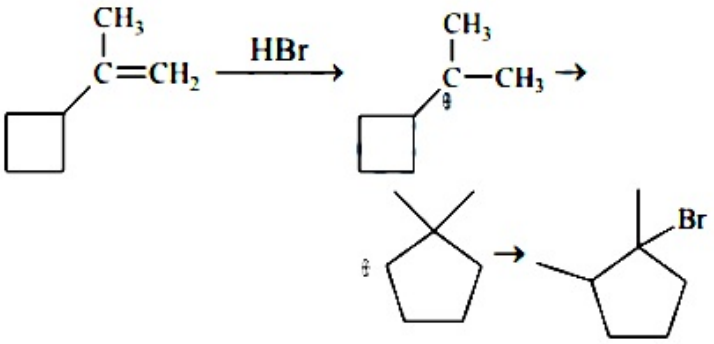


D.



Answer: D

Solution:



Question23

Given below are two statements :
Statement I :

under Clemmensen reduction conditions will give HOOC⟶
Statement II :

under Wolff-Kishner reduction condition will give

In the light of the above statements, choose the correct answer from the options given below :
[24-Jan-2023 Shift 2]

Options:

A. Statement I is false but Statement II is true

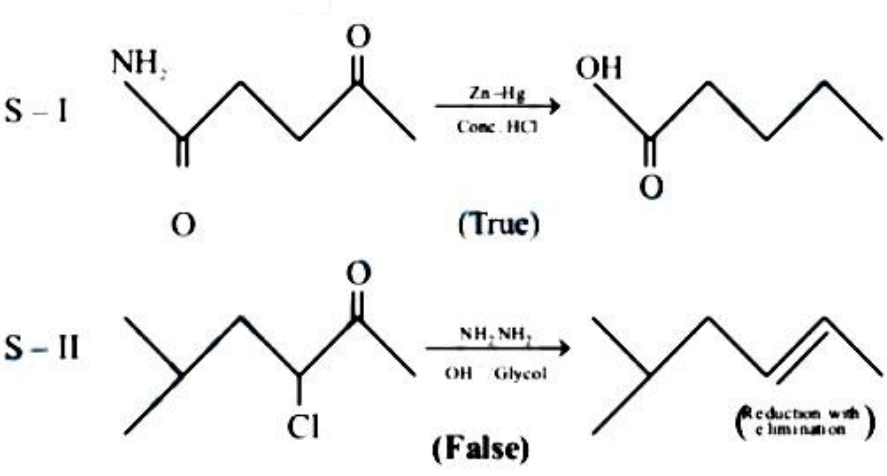
B. Both Statement I and Statement II are false

C. Statement I is true but Statement II is false

D. Both Statement I and Statement II are true

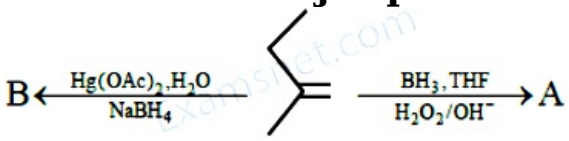
Answer: C

Solution:



Question24

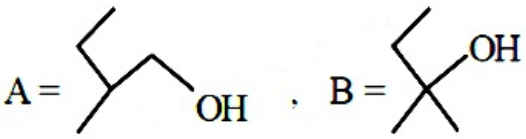
Find out the major products from the following reactions.



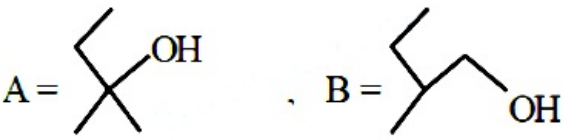
[24-Jan-2023 Shift 2]

Options:

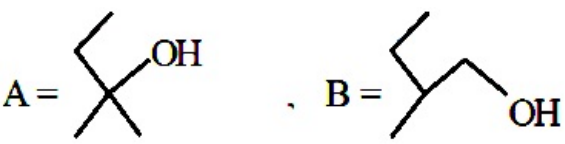
A.



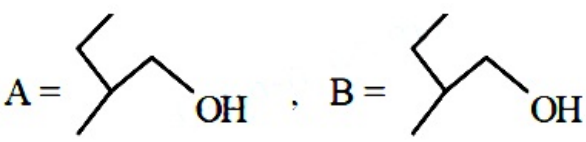
B.



C.



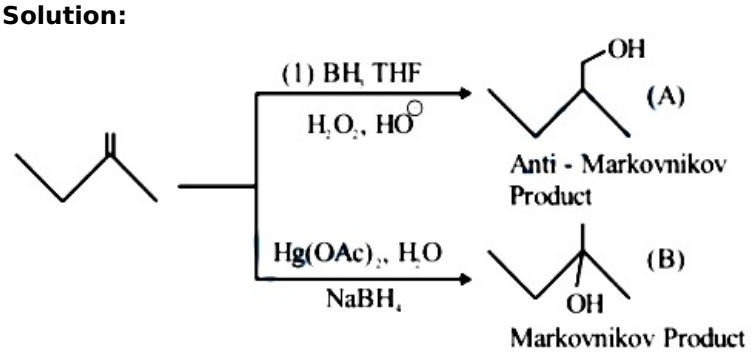
D.



Answer: A

Solution:

Solution:



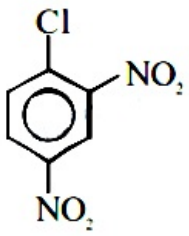
Question25

The compound which will have the lowest rate towards nucleophilic aromatic substitution on treatment with OH^- is
[25-Jan-2023 Shift 1]

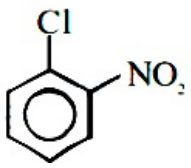
Options:

A.

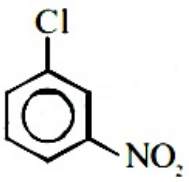
B.



C.



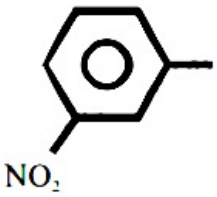
D.



Answer: D

Solution:

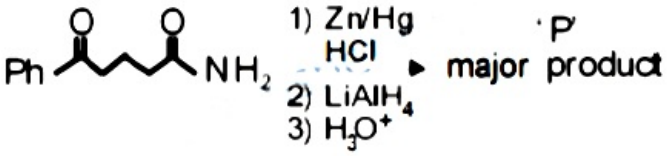
Solution:
Electron withdrawing groups are highly ineffective at meta position in nucleophilic aromatic substitution reactions.
Hence compound



rate in nucleophilic aromatic substitution.

Question26

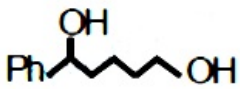
The major product ' P ' for the following sequence| of reactions is:



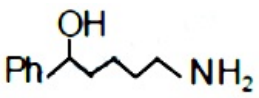
[29-Jan-2023 Shift 1]

Options:

A.

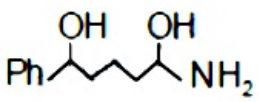


B.



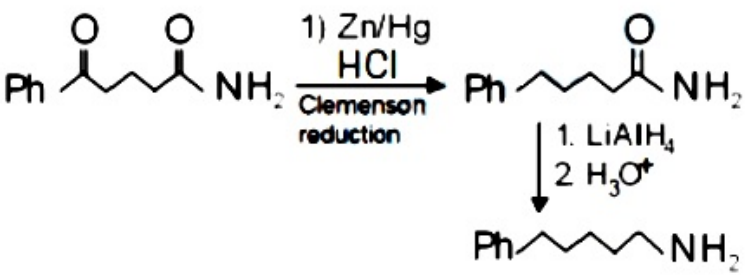
C.

D.



Answer: C

Solution:



Question27

17 mg of a hydrocarbon (M.F. $C_{10}H_{16}$) takes up 8.40 mL of the H_2 gas measured at 0°C and 760 mm of Hg. Ozonolysis of the same hydrocarbon yields

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

The number of double bond/s present in the hydrocarbon is _____.

[29-Jan-2023 Shift 1]

Answer: 3

Solution:

Moles of hydrocarbon $= \frac{17 \times 10^{-3}}{136} = 1.25 \times 10^{-4}$

Mole of H_2 gas

$\Rightarrow 1 \times \frac{8.40}{1000} = n \times 0.0821 \times 273$

$\Rightarrow n = 3.75 \times 10^{-4}$

Hydrogen molecule used for 1 molecule of hydrocarbon is 3

$= \frac{3.75 \times 10^{-4}}{1.25 \times 10^{-4}} = 3$

Question28

The one giving maximum number of isomeric alkenes on dehydrohalogenation reaction is (excluding rearrangement) [29-Jan-2023 Shift 2]

Options:

A. 1-Bromo-2-methylbutane

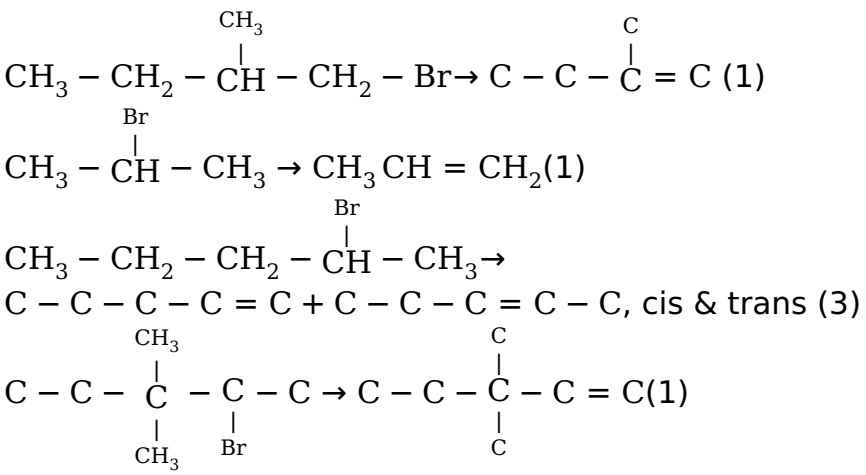
B. 2-Bromopropane

C. 2-Bromopentane

D. 2-Bromo-3,3-dimethylpentane

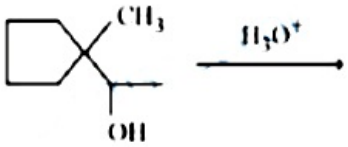
Answer: C

Solution:



Question29

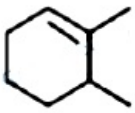
Find out the major product for the following reaction.



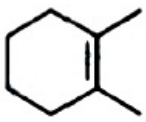
[29-Jan-2023 Shift 2]

Options:

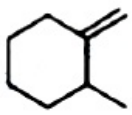
A.



B.



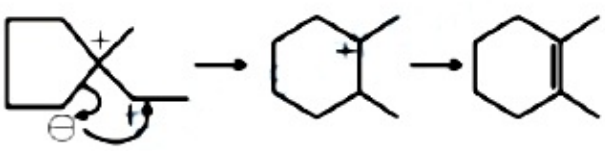
C.



D.

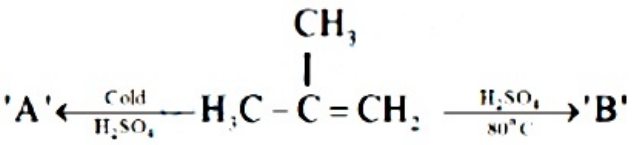
Answer: B

Solution:



Question30

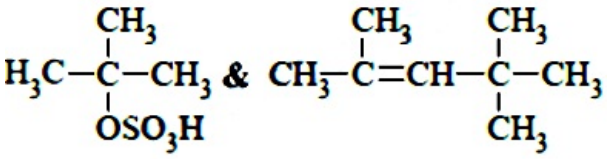
The major products ' A ' and ' B ', respectively, are



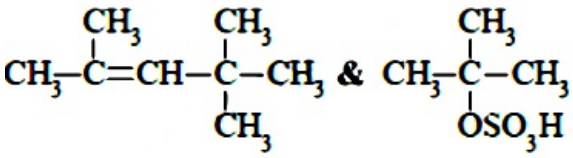
[30-Jan-2023 Shift 1]

Options:

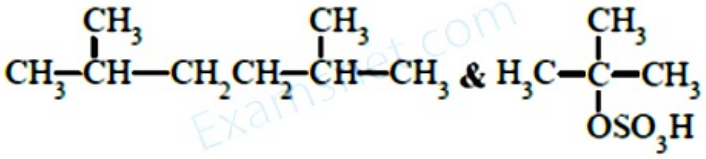
A.



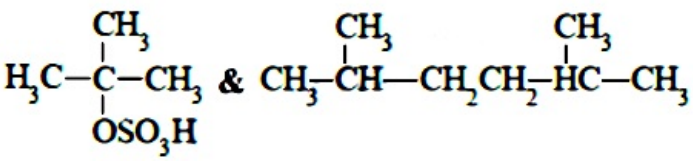
B.



C.

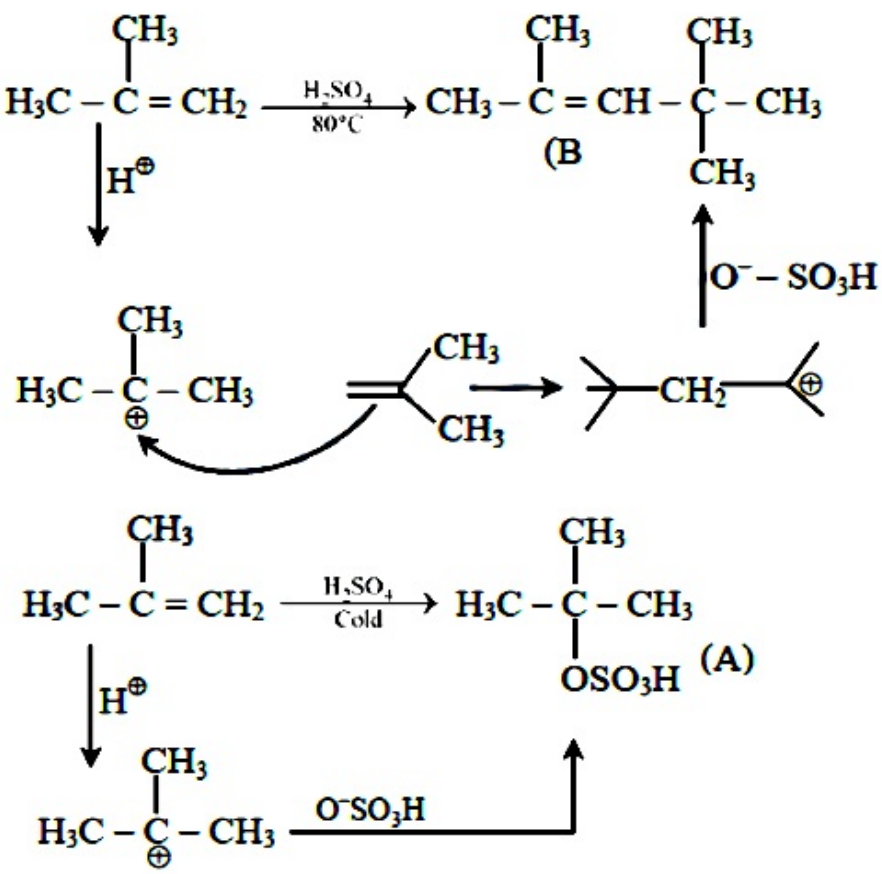


D.



Answer: A

Solution:



Question31

Choose the correct set of reagents for the following conversion trans $(Ph - CH = CH - CH_3) \rightarrow cis(Ph - CH = CH - CH_3)$
[31-Jan-2023 Shift 1]

Options:

A. Br_2, alc KOH, $NaNH_2$, $Na(Liq\,NH_3)$

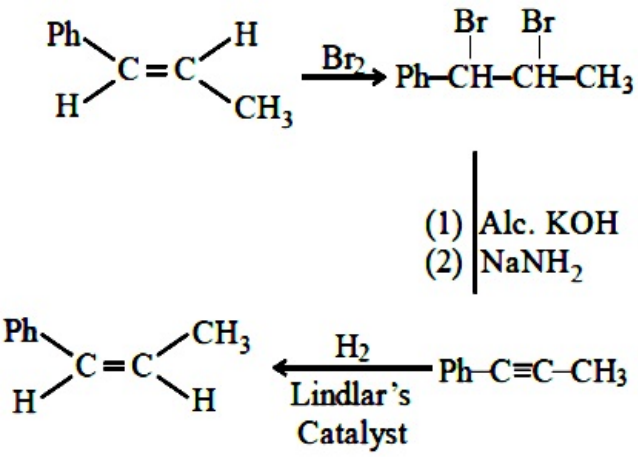
B. Br_2, alc KOH, $NaNH_2$, H_2 Lindlar Catalyst

C. Br_2, aq KOH, $NaNH_2$, H_2 Lindlar Catalyst

D. Br_2, aq KOH, $NaNH_2$, $Na(Liq\,NH_3)$

Answer: B

Solution:



Question32

A hydrocarbon ' X ' with formula C_6H_8 uses two moles of H_2 on catalytic hydrogenation of its one mole. On ozonolysis, ' X ' yields two moles of methane dicarbaldehyde. The hydrocarbon ' X ' is:
[31-Jan-2023 Shift 2]

Options:

A. hexa-1, 3, 5-triene

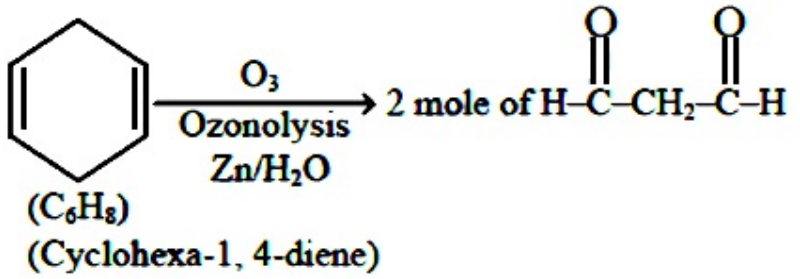
B. 1-methylcyclopenta-1, 4-diene

C. cyclohexa-1, 3-diene

D. cyclohexa-1, 4-diene

Answer: D

Solution:



Question33

But-2-yne is reacted separately with one mole of Hydrogen as shown below:

$$B \xleftarrow[liq\ NH_3]{Na} NH_3 - C \equiv C - CH_3 \xrightarrow[\Delta]{Pd/C} A$$

Identify the incorrect statements from the options given below:
A. A is more soluble than B.
B. The boiling point & melting point of A are higher and lower than B respectively.
C. A is more polar than B because dipole moment of A is zero.
D. Br_2 adds easily to B than A.
[1-Feb-2023 Shift 1]

Options:

A. B and C only

B. B, C and D only

C. A, C and D only

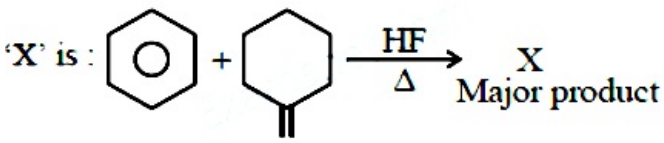
D. C and D only

Answer: D

Solution:

Incorrect statements are C and D only

Question34

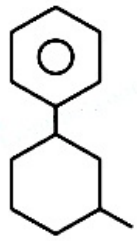


[1-Feb-2023 Shift 2]

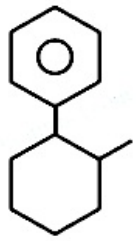
Options:

A.

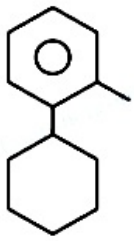
B.



C.

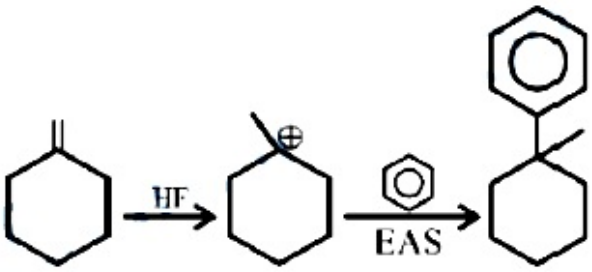


D.



Answer: A

Solution:



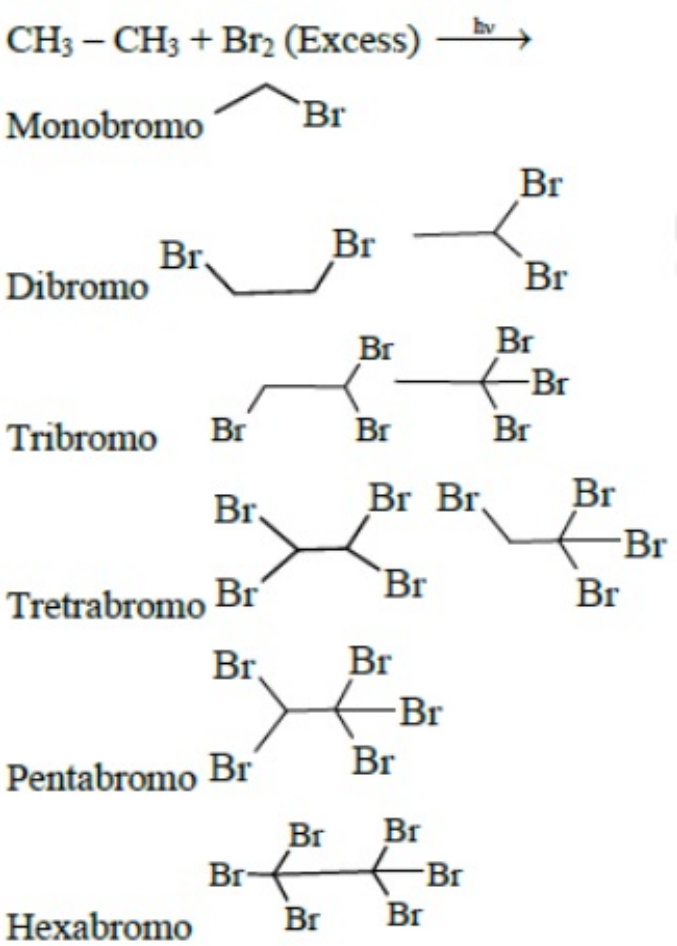
Question35

Number of bromo derivatives obtained on treating ethane with excess of Br_2, in diffused sunlight is...

[6-Apr-2023 shift 1]

Answer: 9

Solution:

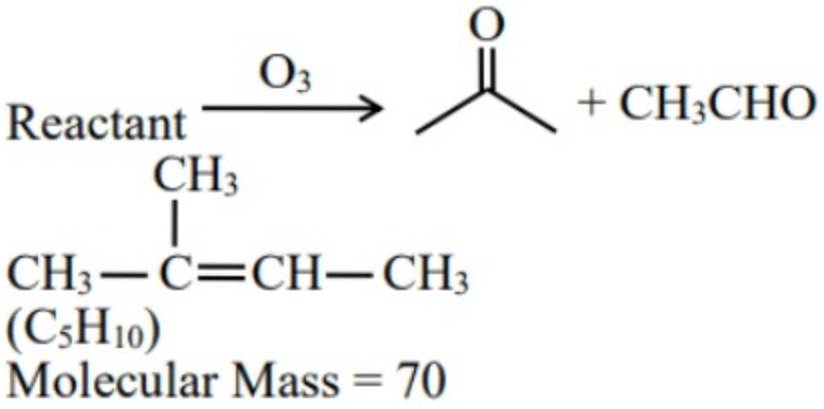


Question36

Molar mass of the hydrocarbon (X) which on ozonolysis consumes one mole of O_3 per mole of (X) and gives one mole each of ethanol and propanone is _____ $gmol^{-1}$ (Molar mass of C : 12$gmol^{-1}$, H : 1$gmol^{-1}$) [8-Apr-2023 shift 1]

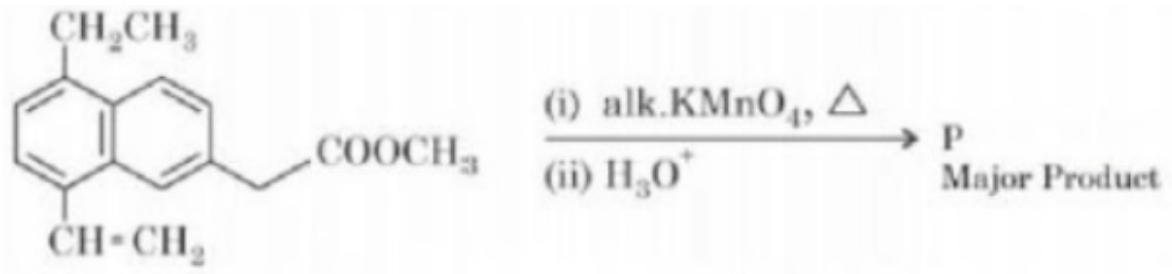
Answer: 70

Solution:



Question37

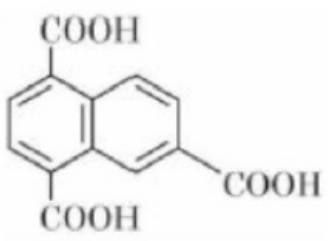
The major product ' P ' formed in the given reaction is



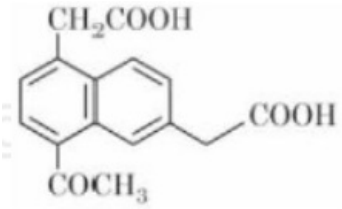
[10-Apr-2023 shift 1]

Options:

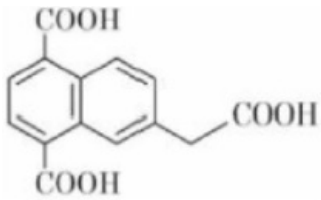
A.



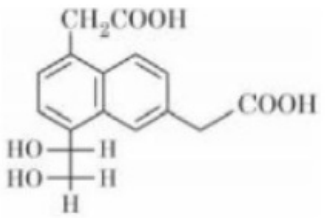
B.



C.

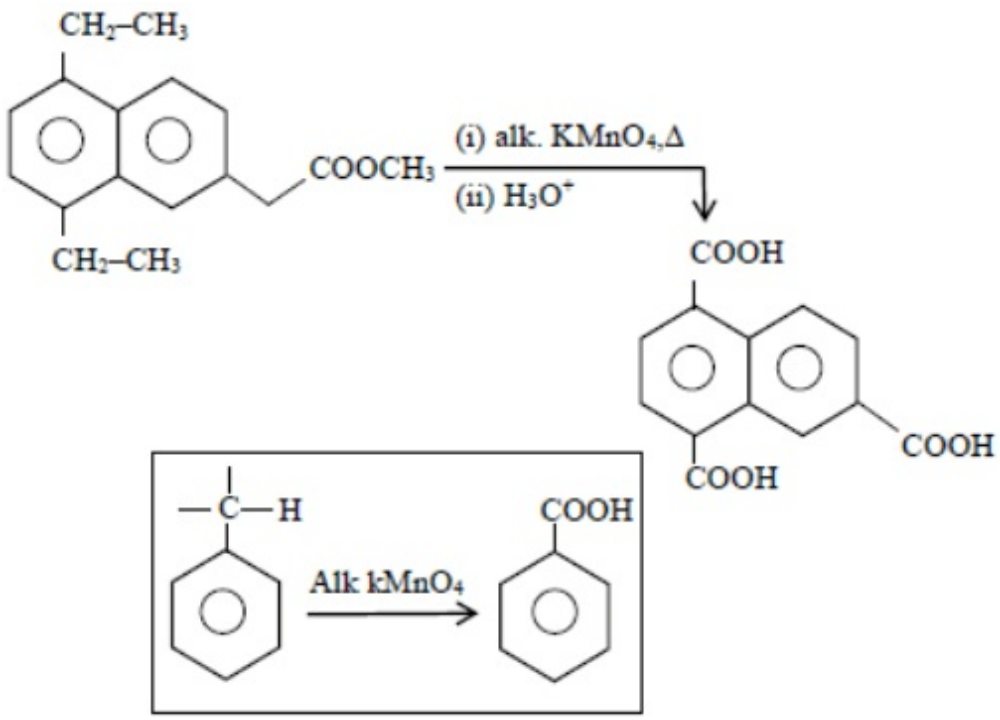


D.



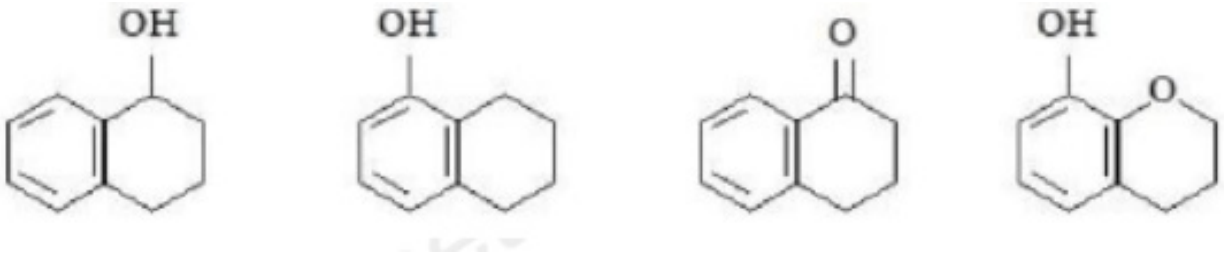
Answer: A

Solution:



Question38

Arrange the following compounds in increasing order of rate of aromatic electrophilic substitution reaction



[11-Apr-2023 shift 1]

Options:

A. c, a, b, d

B. d, b, c, a

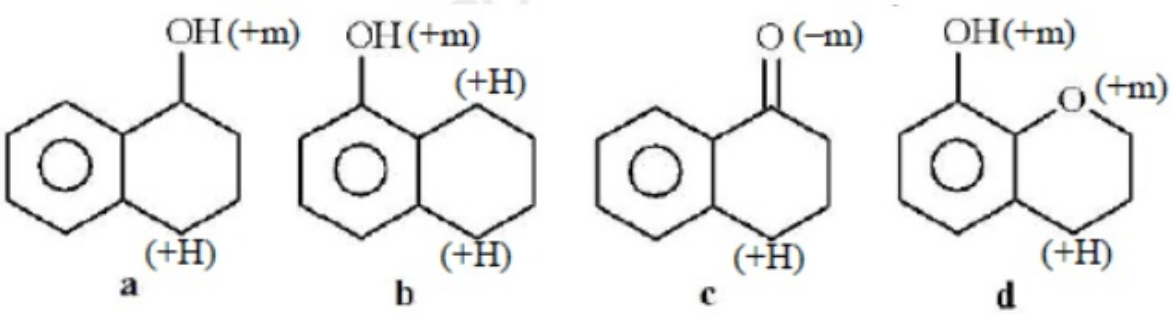
C. d, b, a, c

D. b, c, a, d

Answer: A

Solution:

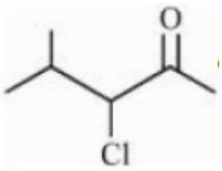
Benzene becomes more reactive towards EAS when any substituent raises the electron density.



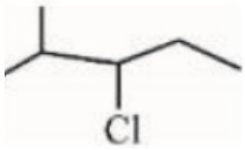
Correct order c < a < b < d

Question39

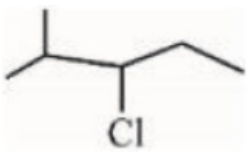
Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A



can be subjected to Wolff-Kishner reduction to give



Reason R:Wolff-Kishner reduction is used to convert



In the light of the above statements, choose the correct answer from the options given below:
[11-Apr-2023 shift 2]

Options:

A. Both A and R are true and R is the correct explanation of A

B. A is true but R is false

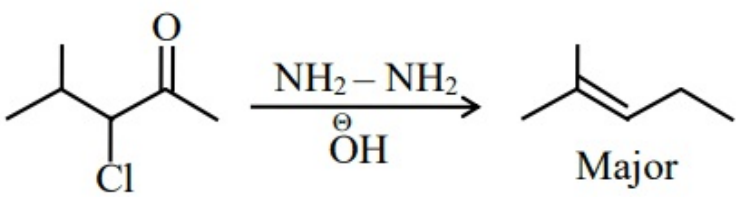
C. Both A and R are true but R is NOT the correct explanation of A

D. A is false but R is true

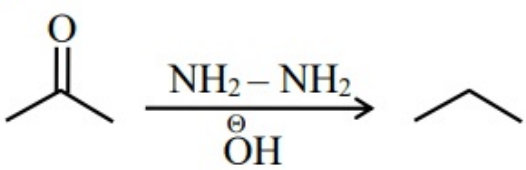
Answer: D

Solution:

Assertion (A)



Reason (R)



Question40

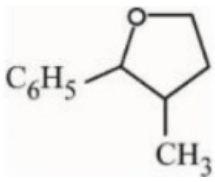
The major product formed in the following reaction is

$C_6H_5 - CH(OH) - \underset{\underset{CH_3}{|}}{CH} - CH_2CHO \xrightarrow[\Delta]{Zn(Hg)\ /\ HCl}$ Major products

A. $C_6H_5 - CH(OH) - \underset{\underset{CH_3}{|}}{CH} - C_2H_5$

B. $C_6H_5 - CH = \underset{\underset{CH_3}{|}}{C} - C_2H_5$

C. $C_6H_5 - \underset{\underset{CH_3}{|}}{C} = CH - C_2H_5$

D. 

Choose the correct answer from the options given below:
[11-Apr-2023 shift 2]

Options:

A. C only

B. A only

C. B only

D. D only

Answer: C

Solution:

Solution:

$$Ph - \underset{\underset{OH}{|}}{CH} - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CHO \xrightarrow[\Delta]{Zn(Hg)\ /\ HCl} Ph - CH = \underset{\underset{CH_3}{|}}{C} - CH_2 - CH_3$$

Question41

2-hexene $\xrightarrow[(ii)\ H_2O]{(i)O_3}$ Products

The two products formed in above reaction are - [12-Apr-2023 shift 1]

Options:

A. Butanal and acetaldehyde

B. Butanal and acetic acid

C. Butanoic acid and acetaldehyde

D. Butanoic acid and acetic acid

Answer: A

Solution:

Solution:

$$C-C-C-C=C-C \xrightarrow[(ii)H_2O]{(i)\ O_3} \rightarrow \underset{(Butanal)}{C-C-C-CHO} + \underset{acetaldehyde}{OHC-CH_3}$$

Question42

In the following reaction ' X ' is

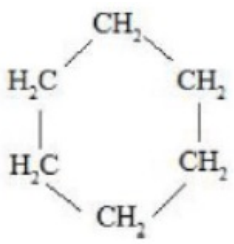
$CH_3(CH_2)_4CH_3 \xrightarrow[\Delta]{\text{Anhy. } AlCl_3,\ HCl} \underset{\text{major product}}{X}$ '

[13-Apr-2023 shift 1]

Options:

A. $CH_3(CH_2)_4CH_2Cl$

B.



C. $Cl-CH_2-(CH_2)_4-CH_2-Cl$

D. $CH_3\underset{\underset{CH_3}{|}}{CH}-(CH_2)_2CH_3$

Answer: D

Solution:

n-alkanes on heating in this presence of anhydrous $AlCl_3$ and hydrogen chloride gas isomerise to branched chain alkanes. The major product has one methyl side chain.

$$CH_3(CH_2)_4CH_3 \xrightarrow[\substack{HCl \\ \Delta}]{\text{Anhy. } AlCl_3} CH_3 - \underset{\substack{| \\ CH_3}}{CH} - (CH_2)_2 - CH_3$$

2 − methylpentane(major)

Question43

The product formed in the following multistep reaction is:

$$CH_3 - CH = CH_2 \xrightarrow[\substack{ii)\, H_2O_2,\, NaOH \\ iii)\, PCC \\ iv)\, CH_3MgBr}]{i)\, B_2H_6}$$

[15-Apr-2023 shift 1]

Options:

A. $CH_3 - CH_2 - \underset{|}{\overset{OH}{CH}} - CH_3$

B. $CH_3 - CH_2 - CH_2 - CH_2 - OH$

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

D. $CH_3 - \underset{\substack{| \\ OH_3}}{\overset{OH}{\overset{|}{C}}} - CH_3$

Answer: A

Solution:

$$CH_3 - CH = CH_2 \xrightarrow[ii)\, H_2O_2, NaOH]{i)\, B_2H_6} CH_3 - CH_2 - \overset{OH}{\overset{|}{CH_2}}$$

$$\downarrow P.C.C$$

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

$$\downarrow CH_3MgBr$$

$$CH_3 - CH_2 - \underset{|}{\overset{OH}{CH}} - CH_3$$

Question44

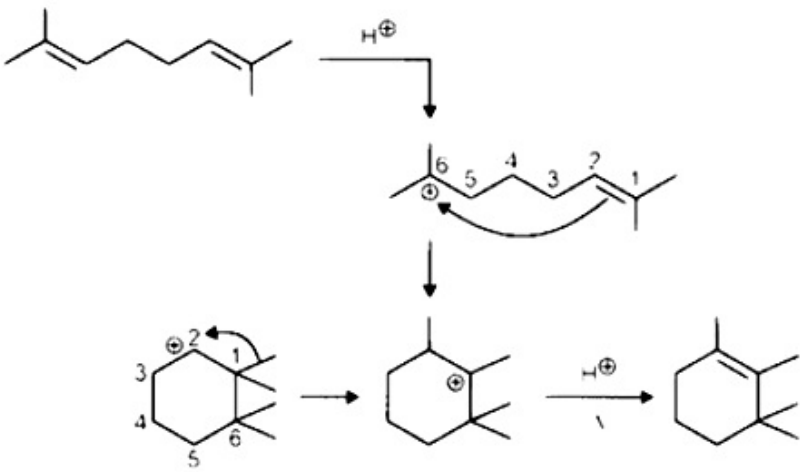
The major product ′A′ of the following given reaction has_____ sp^2 hybridized carbon atoms.

2,7-Dimethyl-2, 6-octadiene $\xrightarrow{H^+}$ **A** (Major product)

[24-Jun-2022-Shift-1]

Answer: 2

Solution:



Number of sp^2 hybridised carbon atoms = 2

Question45

Given below are two statements:
Statement I : The presence of weaker π-bonds make alkenes less stable than alkanes.
Statement II : The strength of the double bond is greater than that of carbon-carbon single bond.
In the light of the above statements, choose the correct answer from the options given below:
[24-Jun-2022-Shift-2]

Options:

A. Both Statement I and Statement II are correct.

B. Both Statement I and Statement II are incorrect.

C. Statement I is correct but Statement II is incorrect.

D. Statement I is incorrect but Statement II is correct.

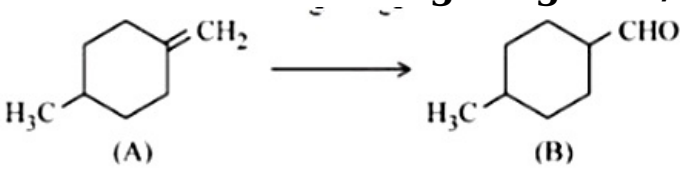
Answer: A

Solution:

The π-bond present is alkenes is weaker than σ bond present in alkanes. That makes alkenes less stable than alkanes. Therefore, statement-I is correct.
Carbon-carbon double bond is stronger than Carbon-carbon single bond because more energy is required to break 1 sigma and 1 pi bond than to break 1 sigma bond only. Therefore, statement-II is also correct.

Question46

Which of the following reagents / reactions will convert 'A' to ' B ' ?



[24-Jun-2022-Shift-2]

Options:

A. PCC oxidation

B. Ozonolysis

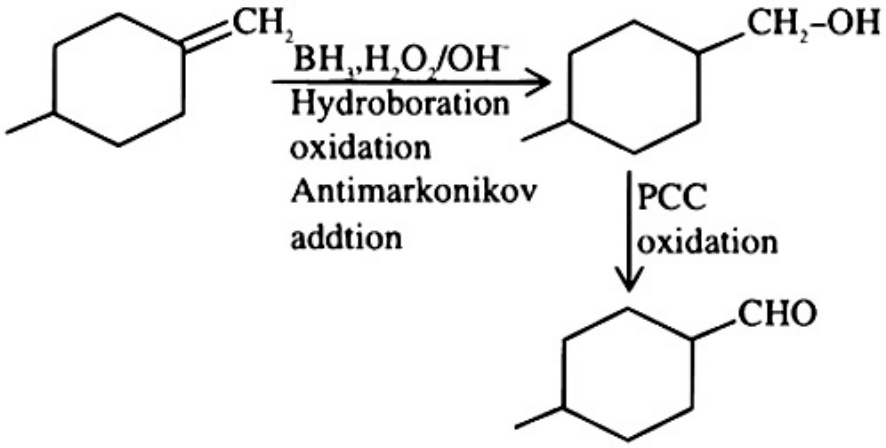
C. BH_3, H_2O_2 / ^-OH followed by PCC oxidation

D. HBr, hydrolysis followed by oxidation by $K_2Cr_2O_7$.

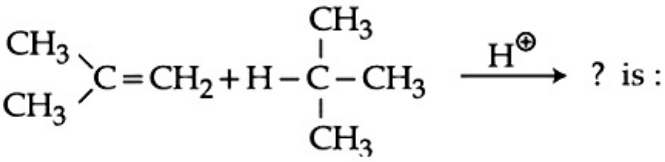
Answer: C

Solution:

BH_3, H_2O_2 / ^-OH followed by PCC oxidation.



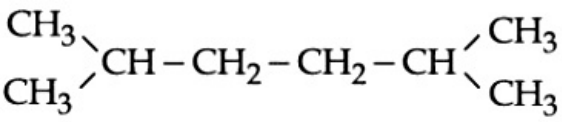
Question47



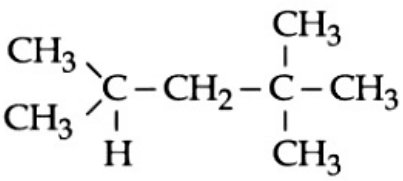
[25-Jun-2022-Shift-1]

Options:

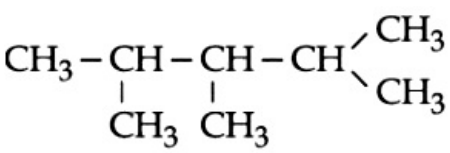
A.



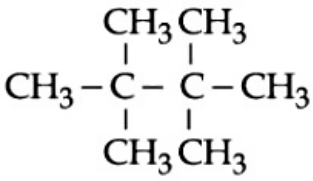
B.



C.

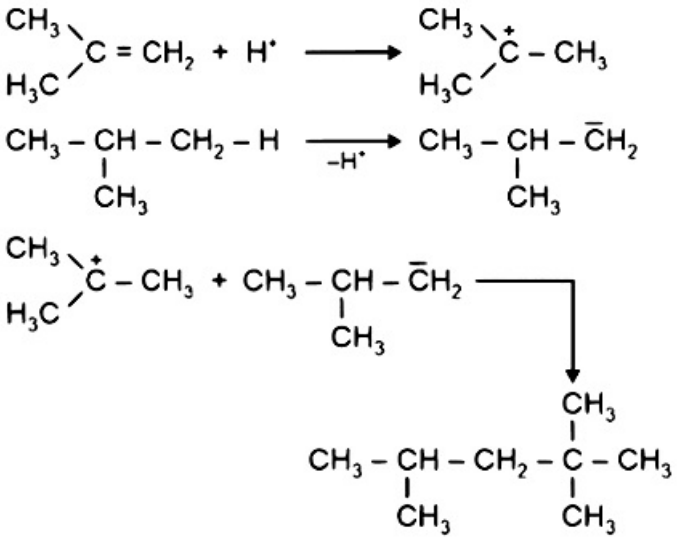


D.



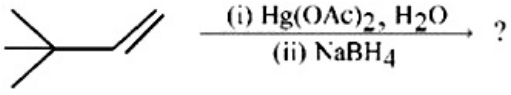
Answer: B

Solution:



Question48

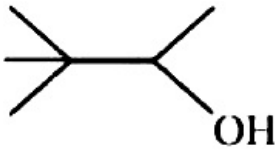
The major product in the following reaction



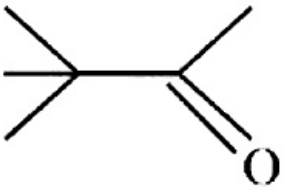
[26-Jun-2022-Shift-2]

Options:

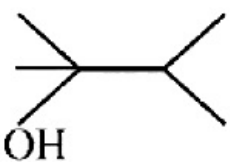
A.



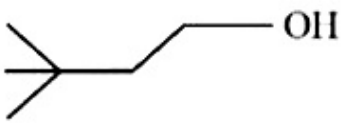
B.



C.

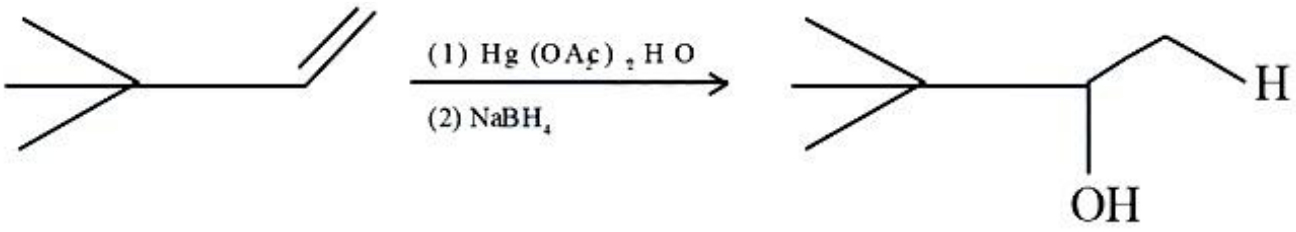


D.



Answer: A

Solution:



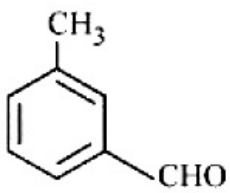
Oxymercuration-Demercuration
Addition of H_2O
Markovnikov's addition without rearrangement

Question49

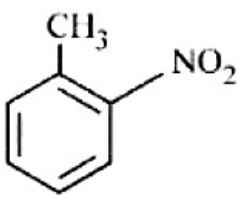
Halogenation of which one of the following will yield m-substituted product with respect to methyl group as a major product? [26-Jun-2022-Shift-2]

Options:

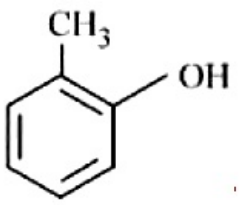
A.



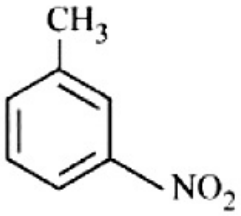
B.



C.



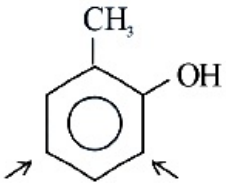
D.



Answer: C

Solution:

Solution:
Electrophile will attack at ortho and para position with respect to better electron releasing group (ERG)



Para position with respect to $-\mathrm{mathrm\,OH}$ $(+\mathrm{mathrm\,R})$ group and it will be meta position with respect to $-\mathrm{mathrm\,CH}_3$ group.

Question50

'A' and 'B' respectively are:

$\mathbf{A} \xrightarrow[(2)\,Zn-H_2O]{(1)\,O_3}$ Ethane-1,2-dicarbaldehyde + Glyoxal/Oxaldehyde

$\mathbf{B} \xrightarrow[(2)\,Zn-H_2O]{(1)\,O_3}$ 5-oxohexanal

[27-Jun-2022-Shift-1]

Options:

A. 1-methylcyclohex-1,3-diene \& cyclopentene.

B. Cyclohex-1,3-diene \& cyclopentene

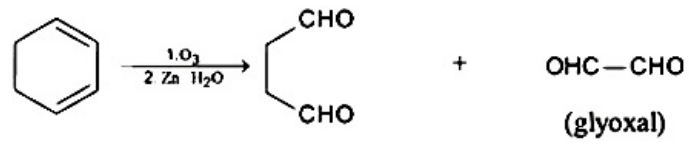
C. 1-methylcyclohex-1,4-diene \& 1-methylcyclopent-1-ene

D. Cyclohex-1,3-diene \& 1-methylcyclopent-1-ene

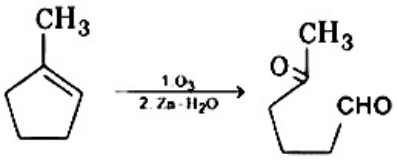
Answer: D

Solution:

Solution:



ethane-1, 2-dicarbaldehyde



5-oxohexanal

Question51

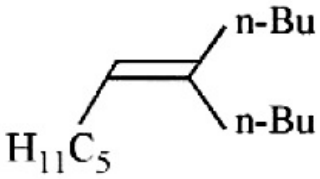
What will be the major product of following sequence of reactions?

$$\text{n-Bu-} \equiv \xrightarrow[\text{(ii) Lindlar cat, } H_2]{\text{(i) n-BuLi, n-}C_5H_{11}Cl}$$

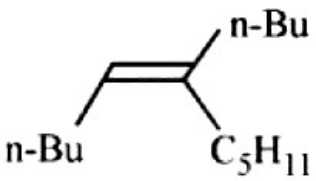
[27-Jun-2022-Shift-2]

Options:

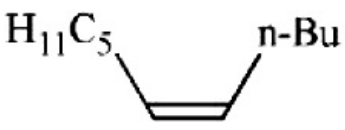
A.



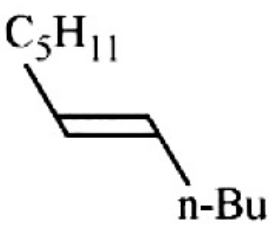
B.



C.

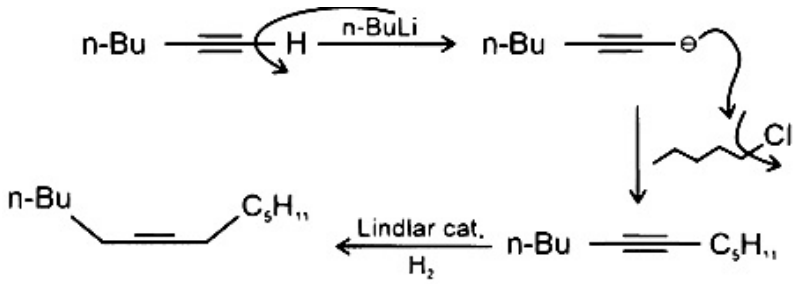


D.



Answer: C

Solution:



Question52

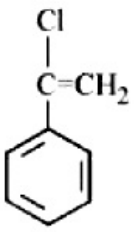
Product 'A' of following sequence of reactions is

Ethylbenzene $\xrightarrow[\text{(b)}Cl_2, \Delta \\ \text{(c) alc . KOH}]{\text{(a) } Br_2, Fe}$ 'A' Major Product

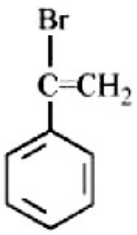
[27-Jun-2022-Shift-2]

Options:

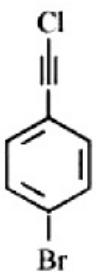
A.



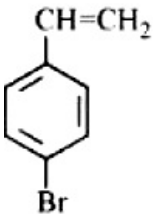
B.



C.



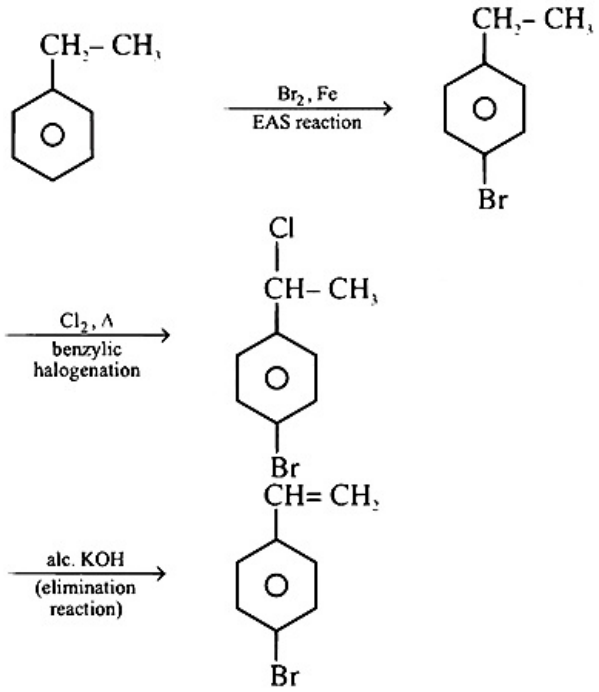
D.



Answer: D

Solution:

Solution:



Question53

Two isomers ' A ' and ' B ' with molecular formula C_4H_8 give different products on oxidation with $KMnO_4$ in acidic medium. Isomer ' A' on reaction with $KMnO_4$ / H^+results in effervescence of a gas and gives ketone. The compound ' A' is
[29-Jun-2022-Shift-1]

Options:

A. But-1-ene.

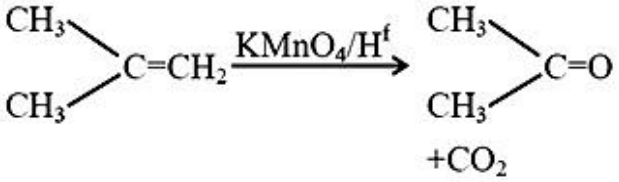
B. cis-But-2-ene.

C. trans-But-2-ene.

D. 2-methyl propene.

Answer: D

Solution:



Question54

In Friedel-Crafts alkylation of aniline, one gets [29-Jun-2022-Shift-2]

Options:

A. alkylated product with ortho and para substitution.

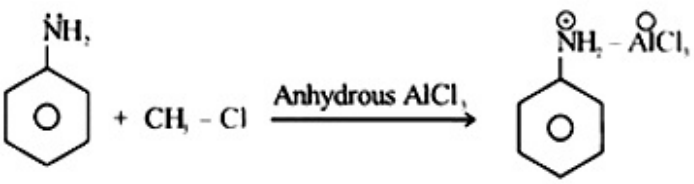
B. secondary amine after acidic treatment.

C. an amide product.

D. positively charged nitrogen at benzene ring.

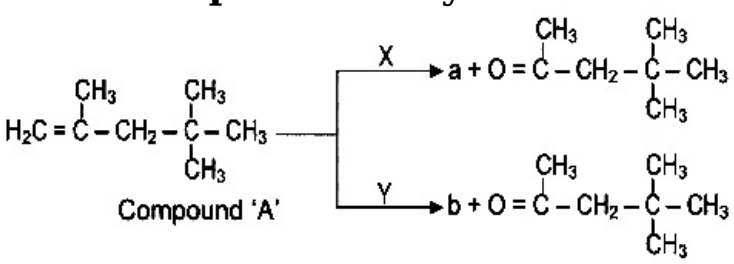
Answer: D

Solution:



Question55

A compound ′A′ on reaction with ′X′ and ′Y′ produces the same major product but different by product ' a ' and ' b '. Oxidation of ' a ' gives a substance produced by ants.



' X ' and 'Y' respectively are [25-Jul-2022-Shift-1]

Options:

A. $KMnO_4$ / $H^+$and dil. $KMnO_4$,273K

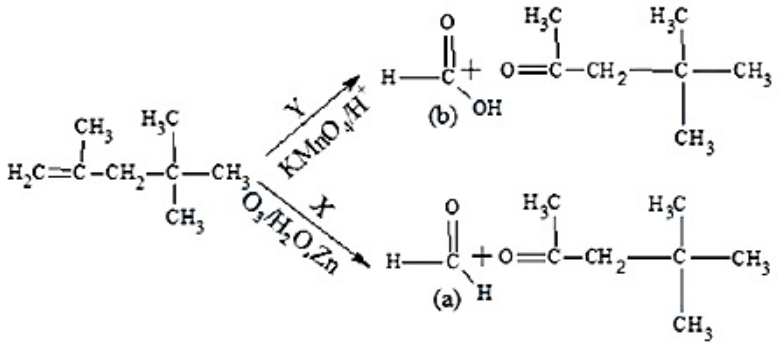
B. $KMnO_4$ (dilute), 273K and $KMnO_4$ / H^+

C. $KMnO_4$ / H^+ and O_3, H_2O / Zn

D. O_3, H_2O / Zn and $KMnO_4$ / H^+

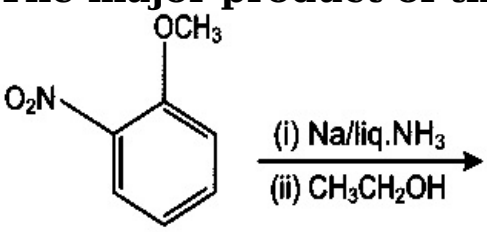
Answer: D

Solution:



Question56

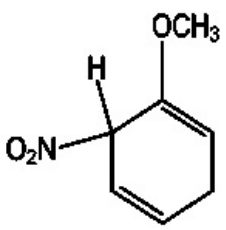
The major product of the following reaction is



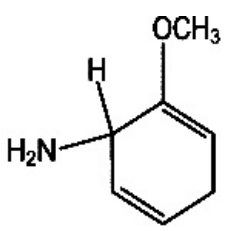
[26-Jul-2022-Shift-1]

Options:

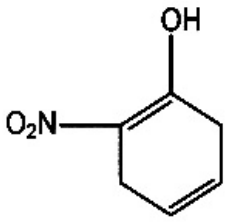
A.



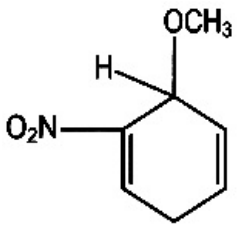
B.



C.



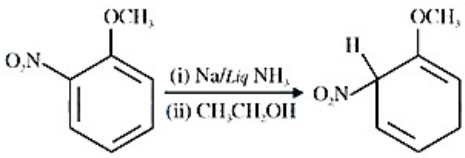
D.



Answer: A

Solution:

Solution:



Given reaction is an example of birch reduction.

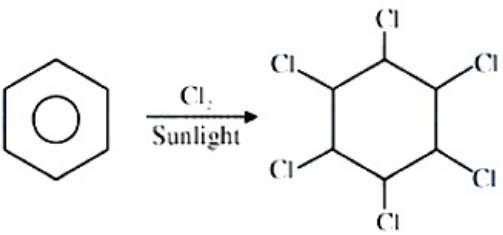
Question57

In the presence of sunlight, benzene reacts with Cl_2 to give product, X. The number of hydrogens in X is _____.
[26-Jul-2022-Shift-1]

Answer: 6

Solution:

Solution:

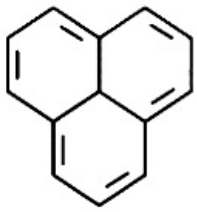


Question58

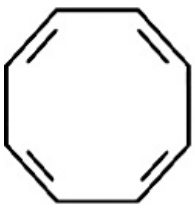
Which of the following is not an example of benzenoid compound? [26-Jul-2022-Shift-2]

Options:

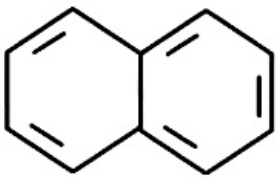
A.



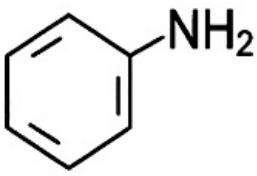
B.



C.



D.



Answer: B

Solution:

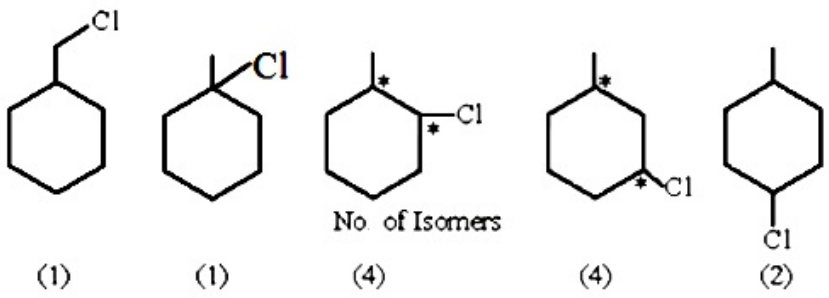
Solution:

Question59

Total number of isomers (including stereoisomers) obtained on monochlorination of methylcyclohexane is _____. [26-Jul-2022-Shift-2]

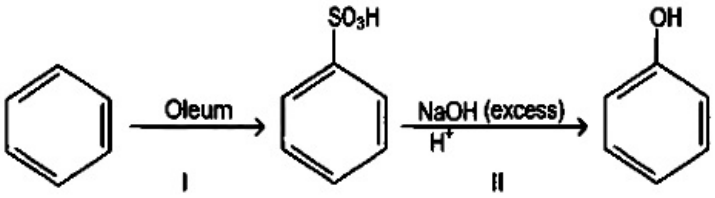
Answer: 12

Solution:



Question60

In the following reaction



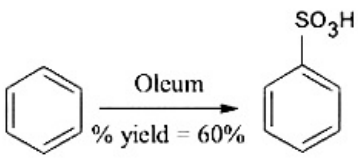
The % yield for reaction I is 60% and that of reaction II is 50%. The overall yield of the complete reaction is _____%. [nearest integer]
[27-Jul-2022-Shift-1]

Answer: 30

Solution:

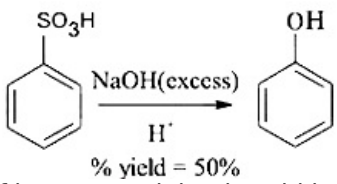
Solution:

(I)



Let initial moles of reactant taken $= n$
Total moles obtained for benzene sulphonic acid (with % yield $= 60\%$) $= 0.6n$

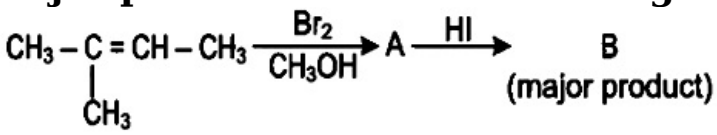
(II)



Moles of benzene sulphonic acid before reaction II $= 0.6n$
Moles obtained for phenol (with \% yield $= 50\%$) $= 0.6 \times 0.5n = 0.3n$
So over all \% yield of complete reaction $= \frac{0.3n}{n} \times 100 = 30$

Question61

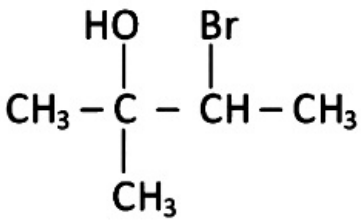
Major product B' of the following reaction sequence is :



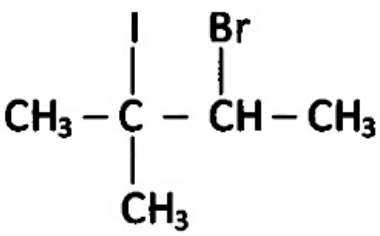
[27-Jul-2022-Shift-2]

Options:

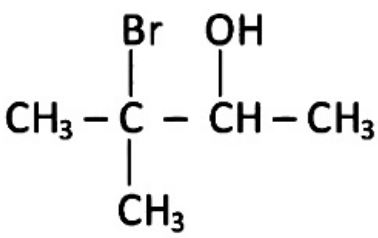
A.



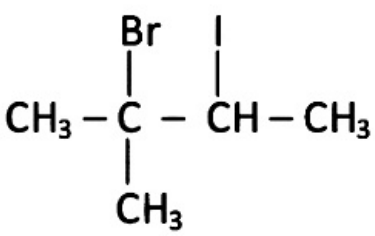
B.



C.



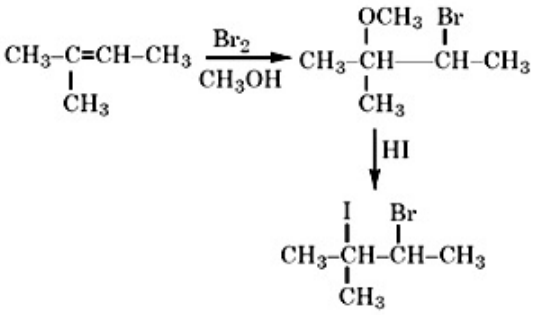
D.



Answer: B

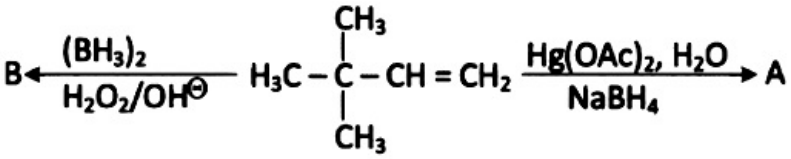
Solution:

Solution:



Question62

Choose the correct option for the following reactions.



[28-Jul-2022-Shift-1]

Options:

A. ' A ' and ' B ' are both Markovnikov addition products.

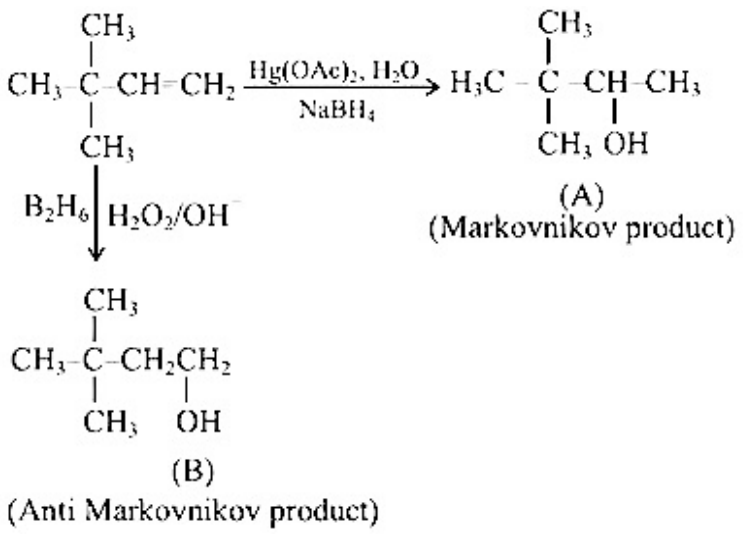
B. 'A' is Markovnikov product and 'B' is anti-Markovnikov product.

C. 'A' and 'B' are both anti-Markovnikov products.

D. ' B ' is Markovnikov and ' A ' is anti-Markovnikov product.

Answer: B

Solution:



Question63

Arrange the following in increasing order of reactivity towards nitration
A. p-xylene
B. bromobenzene
C. mesitylene
D. nitrobenzene

E. benzene

Choose the correct answer from the options given below
[28-Jul-2022-Shift-2]

Options:

A. C < D < E < A < B

B. D < B < E < A < C

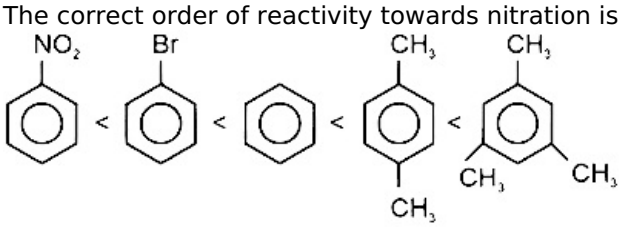
C. D < C < E < A < B

D. C < D < E < B < A

Answer: B

Solution:

Solution:
The correct order of reactivity towards nitration is



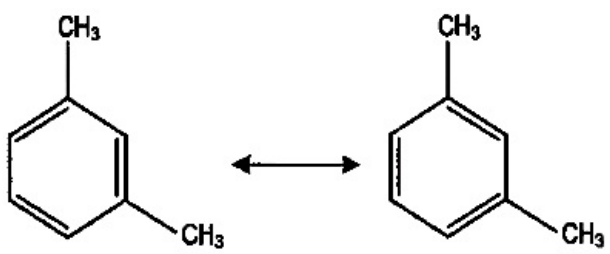
as electron releasing groups on benzene ring facilitate the nitration at benzene ring.

Question64

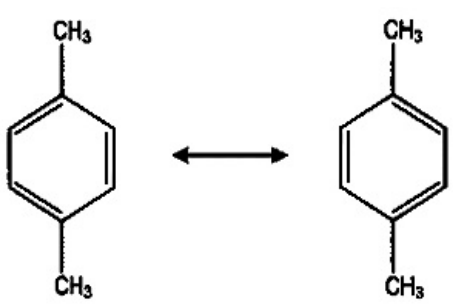
Which among the following pairs of the structures will give different products on ozonolysis? (Consider the double bonds in the structures are rigid and not delocalized.)
[29-Jul-2022-Shift-1]

Options:

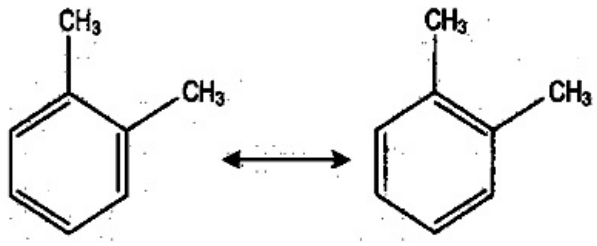
A.



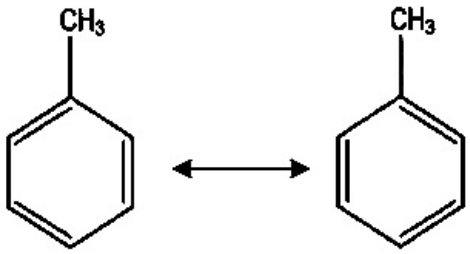
B.



C.



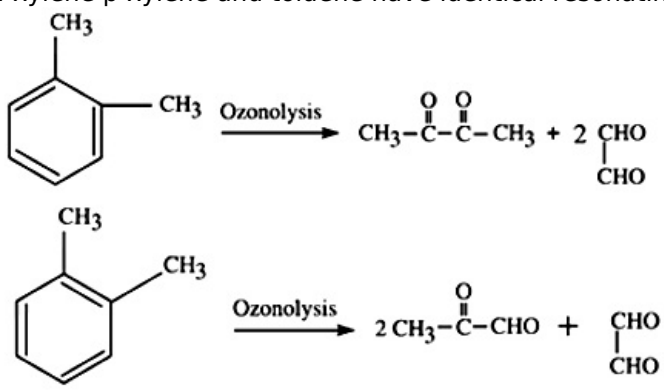
D.



Answer: C

Solution:

Solution:
O-xylene has different resonating structures which will produce different ozonolysis products.
m-xylene p-xylene and toluene have identical resonating structures which will give identical ozonolysis products.

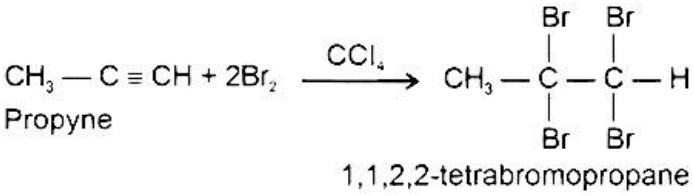


Question65

In bromination of Propyne, with Bromine, 1, 1, 2, 2-tetrabromopropane is obtained in 27\% yield. The amount of 1, 1, 2, 2-tetrabromopropane obtained from 1g of Bromine in this reaction is _____ x 10^{-1}g. (Nearest integer)
(Molar Mass : Bromine = 80g / mol)
[29-Jul-2022-Shift-1]

Answer: 3

Solution:



Propyne

1,1,2,2-tetrabromopropane

2 moles Br_2 ≡ 1 mole 1,1,2,2-tetrabromopropane $\frac{1}{160}$ mole Br_2 ≡ $\frac{1}{2}\times\frac{1}{160}$ mole 1,1,2,2-tetrabromopropane

But yield of reaction is only 27%

Moles of 1,1,2,2-tetrabromopropane

$= \frac{1}{2}\times\frac{1}{160}\times\frac{27}{100}$

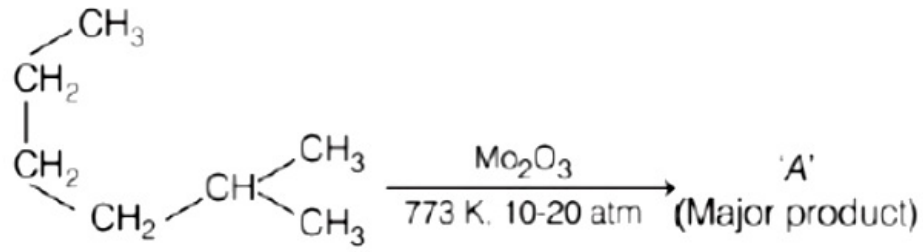
Molar mass of 1,1,2,2-tetrabromopropane $= 360g$ Mass of 1,1,2,2tetrabromopropane

$= \frac{1}{2}\times\frac{1}{160}\times\frac{27}{100}\times 360g$

$\approx 3\times 10^{-1}g$

Question66

Identify A in the given chemical reaction.

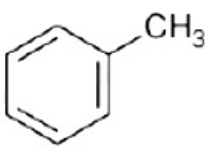


[25 Feb 2021 Shift 1]

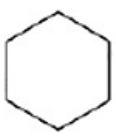
Options:

A.

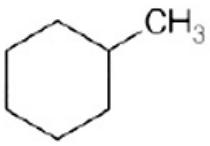
B.



C.



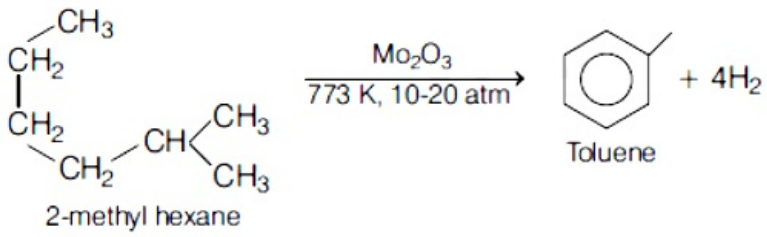
D.



Answer: B

Solution:

Solution:



Oxides of molybdenum, vanadium and chromium, i.e. Mo_2O_3, V_2O_5 and Cr_2O_3 work as catalyst. When they are operated under certain temperature and pressure with n-heptane then they form toluene which is aromatic compound. Mo_2O_3 behave as aromatising agent.

Question67

For the given reaction

$$H\underset{\underset{CH_3}{|}}{C}=CH\,Br \xrightarrow[\text{(ii) Red hot iron tube iron, 873K}]{\text{(i)}NaNH_2} \underset{\text{Major product}}{\text{(A)}}$$

[26 Feb 2021 Shift 1]

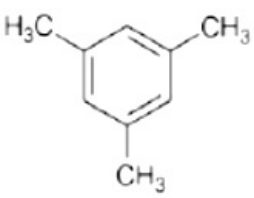
Options:

A. $CH_3CH_2CH_2NH_2$

B. $\underset{\underset{CH_2}{|}}{CH}=CH-NH_2$

C.

D.

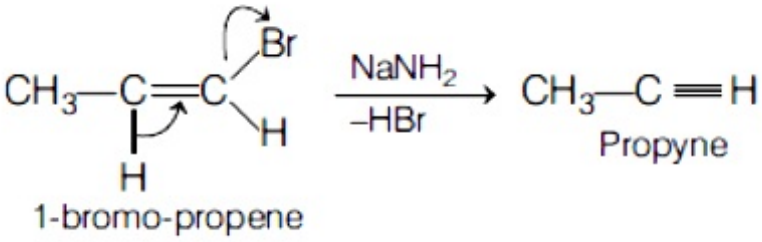


Answer: D

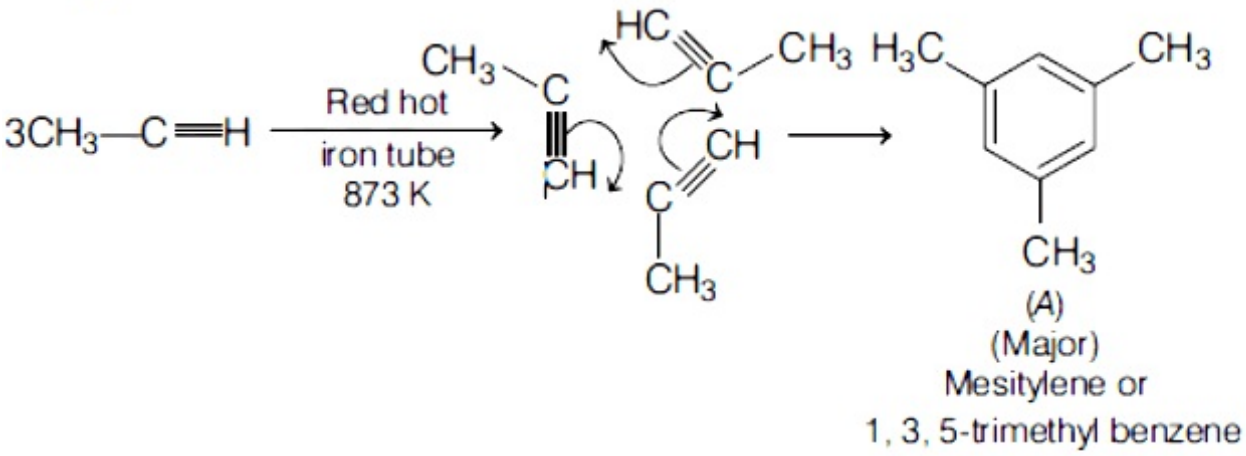
Solution:

Solution:
When 1-bromo-prop-1-ene reacts with $NaNH_2$ (a strong base), β-elimination or dehydrobromination, ($-HBr$) takes place to give propyne in next step. When propyne is passed through red hot iron tube, cyclic trimerisation (aromatisation also) occurs to produce mesitylene (A) as major product.

Step I



Step II



Question68

The correct sequence of reagents used in the preparation of 4-bromo-2-nitroethyl benzene from benzene is [25 Feb 2021 Shift 2]

Options:

A. CH_3COCl / $AlCl_3$, Br_2 / $AlBr_3$, HNO_3 / H_2SO_4, Zn / HCl

B. CH_3COCl / $AlCl_3$, $Zn-Hg$ / HCl, Br_2 / $AlBr_3$, HNO_3 / H_2SO_4

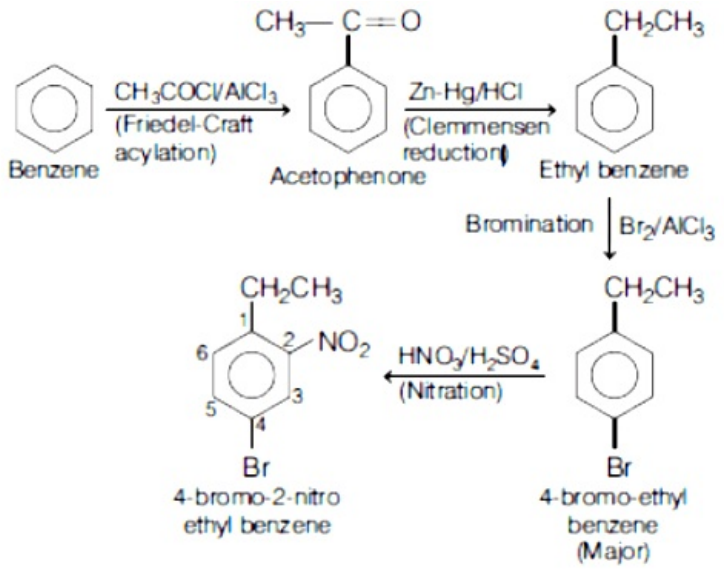
C. Br_2 / $AlBr_3$, CH_3COCl / $AlCl_3$, HNO_3 / H_2SO_4, Zn / HCl

D. HNO_3 / H_2SO_4, Br_2 / $AlCl_3$, CH_3COCl / $AlCl_3$, $Zn-Hg$ / HCl

Answer: B

Solution:

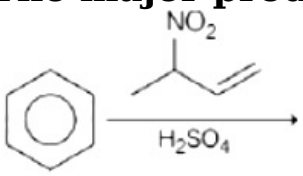
Solution:
Benzene on reaction with CH_3COCl / $AlCl_3$ gives acetophenone which on reduction with $Zn-Hg$ / HCl gives ethyl benzene.
Bromination of ethyl benzene give 4-bromo-ethylbenzene which upon nitration gives 4-bromo-2-nitroethyl benzene.



[-I-effect of Br directs NO_2^- at its meta-position]
So, option (b) is the correct sequence of reagents used.

Question69

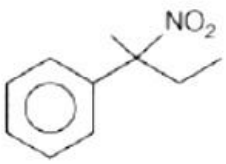
The major product of the following reaction is



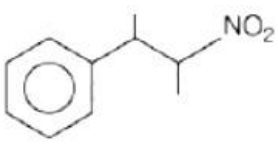
[25 Feb 2021 Shift 2]

Options:

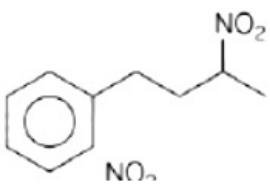
A.



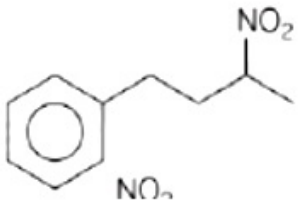
B.



C.



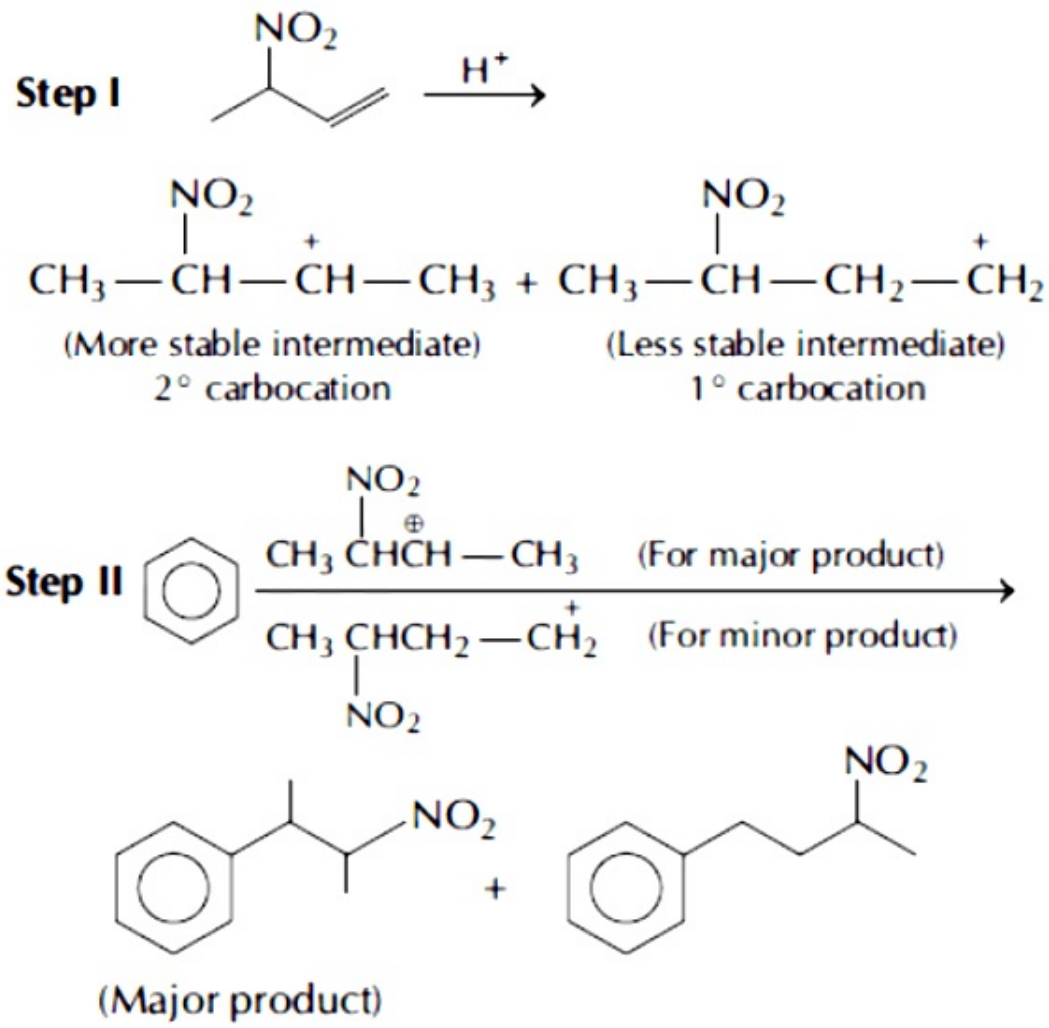
D.



Answer: B

Solution:

Solution:
The reaction take place as follows:



Question70

Consider the following chemical reaction.

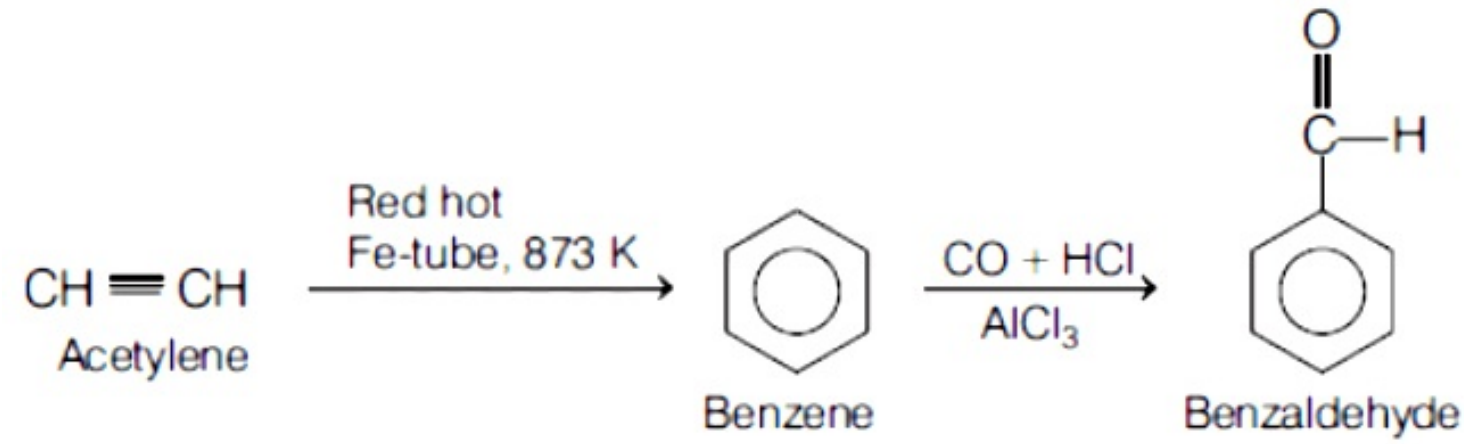
$CH \equiv CH \xrightarrow[(2)\ CO,\ HCl,\ AlCl_3]{(1)\ \text{Red hot Fe tube, } 873K}$ Product The number of sp^2 hybridised carbon atom(s) present in the product is .....

[25 Feb 2021 Shift 1]

Answer: 7

Solution:

Solution:
The reaction take place as follows



Every carbon atom found in benzaldehyde (6 carbon in benzene ring +1 in aldehyde group), forms three bonds with neighbouring atoms-(one double bond + two single bond). Therefore, in benzaldehyde total number of sp^2 C are 7 .

Question71

Which one of the following compounds is non-aromatic ?

[24 Feb 2021 Shift 2]

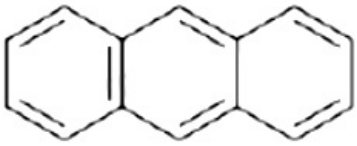
Options:

A.

B.

C.

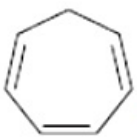
D.

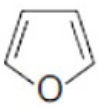


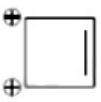
Answer: A

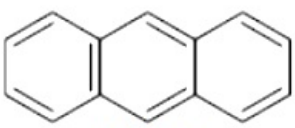
Solution:

Solution:
Compound, which obey Huckel rule, $(4n + 2)\pi$ is called aromatic compound.
Compound, which obey $4n\pi$ rule, is called anti-aromatic compound.
Compound which contain one or more sp^3 carbon in its structure is called non-aromatic compound.
The nature of following ions/compounds are as follows :

(a)  sp^3 Carbon $\longrightarrow$ Non-aromatic

(b)  $(6e^-) \longrightarrow$ Aromatic (follow Huckel's rule)

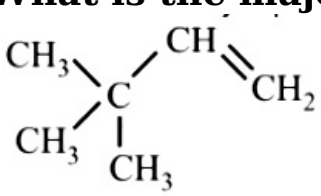
(c)  $(2e^-) \longrightarrow$ Aromatic (follow Huckel's rule)

(d)  $(14e^-)$ $\longrightarrow$ Anthracene $\longrightarrow$ Aromatic

Only (a) is non-aromatic and rest all are aromatic.

Question72

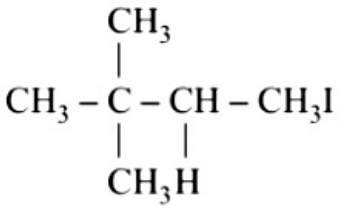
What is the major product formed by HI on reaction with



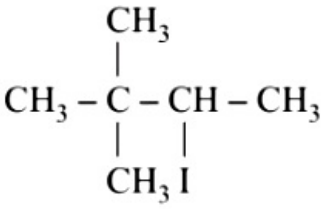
[24feb2021shift1]

Options:

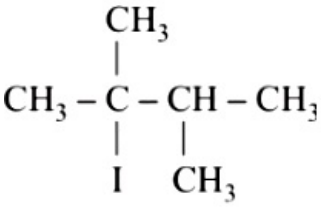
A.



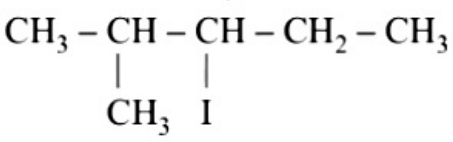
B.



C.



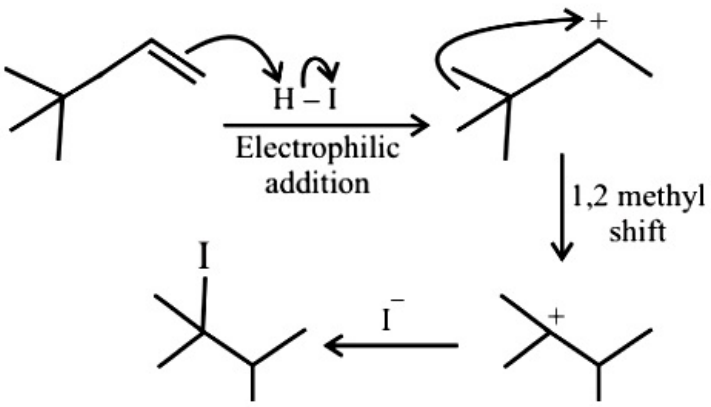
D.



Answer: C

Solution:

Solution:



Question73

Which of the following reagent is used for the following reaction?

$CH_3CH_2CH_3 \xrightarrow{?} CH_3CH_2CHO$

[24feb2021shift1]

Options:

A. Manganese acetate

B. Copper at high temperature and pressure

C. Molybdenum oxide

D. Potassium permanganate

Answer: C

Solution:

Solution:

$CH_3 - CH_2 - CH_3 \xrightarrow{MO_2O_3} CH_3 - CH_2 - CHO$

Question74

Given below are two statements.
Statement-I 2-methylbutane on oxidation with $KMnO_4$ gives 2 - methylbutan-2-ol.
Statement-II n-alkanes can be easily oxidised to corresponding alcohols with $KMnO_4$.
Choose the correct option.
[17 Mar 2021 Shift 2]

Options:

A. Both statements I and II are correct.

B. Both statements I and II are incorrect.

C. Statement I is correct but statement II is incorrect.

D. Statement I is incorrect but statement II is correct.

Answer: C

Solution:

Solution:
Statement I is correct, whereas statement II is incorrect. Corrected statement is as follows: Tertiary alkanes can be oxidised to alcohol by treating with $KMnO_4$. n-alkane are very less reactive and have no reaction with $KMnO_4$. n-alkanes $\xrightarrow{KMnO_4}$ No reaction

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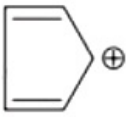
Question75

Which of the following is an aromatic compound?
[17 Mar 2021 Shift 1]

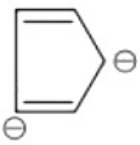
Options:

A.

B.



C.



D.

Answer: A

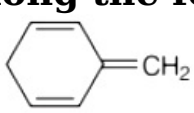
Solution:

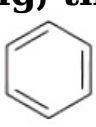
Solution:

is an aromatic compound ($6\pi e^-$).
Aromatic compound possess following characteristics:
(i) Planarity
(ii) Complete delocalisation of the π-electrons in the ring.
(iii) Presence of $(4n + 2)\pi$-electrons in the ring,
where n is an integer ($n = 0, 1, 2\ldots$). That compound follow all aromatic characteristics.

Question76

Among the following, the aromatic compounds are

A. 

B. 

C. 

D. 

Choose the correct answer from the following options.
[16 Mar 2021 Shift 1]

Options:

A. Only (A) and (B)

B. Only (B) and (C)

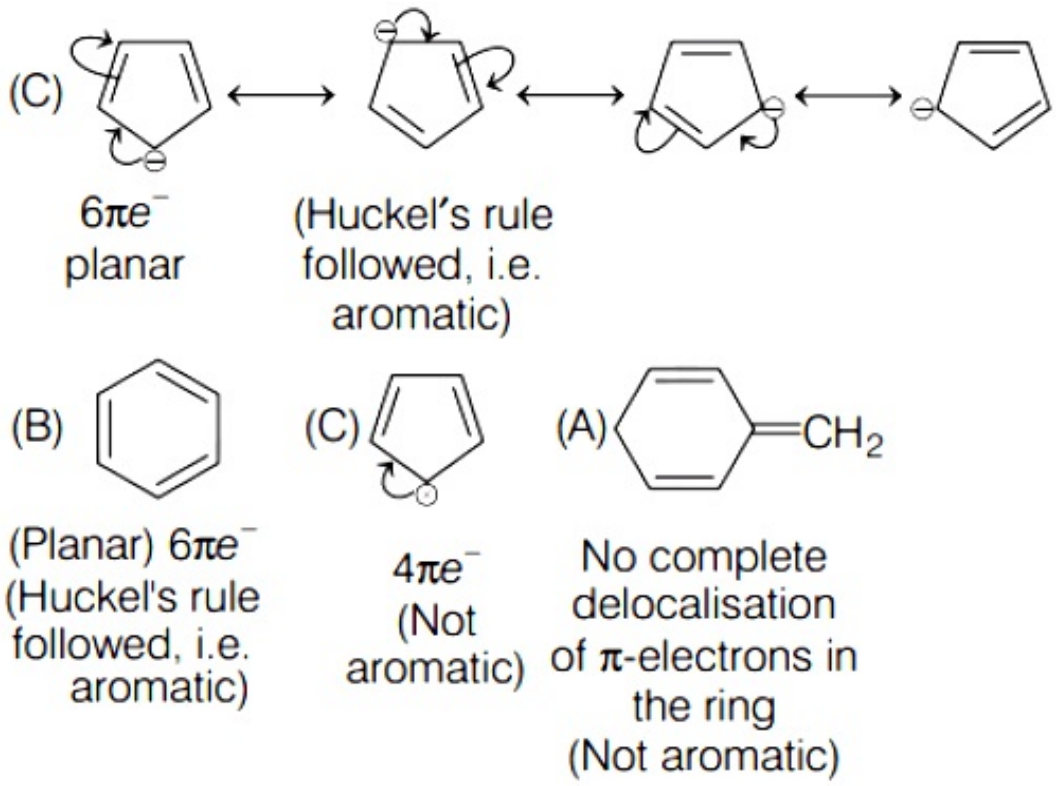
C. (B),(C) and (D)

D. (A),(B) and (C)

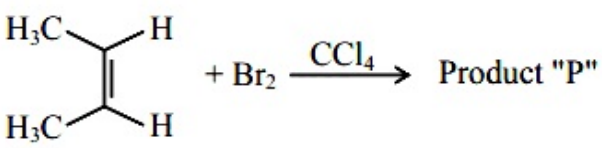
Answer: B

Solution:

Solution:
(b) For aromatic compounds following conditions should be satisfied
(i) planarity
(ii) complete delocalisation of π-electrons in the ring.
(iii) presence of $(4n + 2)\pi$-electrons in the ring, where $n = 0, 1, 2, \ldots$.
This is called Huckel rule.
e.g. $n = 0, 2\pi e^-$
$n = 1, 6\pi e^-$
$n = 2, 10\pi e^-$



Question77

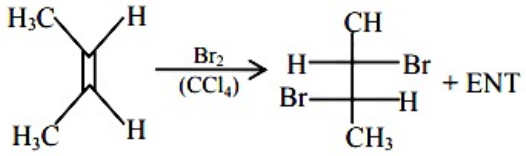


Consider the above chemical reaction. The total number of stereoisomers possible for Product 'P' is _____ .
[25 Jul 2021 Shift 2]

Answer: 2

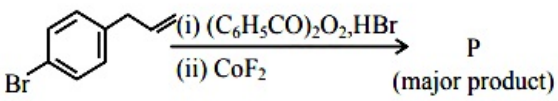
Solution:

Solution:



The total number of products possible = 2

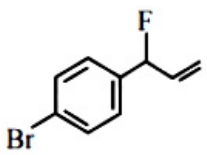
Question78



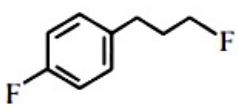
Major product P of above reaction, is :
[20 Jul 2021 Shift 2]

Options:

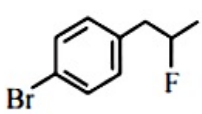
A.



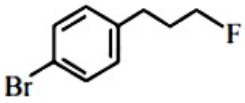
B.



C.



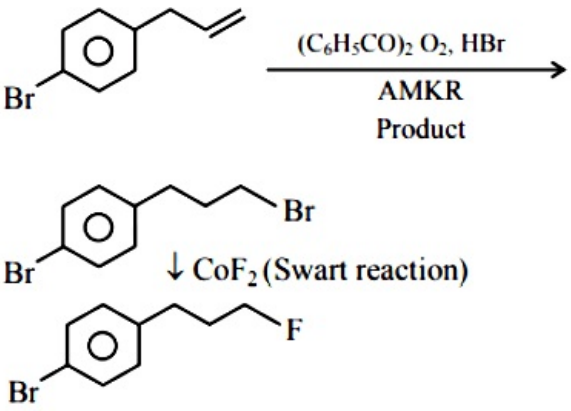
D.



Answer: D

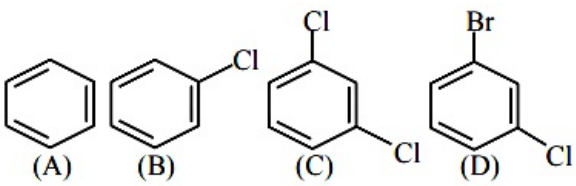
Solution:

Solution:



Question79

The correct decreasing order of densities of the following compounds is :



[25 Jul 2021 Shift 2]

Options:

A. (D) > (C) > (B) > (A)

B. (C) > (D) > (A) > (B)

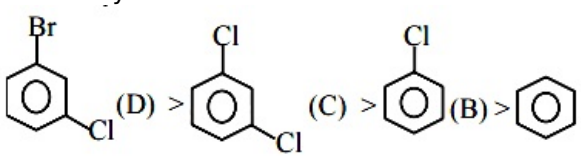
C. (C) > (B) > (A) > (D)

D. (A) > (B) > (C) > (D)

Answer: A

Solution:

Solution:
The density order



Question80

Benzene on nitration gives nitrobenzene in presence of HNO_3 and H_2SO_4 mixture, where :
[20 Jul 2021 Shift 2]

Options:

A. both H_2SO_4 and HNO_3 act as a bases

B. HNO_3 acts as an acid and H_2SO_4 acts as a base

C. both H_2SO_4 and HNO_3 act as an acids

D. HNO_3 acts as a base and H_2SO_4 acts as an acid

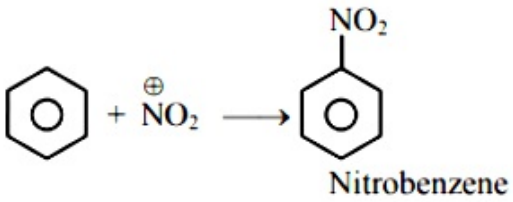
Answer: D

Solution:

Reagent for nitration of Benzene

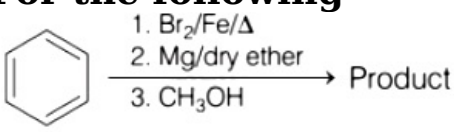
$$\underset{\text{(Acid)}}{H_2SO_4} + \underset{\text{(Base)}}{HNO_3} \rightleftarrows HSO_4^{\ominus} + H_2\overset{\oplus}{N}O_3$$

$$H_2\overset{\oplus}{N}O_3 \rightleftarrows H_2O + \overset{\oplus}{N}O_2$$



Question81

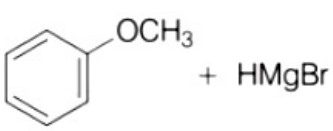
For the following



[31 Aug 2021 Shift 2]

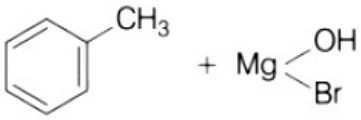
Options:

A.



B.

C.

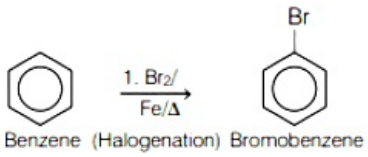


D.

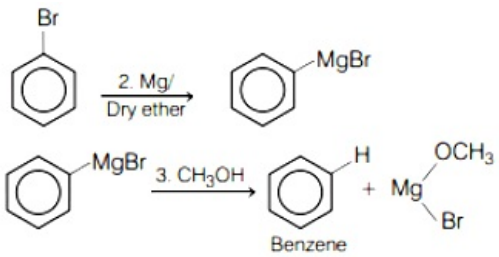
Answer: B

Solution:

Solution:
Benzene on reaction with Br_2 /Fe give 5 bromo benzene as follows



Bromobenzene on reaction with Mg / dry ether and CH_3OH gives benzene as follows



Question82

Which one of the following compounds is not aromatic? [26 Aug 2021 Shift 2]

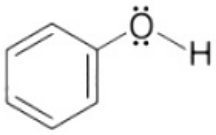
Options:

A.

B.

C.

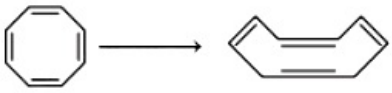
D.



Answer: C

Solution:

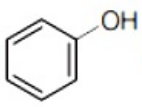
Solution:
The compound which follows Huckel's rule has planar structure is aromatic in nature.

(c) 

It exist in a non-planar tube shape, so it is non-aromatic.

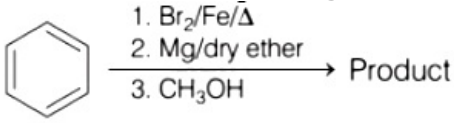
(a)  It is aromatic in nature.
Number of πe^- = $4n + 2\ (n = 2) = 6\ \pi e^-$

(b)  It is also aromatic in nature as the lone pair is in conjugation with πe^-.

(d)  It is aromatic in nature as it contains benzene ring.

Question83

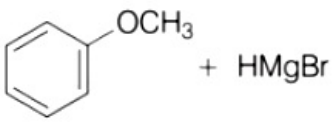
For the following



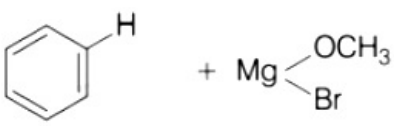
[31 Aug 2021 Shift 2]

Options:

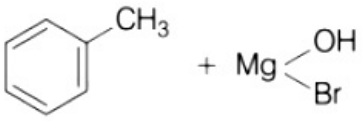
A.



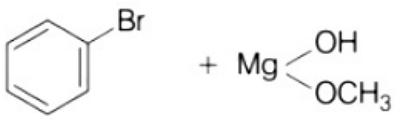
B.



C.



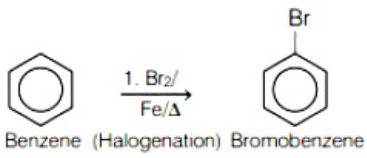
D.



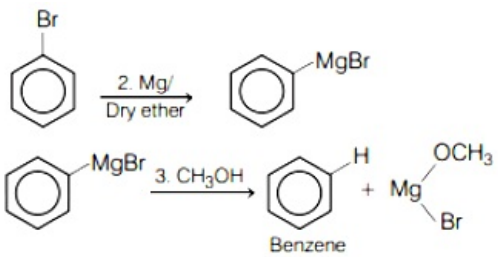
Answer: B

Solution:

Solution:
Benzene on reaction with Br_2 /Fe give 5 bromo benzene as follows



Bromobenzene on reaction with Mg / dry ether and CH_3OH gives benzene as follows



Question84

Which one of the following compounds is not aromatic? [26 Aug 2021 Shift 2]

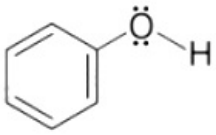
Options:

A.

B.

C.

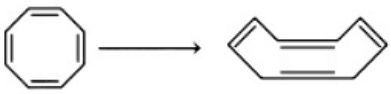
D.



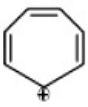
Answer: C

Solution:

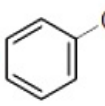
Solution:
The compound which follows Huckel's rule has planar structure is aromatic in nature.

(c) 

It exist in a non-planar tube shape, so it is non-aromatic.

(a)  It is aromatic in nature.
Number of πe^- = $4n + 2\ (n = 2) = 6\ \pi e^-$

(b)  It is also aromatic in nature as the lone pair is in conjugation with πe^-.

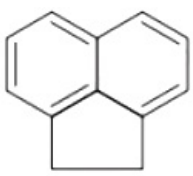
(d)  It is aromatic in nature as it contains benzene ring.

Question85

Which one of the following compounds is aromatic in nature ? [1 Sep 2021 Shift 2]

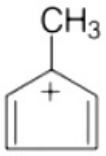
Options:

A.



B.

C.

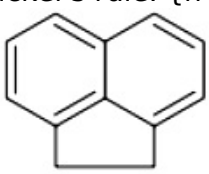


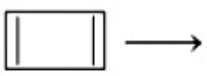
D.

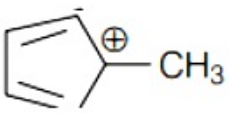
Answer: D

Solution:

Aromatic compounds are conjugated planar ring system having delocalised π - electron clouds and follows(4n + 2) π - electron rule, i.e. Huckel's rule. {n = 0,1, 2, ...}

(a)  → $10\pi e^-$ in cyclic conjugation place
It is aromatic.

(b)  → $4\pi e^-$ in cyclic conjugation
It is anti-aromatic.

(c)  $4\pi e^-$ in cyclic conjugation.
It is anti-aromatic.

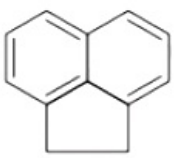
(d)  $6\pi e^-$ in cyclic conjugation.
It is aromatic.

Question86

Which one of the following compounds is aromatic in nature ? [1 Sep 2021 Shift 2]

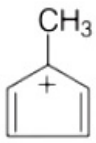
Options:

A.



B.

C.

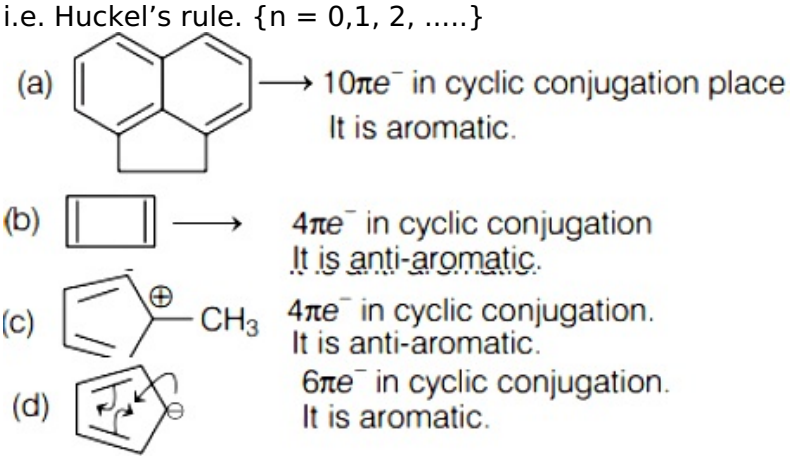


D.

Answer: D

Solution:

Aromatic compounds are conjugated planar ring system having delocalised π - electron clouds and follows(4n + 2) π - electron rule, i.e. Huckel's rule. {n = 0,1, 2, ...}



Question87

Experimentally reducing a functional group cannot be done by which one of the following reagents ?
[1 Sep 2021 Shift 2]

Options:

A. Pt − C / H_2

B. Na / H_2

C. Pd − C / H_2

D. Zn / H_2O

Answer: B

Solution:

Solution:
A functional group cannot be reduced by Na / H_2 as it is not a reducing agent.

Question88

The correct order of heat of combustion for following alkadienes is:

[Jan. 09, 2020(I)]

Options:

A. (A) < (B) < (C)

B. (A) < (C) < (B)

C. (C) < (B) < (A)

D. (B) < (C) < (A)

Answer: A

Solution:

Solution:
In isomers of hydrocarbon heat of combustion is inversely proportional to the stability.
Stability order : A > B > C
Order of heat of combustion : A < B < C

Question89

Which of the following has the shortest C-Cl bond?
[Jan. 09,2020 (II)]

Options:

A. $Cl - CH = CH_2$

B. $Cl - CH = CH\,NO_2$

C. $Cl - CH = CH - CH_3$

D. $Cl\text{-}CH = CH - OCH_3$

Answer: B

Solution:

In Cl-CH=CH-NO_2 double bond character in carbonchlorine bond is maximum due to resonance and so the bond length is shortest.

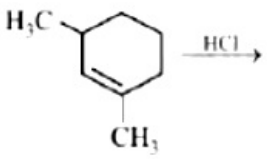
Question90

Which of the following reactions will not produce a racemic product? [Jan. 09, 2020 (II)]

Options:

A. $CH_3-\overset{O}{\overset{\|}{C}}CH_2CH_3 \xrightarrow{HCN}$

B.



C. $CH_3CH_2CH=CH_2 \xrightarrow{HBr}$

D. $CH_3-\overset{CH_3}{\underset{H}{C}}-CH=CH_2 \xrightarrow{HCl}$

Answer: D

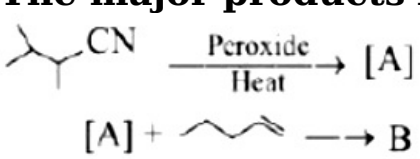
Solution:

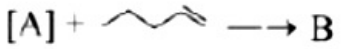
$$(CH_3)_2CH-CH=CH_2 \xrightarrow{HCl} (CH_3)_2CH-CH-CH_3 \xrightarrow{\text{Hydride shift}} CH_3-\overset{+}{\underset{CH_3}{C}}-CH_2-CH_3 \rightarrow CH_3-\overset{Cl}{\underset{CH_3}{C}}-CH_2-CH_3$$

There is no chiral carbon in the product of this reaction.

Question91

The major products A and B in the following reactions are:

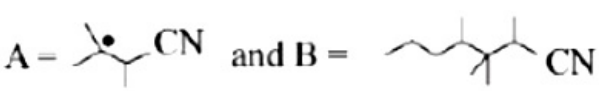




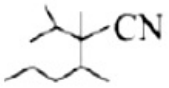
[Jan. 08,2020 (I)]

Options:

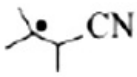
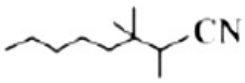
A.



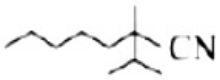
B.

A =  and B = 

C.

A =  and B = 

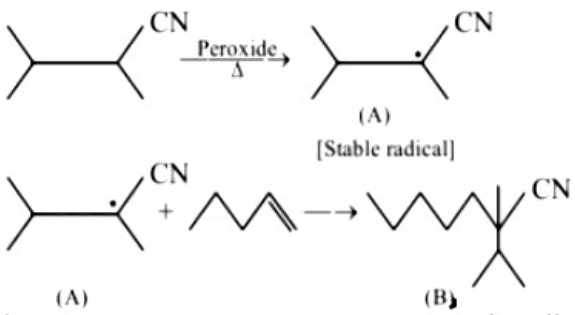
D.

A =  and B = 

Answer: A

Solution:

Solution:



(A) is more stable radical and undergoes Markovnikov addition to form (B).

Question92

The major product [B] in the following sequence of reactions is:

$$CH_3 - \underset{\underset{CH(CH_3)_2}{|}}{C} = CH - CH_2CH_3 \xrightarrow[(ii)H_2O_2,\ OH^{\ominus}]{(i)B_2H_6} [A] \xrightarrow[\Delta]{dil.\ H_2SO_4} [B]$$

[Jan. 08,2020 (II)]

Options:

A. $CH_2 = \underset{\underset{CH(CH_3)_2}{|}}{C} - CH_2CH_2CH_3$

B.

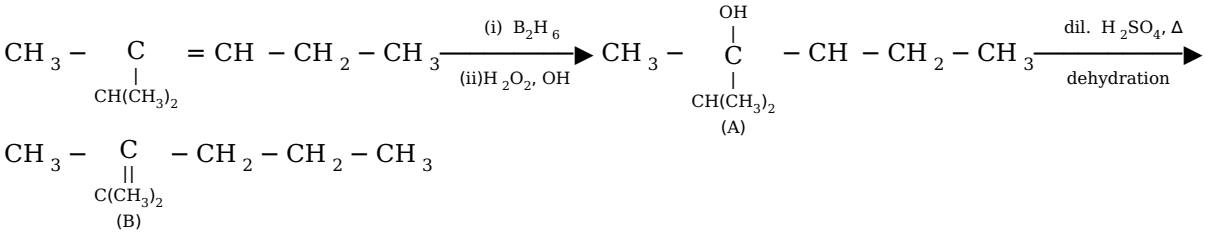
C. $CH_3 - \underset{\underset{CH(CH_3)_2}{|}}{C} = CH - CH_2CH_3$

D. $CH_3 - \underset{\underset{CH(CH_3)_2}{|}}{CH} - CH = CH - CH_3$

Answer: B

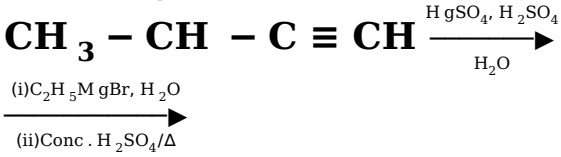
Solution:

Solution:



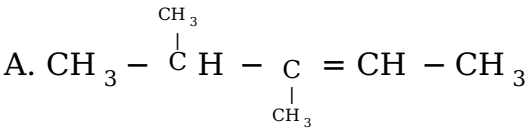
Question93

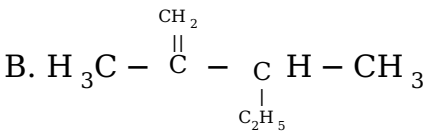
The major product (Y) in the following reactions is:

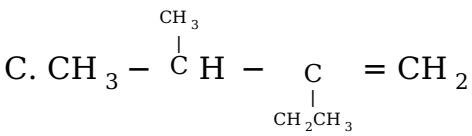


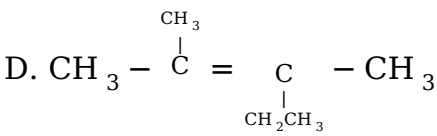
[Jan. 09, 2020 (I)]

Options:

A. 

B. 

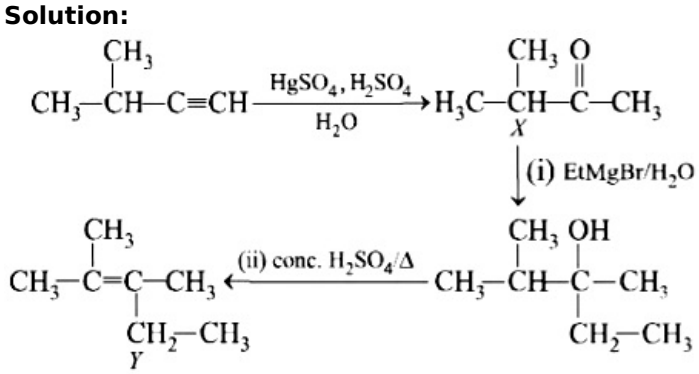
C. 

D. 

Answer: D

Solution:

Solution:



Question94

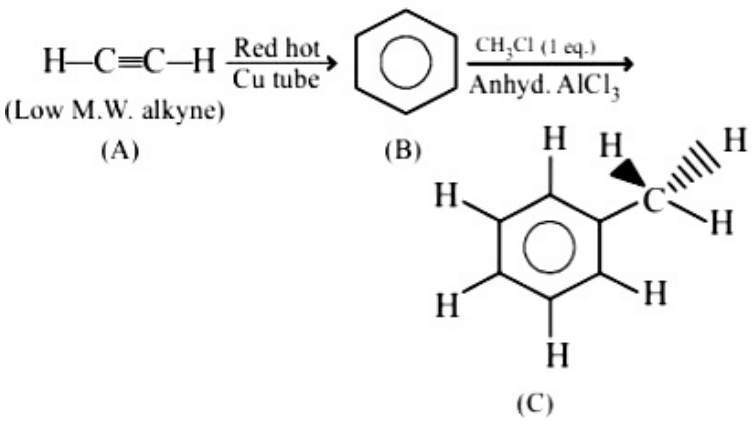
In the following sequence of reactions the maximum number of atoms present in molecule ' C″ in one plane is _____.

$A \xrightarrow[Cu\ \ tube]{Red\ hot} B \xrightarrow[Anhydrous\ \ ACl_3]{CH_3Cl\ (\ L.eq.\ )} \longrightarrow$

(A is a lowest molecular weight alkyne)
[NV. Jan. 08,2020 (II)]

Answer: 13

Solution:



Question95

The number of sp^2 hybrid orbitals in a molecule of benzene is:
[Jan. 09,2020 (II)]

Options:

A. 24

B. 6

C. 18

D. 12

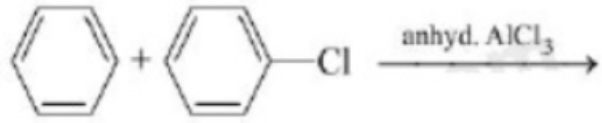
Answer: C

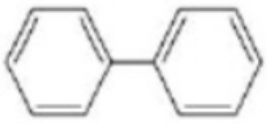
Solution:

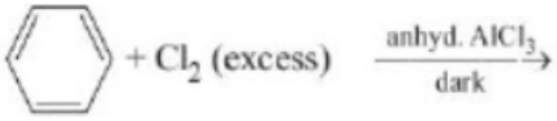
Solution:
In benzene each carbon atom is sp^2 hybridised. Therefore total $18 sp^2$ hybrid orbitals are present in benzene.

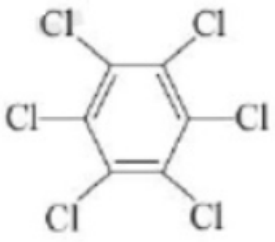
Question96

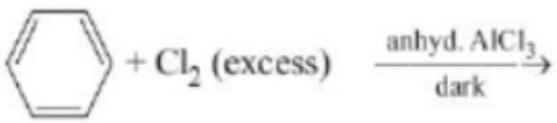
Consider the following reactions:

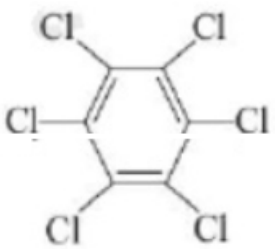
(A) 

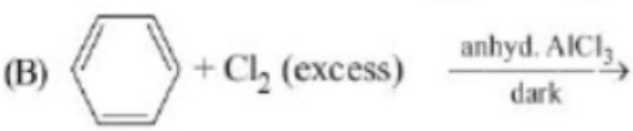


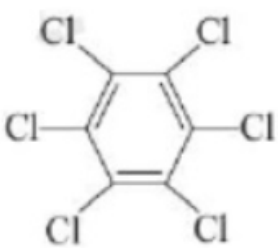
(B) 



(B) 



(B) 



Which of these reactions are possible?
[Jan. 07, 2020(II)]

Options:

A. (A) and (B)

B. (A) and (D)

C. (B), (C) and (D)

D. (B) and (D)

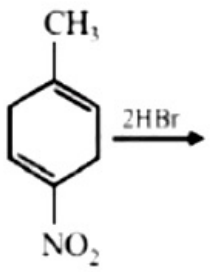
Answer: D

Solution:

Solution:
Vinyl halides and aryl halides are unreactive towards Friedel Craft's reaction. Therefore reactions (A) and (C) are not possible.

Question97

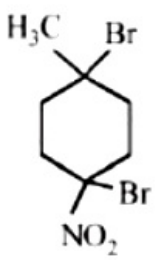
The major product of the following reaction is :



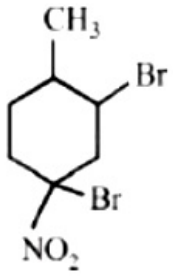
[Sep. 06, 2020(I)]

Options:

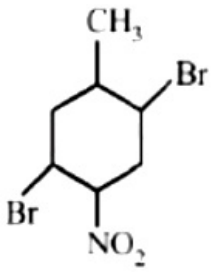
A.



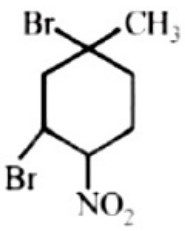
B.



C.

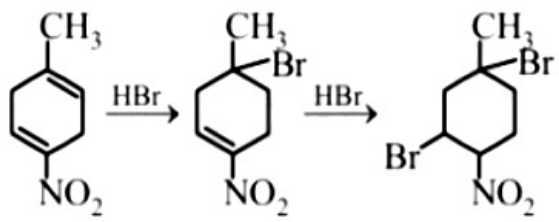


D.



Answer: D

Solution:



Question98

Which of the following compounds shows geometrical isomerism? [Sep. 06,2020(I)]

Options:

A. 2 -methylpent-2-ene

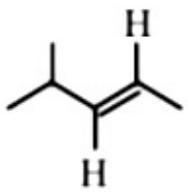
B. 4 -methylpent-2-ene

C. 4-methylpent-1-ene

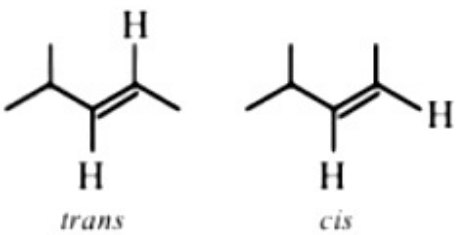
D. 2 -methylpent-1-ene

Answer: B

Solution:



4-Methylpent-2-ene

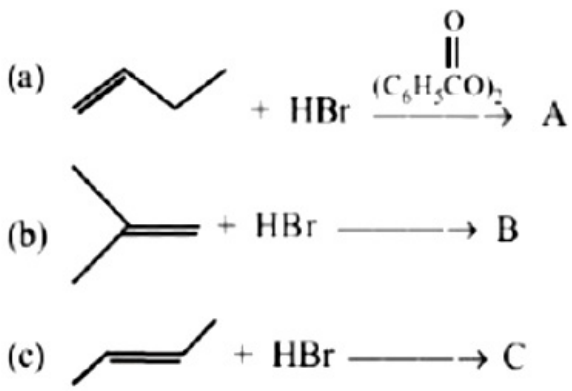


trans *cis*

Geometrical isomers

Question99

The increasing order of the boiling point of the major products A, B and C of the following reactions will be:



[Sep .06,2020(II)]

Options:

A. B < C < A

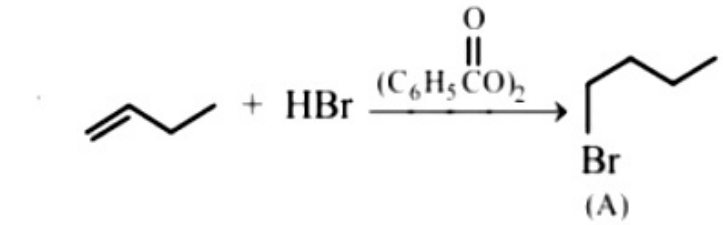
B. C < A < B

C. A < B < C

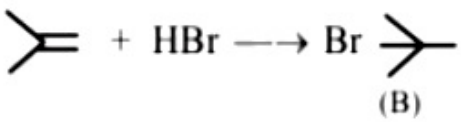
D. A < C < B

Answer: A

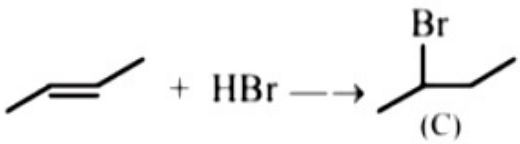
Solution:



(A)



(B)



(C)

The boiling points of isomeric haloalkanes decrease with increase in branching.
So order of B.P. is A > C > B.

Question100

The major product formed in the following reaction is:

$CH_3CH = CHCH(CH_3)_2 \xrightarrow{HBr}$

[Sep. 05, 2020(II)]

Options:

A. $CH_3CH(Br)CH_2CH(CH_3)_2$

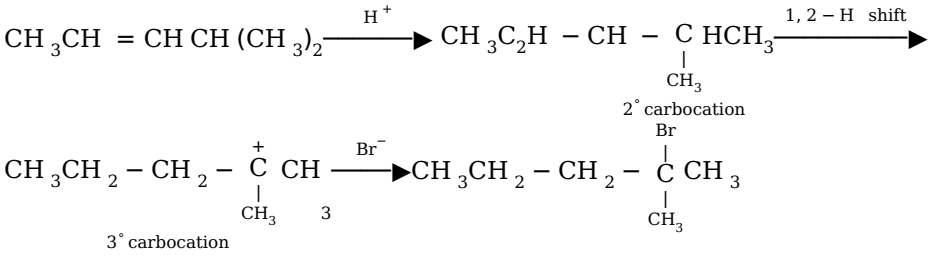
B. $CH_3CH_2CH(Br)CH(CH_3)_2$

C. $Br(CH_2)_3CH(CH_3)_2$

D. $CH_3CH_2CH_2C(Br)(CH_3)_2$

Answer: D

Solution:

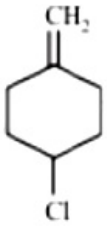


Question101

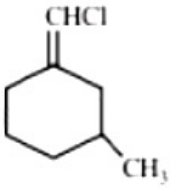
Among the following compounds, geometrical isomerism is exhibited by: [Sep. 05, 2020 (II)]

Options:

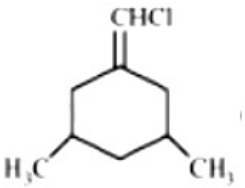
A.



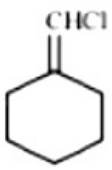
B.



C.



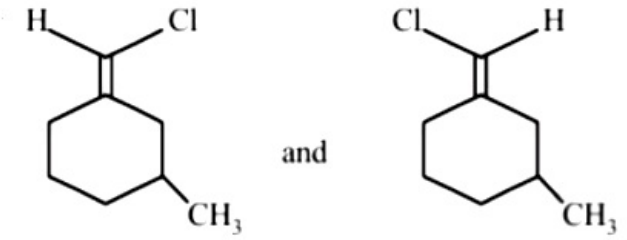
D.



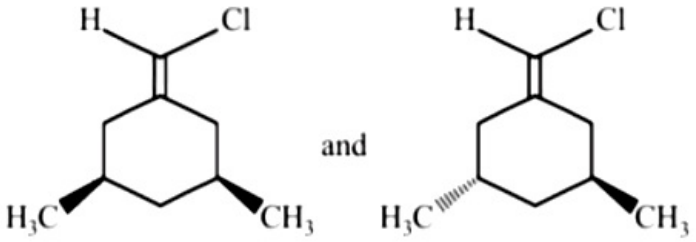
Answer: C

Solution:

Solution:



Geometrical isomers



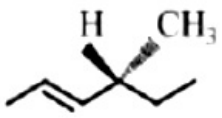
Geometrical isomers

Question102

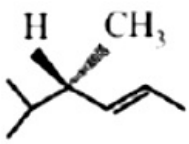
Which of the following compounds produces an optically inactive compound on hydrogenation?
[Sep. 03,2020 (I)]

Options:

A.

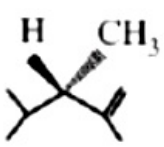


B.



C.

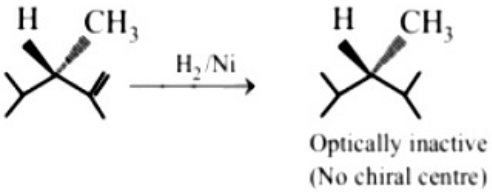
D.



Answer: D

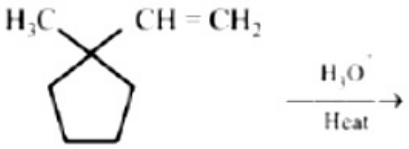
Solution:

Solution:



Question103

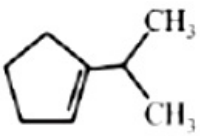
The major product in the following reaction is:



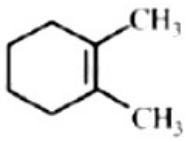
[Sep. 02,2020(I)]

Options:

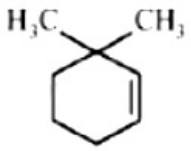
A.



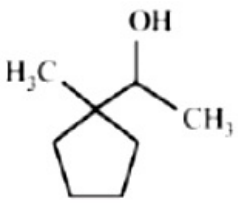
B.



C.



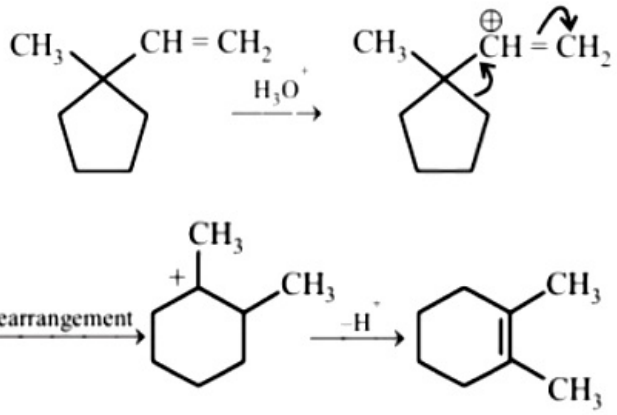
D.



Answer: B

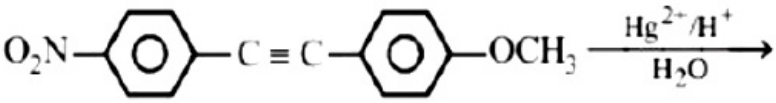
Solution:

Solution:



Question104

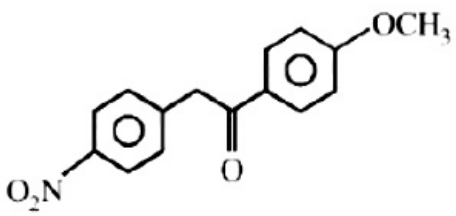
The major product obtained from the following reaction is:



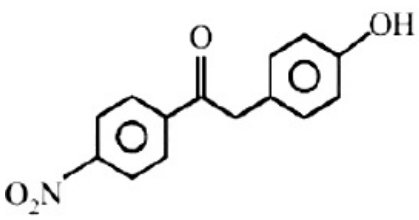
[Sep. 06,2020 (I)]

Options:

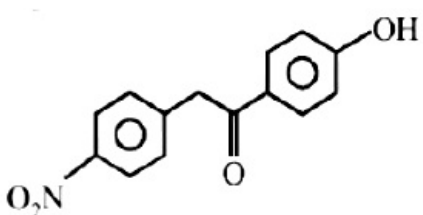
A.



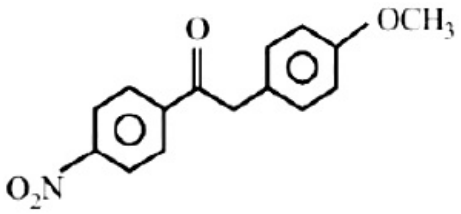
B.



C.



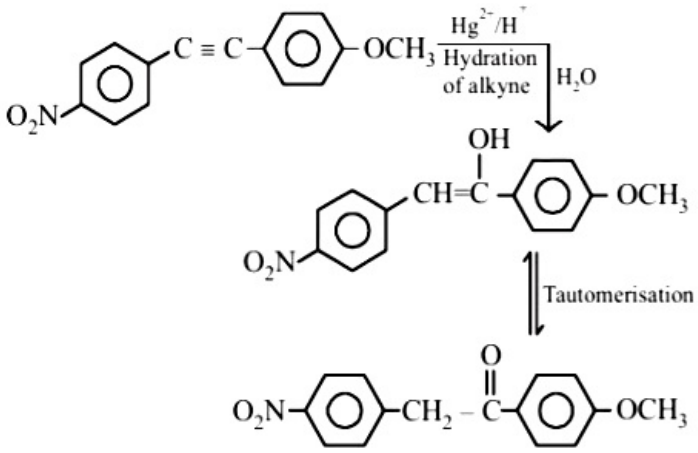
D.



Answer: A

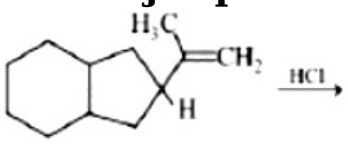
Solution:

Solution:



Question105

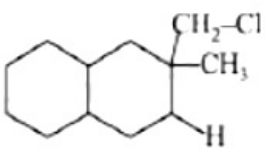
The major product of the following reaction is :



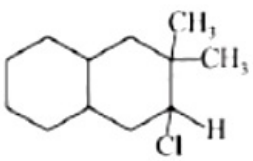
[Jan. 12, 2019 (II)]

Options:

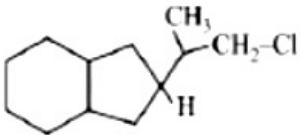
A.



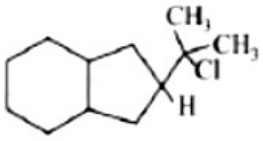
B.



C.



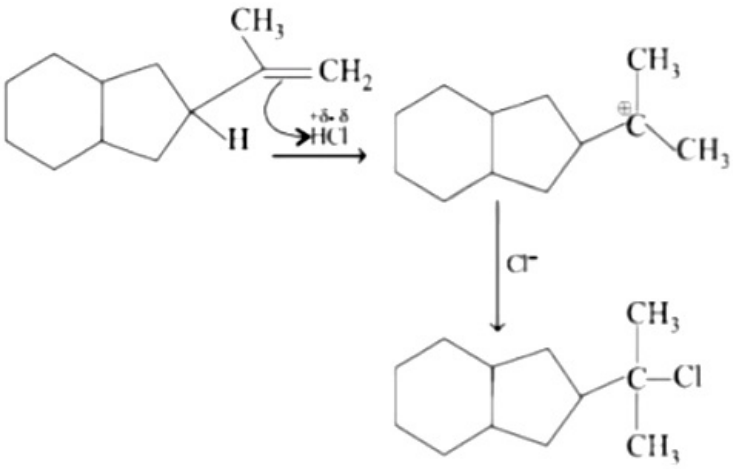
D.



Answer: D

Solution:

Solution:



Question106

The correct order for acid strength of compounds CH ≡ CH , $CH_3 - C \equiv CH$ and $CH_2 = CH_2$ is as follows: [Jan. 12, 2019 (I)]

Options:

A. $CH = CH > CH_2 = CH_2 > CH_3 - C = CH$

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

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

D. $HC = CH > CH_3 - C = CH > CH_2 = CH_2$

Answer: D

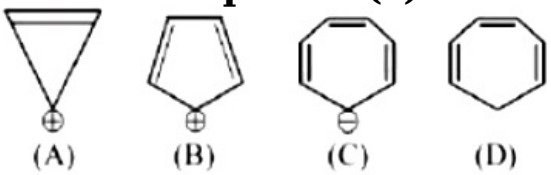
Solution:

Solution:
Alkynes having sp -hybridised carbon has max. s character and hence max. electronegativity with the result it attracts the electron pair of the bond $C - H$ to a greater extent and makes the removal of proton easier than the alkenes having

sp^2 hybridised carbon. Now presence of electron donating group ($-CH_3$) in alkyne $CH_3 - C \equiv CH$ decreases acidic strength of the compound. Hence the correct order of acidic strength is
$HC \equiv CH > H_3C \rightarrow C \equiv CH > CH_2 = CH_2$

Question107

Which compound (s) out of the following is\/are not aromatic?



[Jan. 11, 2019 (I)]

Options:

A. , (C) and (D)

B. (C) and (D)

C. (B)

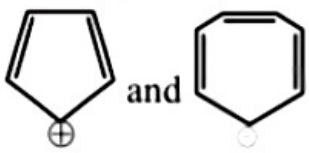
D. (A) and (C)

Answer: A

Solution:

Solution:

is aromatic; $(4 \times 0 + 2) = 2\pi e^-$ in conjugation



$4\pi e^-$ $8\pi e^-$

$(4 \times 1)\,\pi e^-$ $(4 \times 2)\,\pi e^-$

are antiaromatic

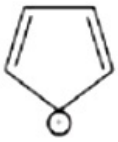
is non aromatic due to the presence of sp^3 carbon.

Question108

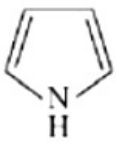
Which of the following compounds is not aromatic?
[Jan. 9, 2019 (II)]

Options:

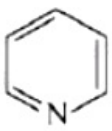
A.



B.



C.

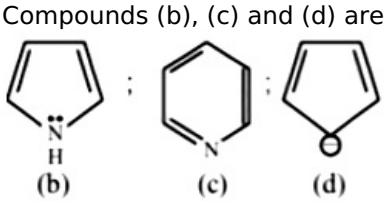


D.

Answer: A

Solution:

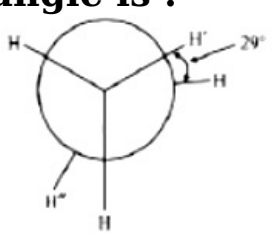
Solution:
Compounds (b), (c) and (d) are containing $6\pi e^-$ in complete conjugation and are aromatic.



Compound (a) is anti-aromatic as it has $4\pi e^-$ in complete conjugation and doesn't obey Hückel rule.

Question109

In the following skew conformation of ethane, $H' - C - C - H$ 3 dihedral angle is :



[April 12, 2019 (II)]

Options:

A. 58°

B. 149°

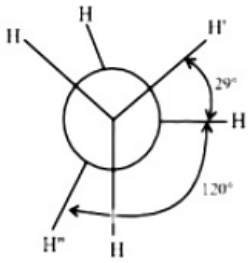
C. 151°

D. 120°

Answer: B

Solution:

Solution:



∴ Angle between H′ and H″ = 120° + 29° = 14

Question110

25g of an unknown hydrocarbon upon burning produces 88g of CO_2 and 9g of H_2O. This unknown hydrocarbon contains: [April 12, 2019 (II)]

Options:

A. 20g of carbon and 5g of hydrogen

B. 22g of carbon and 3g of hydrogen

C. 24g of carbon and 1g of hydrogen

D. 18g of carbon and 7g of hydrogen

Answer: C

Solution:

Solution:
Let the hydrocarbon be C_xH_y

$$\underset{25g}{C_xH_y} + \underset{\text{excess}}{\left(x + \frac{y}{4}\right)O_2} \rightarrow \underset{88g}{xCO_2} + \underset{9g}{\frac{y}{2}H_2O}$$

$2mol \quad \frac{1}{2}mol$

$x = 2 \quad y = 1$

∵x = 2 and y = 1, the hydrocarbon will be $(C_2H)_n$

2 mol carbon contains 24g and 1 mol hydrogen contains lg.

Question111

At 300K and 1 atmospheric pressure, 10mL of a hydrocarbon required 55mL of O_2 for complete combustion, and 40mL of CO_2 is formed. The formula of the hydrocarbon is:
[April 10,2019, (I)]

Options:

A. C_4H_{10}

B. C_4H_6

C. C_4H_7Cl

D. C_4H_8

Answer: B

Solution:

Let the hydrocarbon be C_xH_y

$$C_xH_y + \left(x + \frac{y}{4}\right)O_2 \longrightarrow xCO_2 + \frac{y}{2}H_2O$$

Before combustion:	10 mL	55 mL	0
After combustion:	0	$55 - 10\left(x + \frac{y}{4}\right)$	10 x

Volume of CO_2, $10x = 40$; $x = 4$

Volume of CO_2, $10x = 40$; $x = 4$

$55 - 10\left(x + \frac{y}{4}\right) = 0$; $y = 6$

∴ Hydrocarbon is C_4H_6

Question112

Which of these factors does not govern the stability of a conformation in acyclic compounds?
[April 10,2019, (II)]

Options:

A. Steric interactions

B. Torsional strain

C. Electrostatic forces of interaction

D. Angle strain

Answer: D

Solution:

Solution:
In a cyclic or open chain compounds, angle strain is absent.

Question113

The major product of the following addition reaction is

$$H_3C - CH = CH_2 \xrightarrow{Cl_2 / H_2O}$$

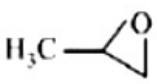
[April 12, 2019(I)]

Options:

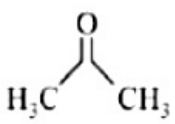
A. $H_3C - \underset{Cl}{CH} - \underset{OH}{CH_2}$

B. $H_3C - \underset{OH}{CH} - \underset{Cl}{CH_2}$

C.



D.



Answer: B

Solution:

$$CH_3 - CH = CH_2 \xrightarrow[H_2O]{Cl_2} CH_3 - \underset{\overset{+}{Cl}}{CH} - CH_2$$

$$\longrightarrow \underset{\text{(more stable)}}{CH_3 - \overset{+}{C}H - CH_2Cl} \xrightarrow{H_2O} CH_3 - \underset{OH}{CH} - \underset{Cl}{CH_2}$$

Question114

But 2 -ene on reaction with alkaline $KMnO_4$ at elevated temperature followed by acidification will give :

[April 12, 2019 (I)]

Options:

A. $CH_3 - \underset{\underset{OH}{|}}{CH} - \underset{\underset{OH}{|}}{CH} - CH_3$

B. one molecule of CH_3CHO and one molecule of CH_3COOH

C. 2 molecules of CH_2COOH

D. 2 molecules of $CH_3^{\circ}CHO$

Answer: C

Solution:

Solution:

$$CH_3 - CH = CH - CH_3 \xrightarrow{\text{alk } KMnO_4} \left[CH_3 - CH - \underset{\underset{OH}{|}}{CH} - \underset{\underset{OH}{|}}{CH}_3 \right] \xrightarrow[(ii)H^+]{\text{(i) heated at elevated temp.}} 2CH_3COOH$$

Question115

Which one of the following alkenes when treated with HCl yields majorly an anti Markovnikov product? [April 8, 2019 (II)]

Options:

A. $CH_3O - CH = CH_2$

B. $Cl - CH = CH_2$

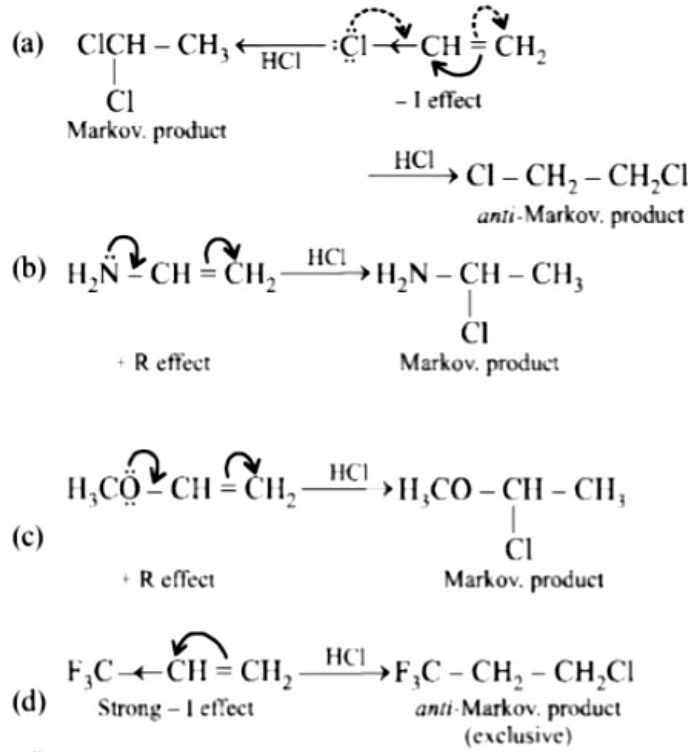
C. $H_2N - CH = CH_2$

D. $F_3C - CH = CH_2$

Answer: D

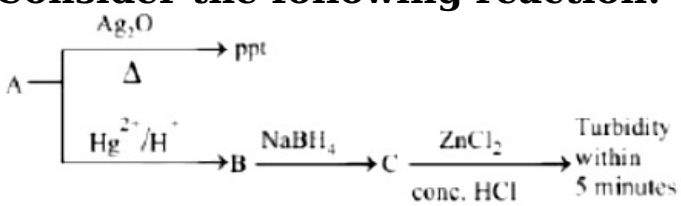
Solution:

Solution:



Question116

Consider the following reaction:



'A' is:
[April 12, 2019 (II)]

Options:

A. $CH \equiv CH$

B. $CH_3 - C \equiv C - CH_3$

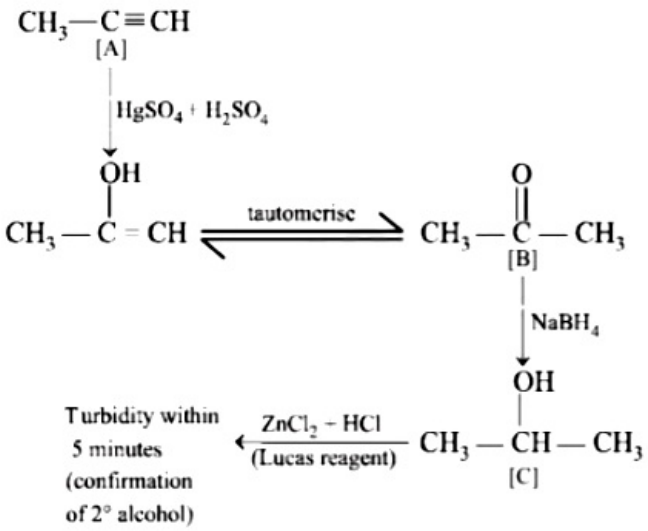
C. $CH_3 - C \equiv CH$

D. $CH_2 = CH_2$

Answer: C

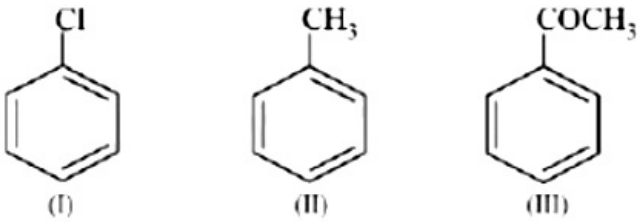
Solution:

Solution:
(i) Reaction of ' A ' with Ag_2O to give ppt indicates $-C \equiv CH$ type of linkage.
(ii) Going backward in the second set, compound ' C ' when heated with $ZnCl$, and conc. HCl gives turbidity within 5 minutes, it indicates that 'C' is a 2° alcohol, (C) hence 'B' is a ketone and ' A ' is prop-1-yne.



Question117

The increasing order of the reactivity of the following compounds towards electrophilic aromatic substitution reactions is :



[April 10,2019 (I)]

Options:

A. II < I < III

B. III < II < I

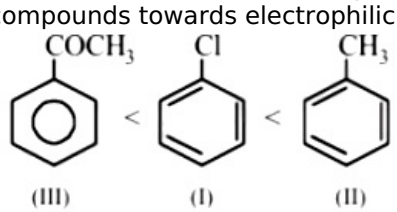
C. III < I < II

D. I < III < II

Answer: C

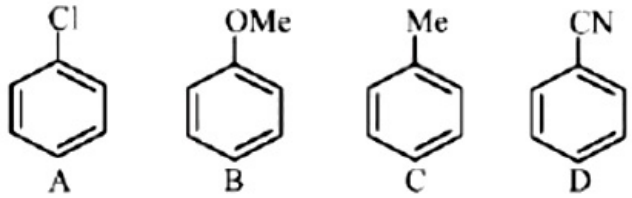
Solution:

Solution:
CH_3 group when bonded to benzene increases the electron density of benzene ring due to $+I$ and hyper conjugation effects. $-Cl$ group decreases the electron density of benzene ring due to $-I$ effect, and $-COCH_3$ group strongly decreases the electron density of benzene ring due to-I and-R effects. Therefore, correct increasing order of the given compounds towards electrophilic aromatic substitution is



Question118

The increasing order of reactivity of the following compounds towards aromatic electrophilic substitution reaction is:



[April 9,2019 (I)]

Options:

A. D < A < C < B

B. B < C < A < D

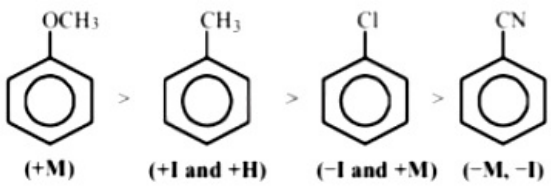
C. A < B < C < D

D. D < B ≤ A < C

Answer: A

Solution:

Solution:



Question119

The major product of the following reaction is:

$$CH_3C \equiv CH \xrightarrow[\text{(ii) D1}]{\text{(i) DCl (1 equiv.)}}$$

[April 9, 2019 (I)]

Options:

A. $CH_3CD(I)CHD(Cl)$

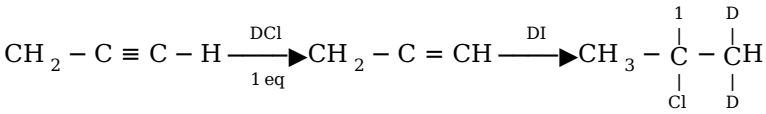
B. $CH_3CD(Cl)CHD(I)$

C. $CH_3CD_2CH(Cl)(I)$

D. $CH_3C(T)(Cl)CHD_2$

Answer: D

Solution:



Both additions follow Markovnikov's rule.

Question120

The trans-alkenes are formed by the reduction of alkynes with: [2018]

Options:

A. $H_2 - Pd$ / C, $BaSO_4$

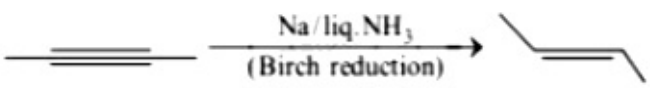
B. $NaBH_4$

C. Na/liq. NH_3

D. $Sn - HCl$

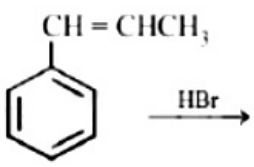
Answer: C

Solution:



Question121

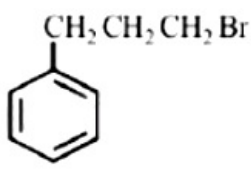
The major product of the following reaction is:



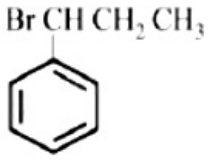
[Online April 16, 2018]

Options:

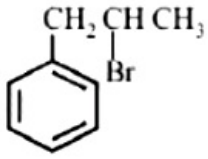
A.



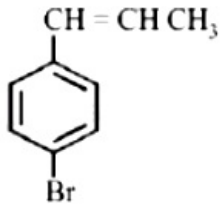
B.



C.



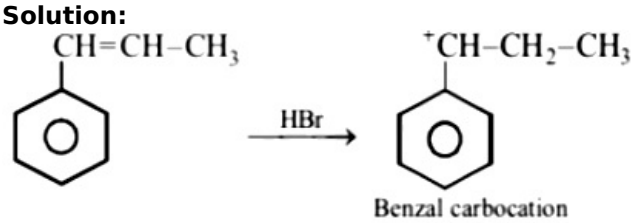
D.

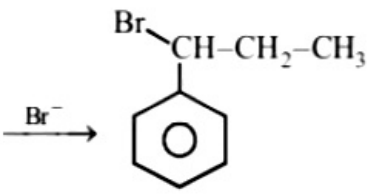


Answer: B

Solution:

Solution:





Question122

When 2 -butyne is treated with $\overline{H}_2$ \/Lindlar's catalyst, compound X is produced as the major product and when treated with Na\/liq. NH_3 it produces Y as the major product. Which of the following statements is correct?
[Online April 15, 2018 (II)]

Options:

A. Y will have higher dipole moment and higher boiling point than X

B. Y will have higher dipole moment and lower boiling point than X

C. X will have lower dipole moment and lower boiling point than Y

D. X will have higher dipole moment and higher boiling point than Y

Answer: D

Solution:

Solution:
When 2 -butyne is treated with H_2/ Lindlar's catalyst, compound X (cis-2-butene) is produced as the major product; and when treated with Na/liq NH_3 it produces Y (trans - 2- butene) as the major product. Cis-isomer (X) will have higher dipole moment and higher boiling point than trans(Y).

Question123

3-Methyl-pent-2-ene on reaction with HBr in presence of peroxide formsan addition product. The number of possible stereoisomers for the product is :
[2017]

Options:

A. Six

B. Zero

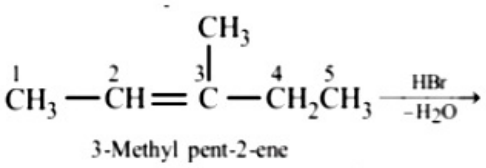
C. Two

D. Four

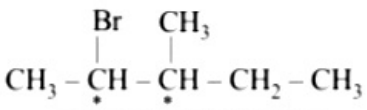
Answer: D

Solution:

Solution:
Addition of HBr on 3-methylpent-2-ene in presence of peroxide, takes place in anti-Markownikov's rule.

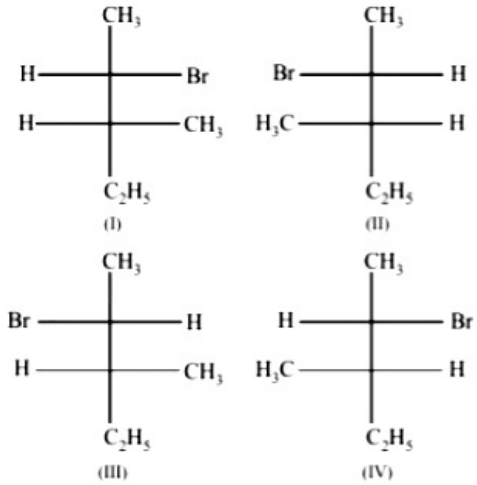


3-Methyl pent-2-ene



2-Bromo-3-methyl pentane
(2 chiral centres)

Since two chiral centres are present in the product, four stereoisomers (n^2) are possible.



Question124

Which of the following compounds is most reactive to an aqueous solution of sodium carbonate?
[Online April 9, 2017]

Options:

A.

B.

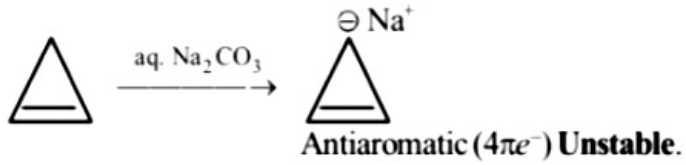
C.

D.

Answer: D

Solution:

Solution:

(a) 

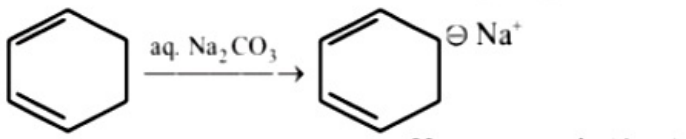
Antiaromatic ($4\pi e^-$) **Unstable**.

(b) 

Antiaromatic ($4\pi e^-$) **Unstable**.

(c) 

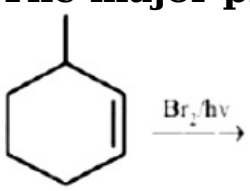
Aromatic ($6\pi e^-$) **Stable**.

(d) 

No delocalization of electron in whole ring Unstable.

Question125

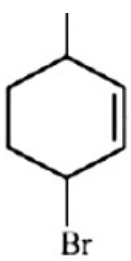
The major product of the following reaction is :



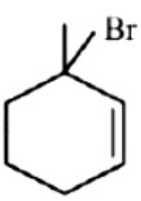
[Online April 9, 2017]

Options:

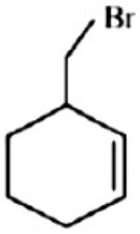
A.



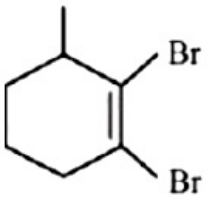
B.



C.



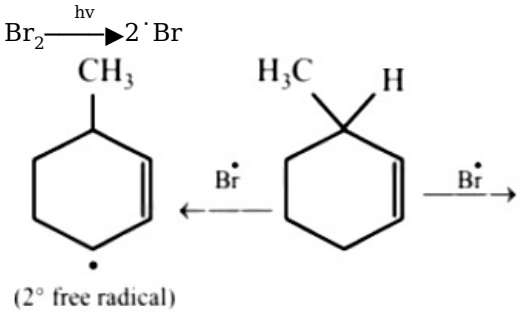
D.



Answer: B

Solution:

Solution:

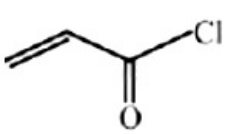


Question126

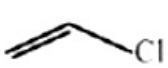
Which of the following compounds will not undergo Friedel Craft's reaction with benzene?
[Online April 8, 2017]

Options:

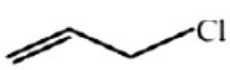
A.



B.



C.

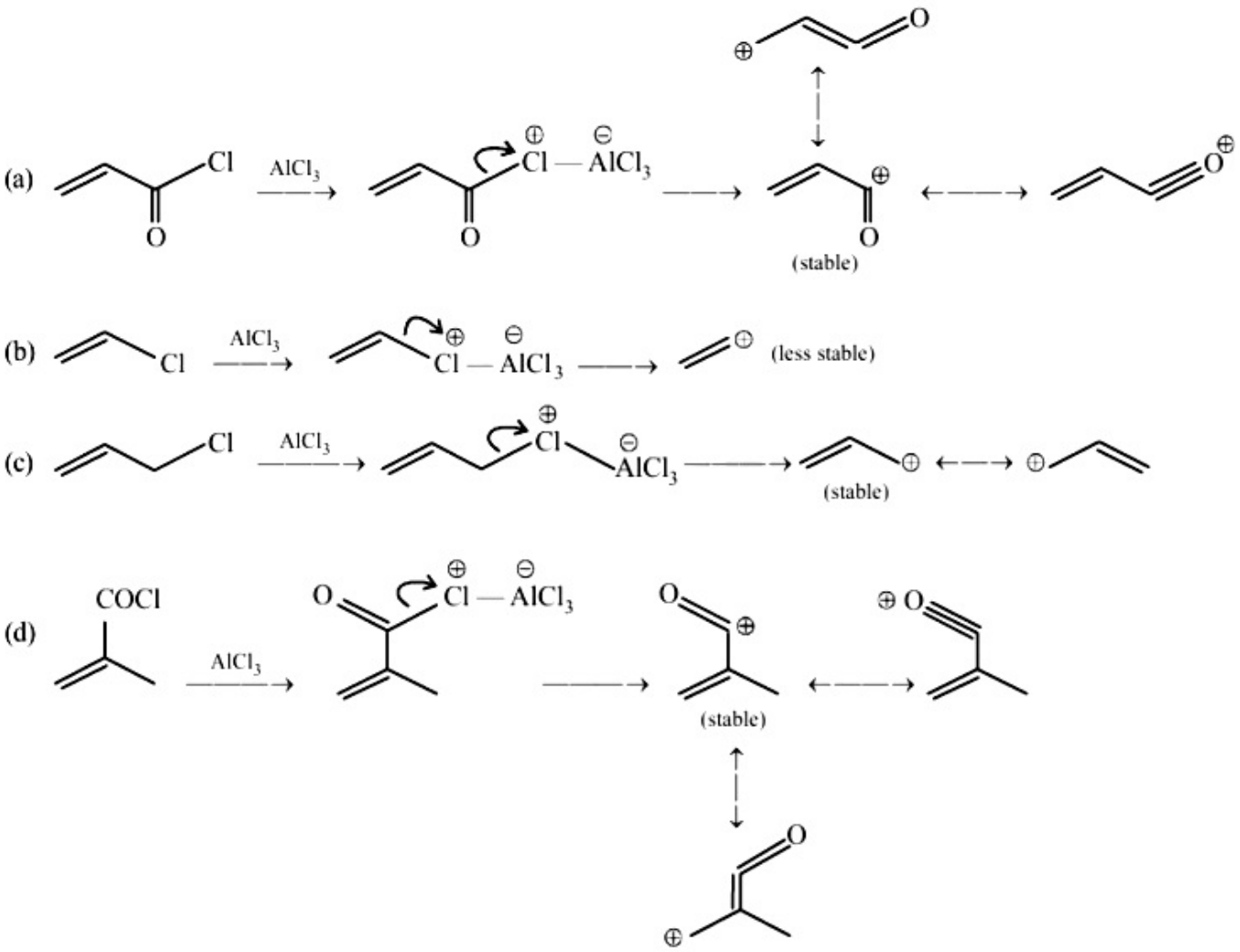


D.

Answer: B

Solution:

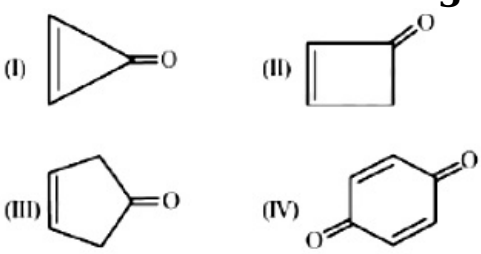
Solution:



Hence formation of carbocation is not possible in the case of vinyl halide.

Question127

Which of the following compounds will show highest dipole moment ?



[Online April 9,2017]

Options:

A. (I)

B. (II)

C. (III)

D. (IV)

Answer: A

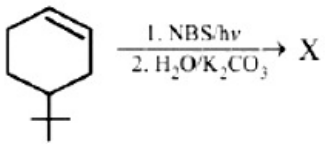
Solution:

Solution:

A dipolar resonance structure has aromatic character in the ring and would be expected to make a major contribution to the overall structure.

Question128

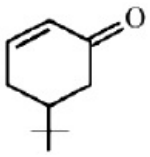
The product of the reaction given below is:



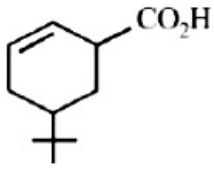
[2016]

Options:

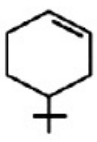
A.



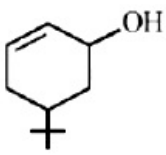
B.



C.



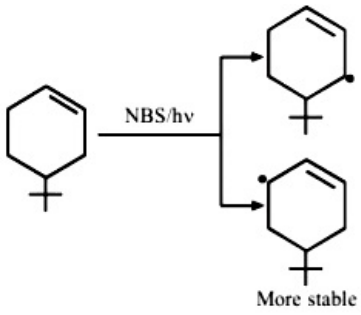
D.



Answer: D

Solution:

Solution:
N - bromosuccinimide results into bromination at allylic and benzylic positions.



Question129

The reaction of propene with H OCl ($Cl_2 + H_2O$) proceeds through the intermediate:
[2016]

Options:

A. $CH_3 - CH(OH) - CH_2^+$

B. $CH_3 - CHCl - CH_2^+$

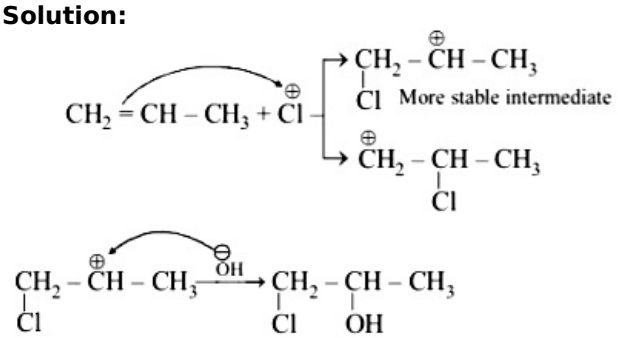
C. $CH_3 - CH^+ - CH_2 - OH$

D. $CH_3 - CH^+ - CH_2 - Cl$

Answer: D

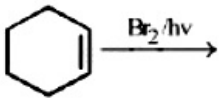
Solution:

Solution:



Question130

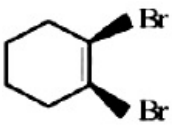
Bromination of cyclohexene under conditions given below yields:



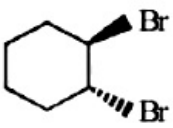
[Online April 10,2016]

Options:

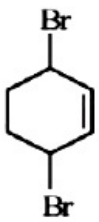
A.



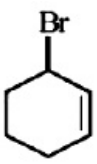
B.



C.



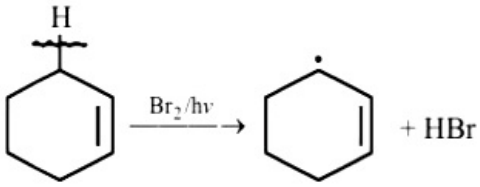
D.

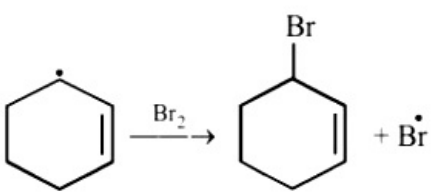


Answer: D

Solution:

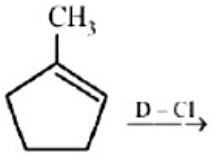
Solution:
In presence of sunlight alkenes undergo free radical substitution.





Question131

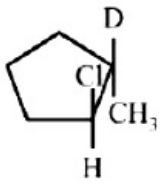
What is the major product expected from the following reaction ?



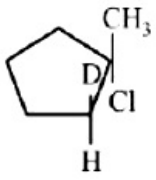
Where D is an isotope of hydrogen
[Online April 11,2015]

Options:

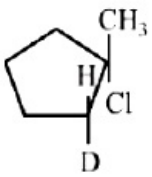
A.



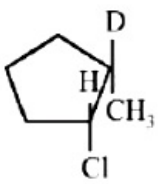
B.



C.



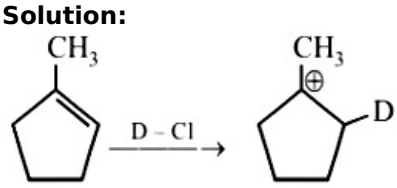
D.



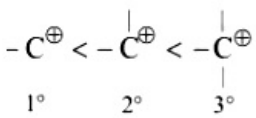
Answer: C

Solution:

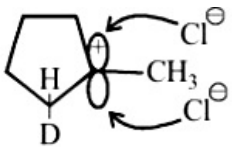
Solution:



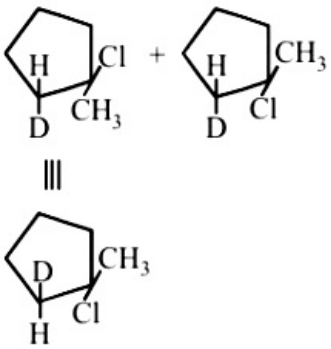
Formation of above species is more favourable. The stability order of carbocations is



Now, carbocation formed is sp^2 hybridised that is triangular planar as shown below



$Cl^{\ominus}$ ion can attack either from above or below the plane of the molecule, so there is probability of resultant product as shown below i.e., both product will form.



Question132

In the following sequence of reactions:

Toluene $\xrightarrow{KMnO_4}$ **A** $\xrightarrow{SOCl_2}$ **B** $\xrightarrow[BaSO_4]{H_2/Pd}$ **C**

the product C is :
[2015]

Options:

A. $C_6H_5CH_2OH$

B. C_6H_5CHO

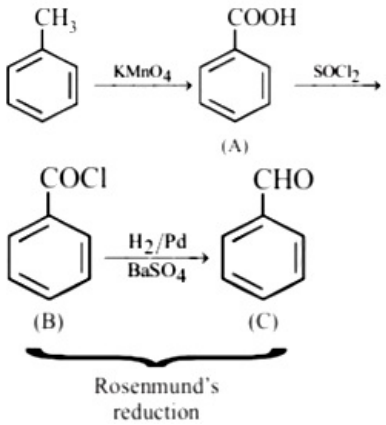
C. C_6H_5COOH

D. $C_6H_5CH_3$

Answer: B

Solution:

Solution:



Question133

In the hydroboration - oxidation reaction of propene with diborane, H_2O_2 and NaOH, the organic compound formed is:
[Online April 9, 2014]

Options:

A. CH_3CH_2OH

B. $CH_3CH\,OH\,CH_3$

C. $CH_3CH_2CH_2OH$

D. $(CH_3)_3COH$

Answer: C

Solution:

Solution:

$$CH_3CH = CH_2CH \xrightarrow[H_2O_2,\ NaOH]{B_2H_6} CH_3CH_2CH_2OH$$

Question134

The gas liberated by the electrolysis of dipotassium succinate solution is:
[Online April 11, 2014]

Options:

A. Ethane

B. Ethyne

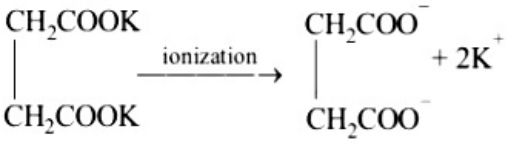
C. Ethene

D. Propene

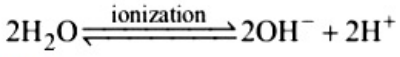
Answer: C

Solution:

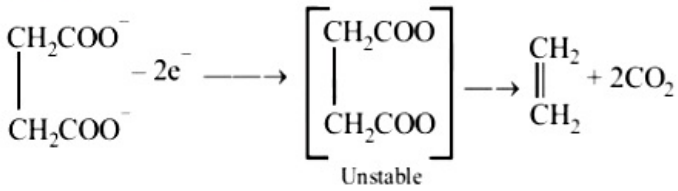
Solution:
Ethene is obtained by electrolysis of dipotassium succinate as follows



Pot. Succinate



At anode :



At cathode :

$2H^+ + 2e^- \longrightarrow [2H] \longrightarrow H_2$

Question135

In the presence of peroxide, H Cl and H I do not give anti-Markownikoff's addition of alkenes because: [Online April 12, 2014]

Options:

A. One of the steps is endothermic in H Cl and H I

B. Both HCl and HI are strong acids

C. H Cl is oxidizing and the H I is reducing

D. All the steps are exothermic is H Cl and H I

Answer: A

Solution:

Solution:
Anti-Markownikov addition is possible only in case of H Br and not in H Cl and H I . In H Br both the chain initiation and propagation steps are exothermic, while in HCl, first step is exothermic, and second step is endothermic and in HI, no step is exothermic. Hence H Cl and HI do not undergo anti-Markownikov's addition.

Question136

The reagent needed for the given conversion is

[Online April 11, 2014]

Options:

A. Cat. hydrogenation

B. H_2/ Lindlar Cat.

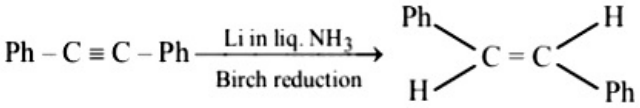
C. Li / NH_3

D. $LiAlH_4$

Answer: C

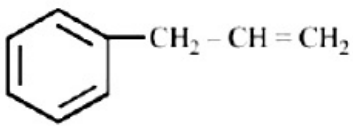
Solution:

Solution:
With Lithium in liquid ammonia, trans-alkene is almost an exclusive product.



Question137

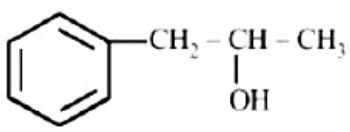
On mercuration-demercuration produces the major product :



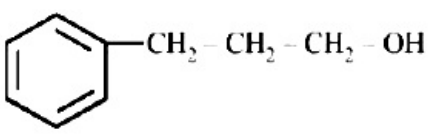
[Online April 12, 2014]

Options:

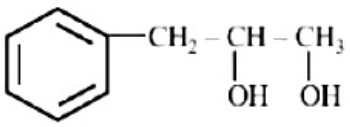
A.



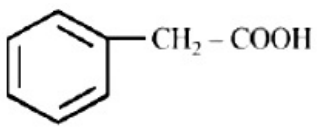
B.



C.

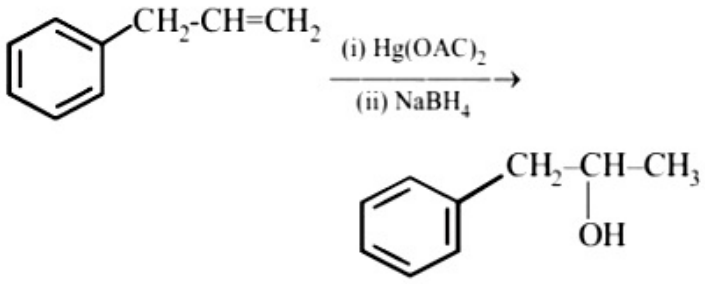


D.



Answer: A

Solution:



Question138

Which one of the following class of compounds is obtained by polymerization of acetylene?
[Online April 9, 2014]

Options:

A. Poly-yne

B. Poly-ene

C. Poly-ester

D. Poly-amine

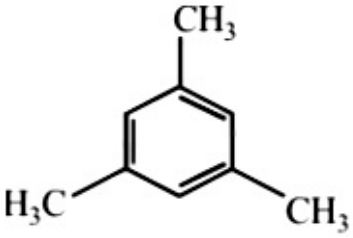
Answer: B

Solution:

Poly-ene. e.g

$$\underset{\text{acetylene}}{3CH \equiv CH} \longrightarrow \underset{\text{Benzene}}{C_6H_6}$$

$$\underset{\text{Propyne}}{3CH_3 - C \equiv CH} \longrightarrow$$



1, 3, 5-Trimethylbenzene

Question139

The addition of HI in the presence of peroxide catalyst does not follow anti-Markovnikov's rule because :
[Online April 9, 2013]

Options:

A. HI is a strong reducing agent.

B. H-I bond is too strong to be broken homolytically.

C. I atom combines with H atom to give back H I .

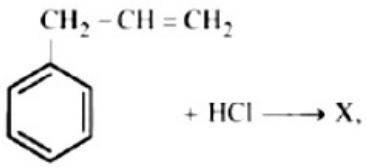
D. Iodine atom is not reactive enough to add across a double bond.

Answer: D

Solution:

Solution:
HI does not exhibit peroxide effect. HI bond although dissociates easily into iodine radicals, they being bigger in size are not much reactive but recombine together to form iodine molecule.

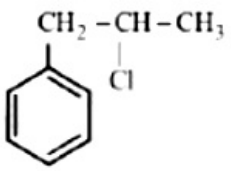
Question140



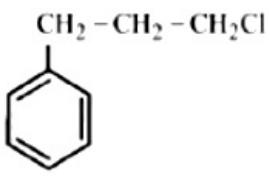
X is:
[Online April 9, 2013]

Options:

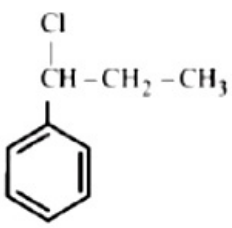
A.



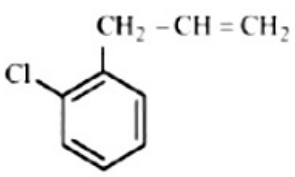
B.



C.

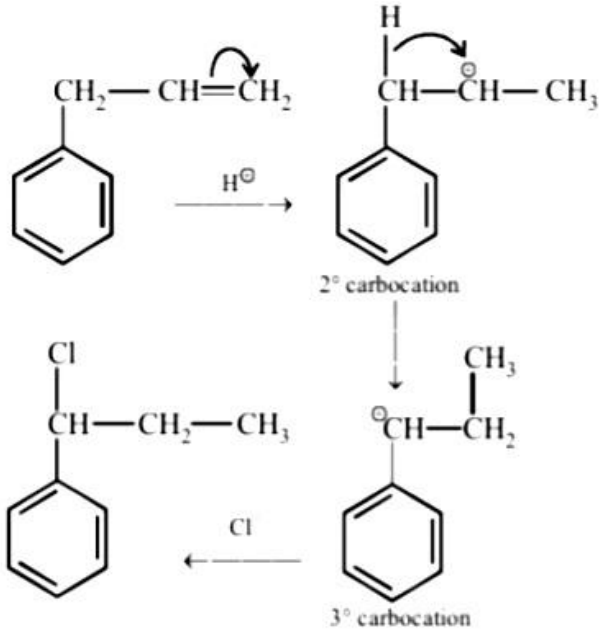


D.



Answer: C

Solution:



Question141

Which of the following would not give 2 -phenyl butane as the major product in a Fricdel-Crafts alkylation reaction? [Online April 22, 2013]

Options:

A. 1 -butene $+HF$

B. 2 -butanol $+H_2SO_4$

C. Butanoyl chloride $+AlCl_3$ then Zn, HCl

D. Butyl choloride $+AlCl_3$

Answer: C

Solution:

Solution:
The Friedal-crafts alkylation reaction will give propyl phenyl ketone which further on Clemmenson's reduction will give butyl benzene

$$C_6H_6 + CH_3CH_2CH_2COCl \xrightarrow{AlCl_3} C_6H_5COCH_2CH_2CH_3 \xrightarrow{Zn-Hg/HCl} \underset{\text{Butyl benzene}}{C_6H_5CH_2CH_2CH_2CH_3}$$

Question142

Which branched chain isomer of the hydrocarbon with molecular mass 72u gives only one isomer of mono substituted alkyl halide? [2012]

Options:

A. Tertiary butyl chloride

B. Neopentane

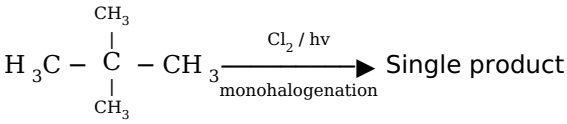
C. Isohexane

D. Neohexane

Answer: B

Solution:

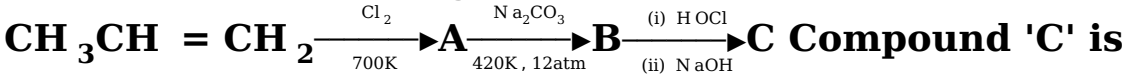
Solution:



In neopentane, all hydrogen atoms are equivalent.

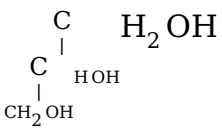
Question143

Consider the following sequence of reactions

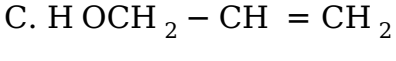


[Online May 26, 2012]

Options:

A. 

B. 

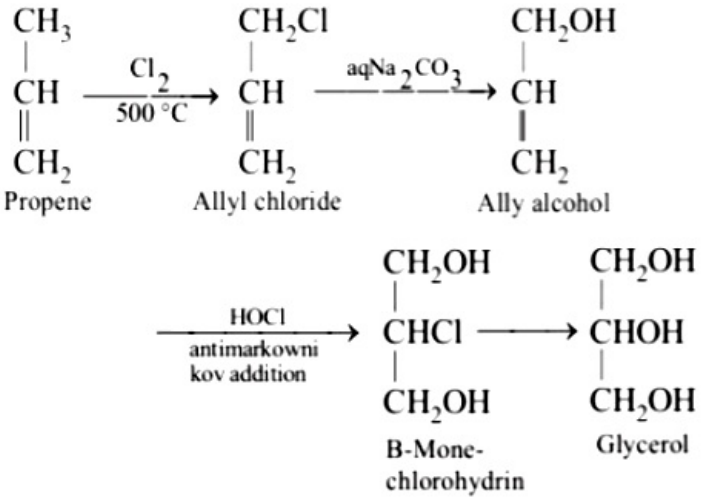
C. 

D. 

Answer: A

Solution:

Solution:



Question144

2-Hexyne gives trans-2-hexene on treatment with: [2012]

Options:

A. Pt / H_2

B. Li / NH_3

C. $Pd / BaSO_4$

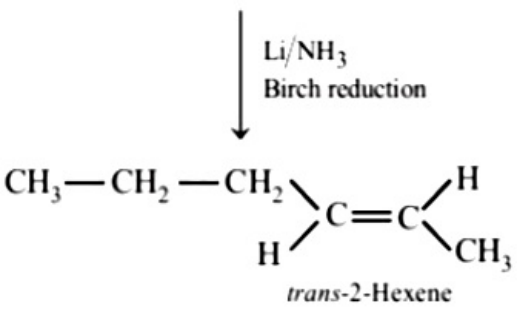
D. $LiAlH_4$

Answer: B

Solution:

Solution:
Anti addition of hydrogen atoms to the triple bond occurs when alkynes are reduced with sodium (or lithium) metal in liq. ammonia, ethylamine, or alcohol at low temperatures. This reaction called, a dissolving metal reduction, produces an (E)- or trans-alkene. Sodium in liq. NH_3 is used as a source of electrons in the reduction of an alkyne to a trans alkene.

$CH_3 - CH_2 - CH_2 - C \equiv C - CH_3$
2 – Hexyne



Question145

The hydration of propyne results in formation of [Online May 26,2012]

Options:

A. Acetonc

B. Propanol- 1

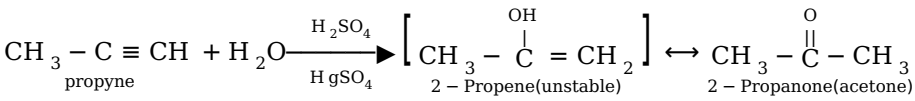
C. Propene

D. Propanal

Answer: A

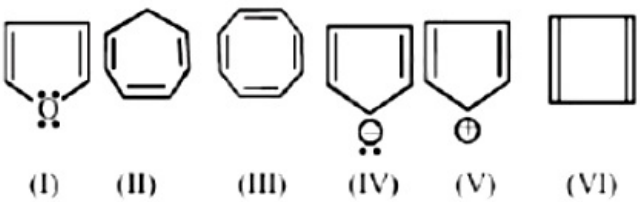
Solution:

Solution:



Question146

Which of the following compounds are antiaromatic



[Online May 26, 2012]

Options:

A. (I) and (V)

B. (II) and (V)

C. (I) and (IV)

D. (III) and (VI)

Answer: D

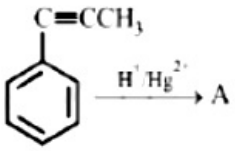
Solution:

Solution:
For a compound to be aromatic it must have $(4n + 2)\pi e^-$ where n is an integer. (III) have 8 and (VI) have $4e^-$. Hence are antiaromatic

---

Question147

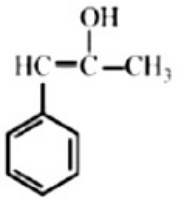
In the given reaction,



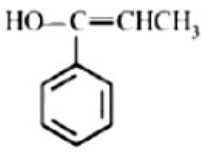
the product ' A ' is
[Online May 12, 2012]

Options:

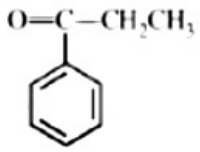
A.



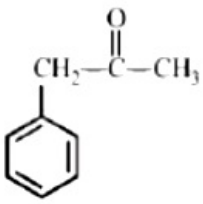
B.



C.



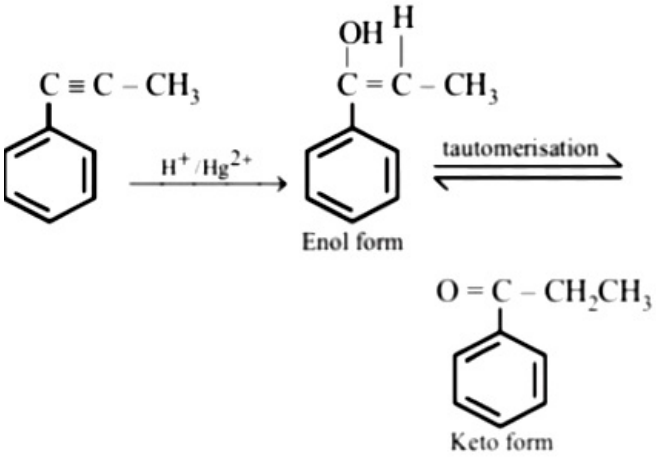
D.



Answer: C

Solution:

Solution:

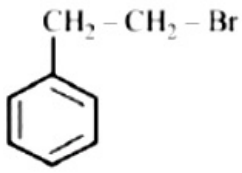


Question148

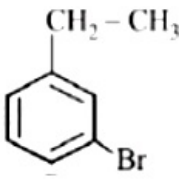
The product of the reaction between ethyl benzene and N-bromosuccinamide is
[Online May 19, 2012]

Options:

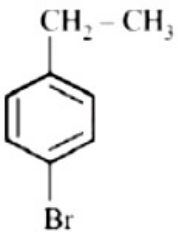
A.



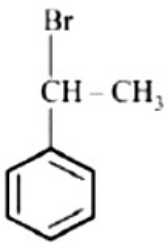
B.



C.



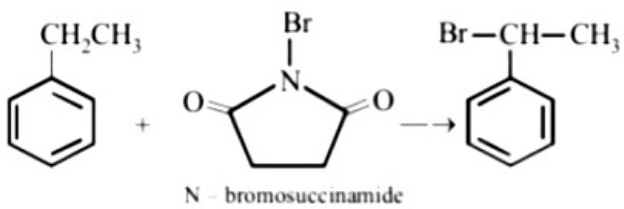
D.



Answer: D

Solution:

Solution:



Question149

Ozonolysis of an organic compound 'A' produces acetone and propionaldehyde in equimolar mixture. Identify'A' from the following compounds:
[2011RS]

Options:

A. 1− Pentene

B. 2 - Pentene

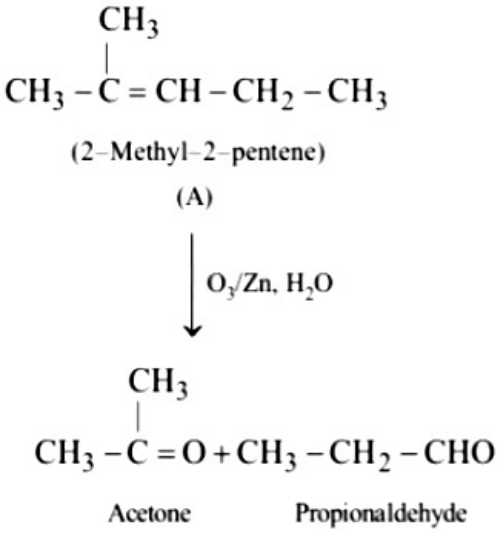
C. 2− Methyl −2− pentene

D. 2− Methyl −1 - pentene

Answer: C

Solution:

Solution:
From the products formed it is clear that the compound has 5 carbon atoms with a double bond and methyl group on 2^{nd} carbon atom.



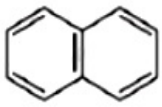
Question150

The non aromatic compound among the following is:
[2011RS]

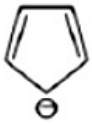
Options:

A.

B.



C.

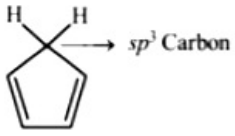


D.

Answer: D

Solution:

Solution:



Cyclopentadiene does not obey Huckel's Rule, as it has sp^3 carbon in the ring.

Question151

One mole of a symmetrical alkene on ozonolysis gives two moles of an aldehyde having a molecular mass of 44u. The alkene is [2010]

Options:

A. propene

B. 1-butene

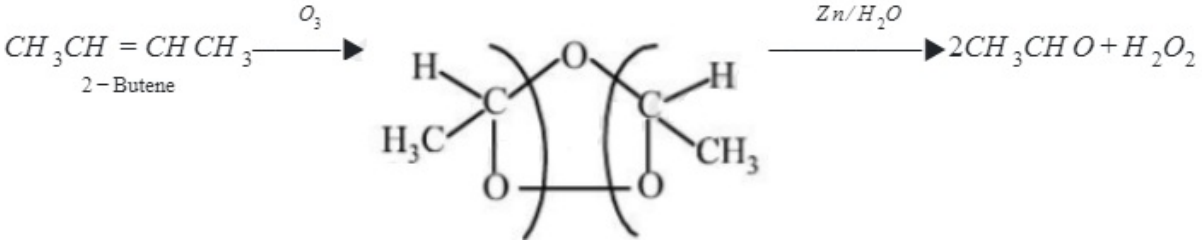
C. 2 -butene

D. ethene

Answer: C

Solution:

Solution:



Question152

In the following sequence of reactions, the alkene affords the compound

' B ' $CH_3 - CH = CH - CH_3 \xrightarrow{O_3} A \xrightarrow[Zn]{H_2O} B$

The compound B is
[2008]

Options:

A. CH_3CH_2CHO

B. CH_3COCH_3

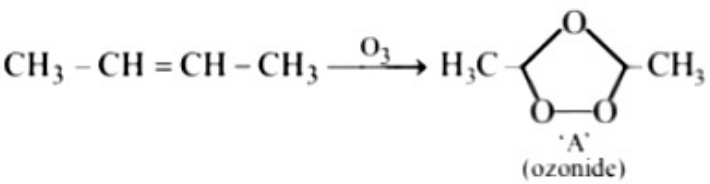
C. $CH_3CH_2COCH_3$

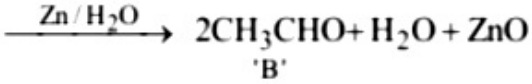
D. CH_3CHO

Answer: D

Solution:

Completing the sequence of given reactions.





Question153

The hydrocarbon which can react with sodium in liquid ammonia is
[2008]

Options:

A. $CH_3CH_2CH_2C \equiv CCH_2CH_2CH_3$

B. $CH_3CH_2C \equiv CH$

C. $CH_3CH = CHCH_3$

D. $CH_3CH_2C \equiv CCH_2CH_3$

Answer: B

Solution:

Solution:
Alkynes having terminal $-C \equiv H$ react with N a in liquid ammonia to yield H_2 gas

$$CH_3CH_2C \equiv CH \xrightarrow[\text{liquid } NH_3]{\text{Na in}} CH_3CH_2C \equiv C^-Na^+ + \frac{1}{2}H_2(g)$$

Question154

The treatment of CH_3MgX with $CH_3C \equiv C - H$ produces [2008]

Options:

A. $CH_3 - CH = CH_2$

B. $CH_3C \equiv C - CH_3$

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

D. CH_4

Answer: D

Solution:

Solution:
$CH_3MgX + CH_3 - C \equiv C - H \longrightarrow CH_3 - C \equiv CMgX + CH_4(g)$

Question155

Toluene is nitrated and the resulting product is reduced with tin and hydrochloric acid. The product so obtained is diazotised and then heated wth cuprous bromide. The reaction mixture so formed contains [2008]

Options:

A. mixture of o -and p -bromotoluenes

B. mixture of o - and p -dibromobenzenes

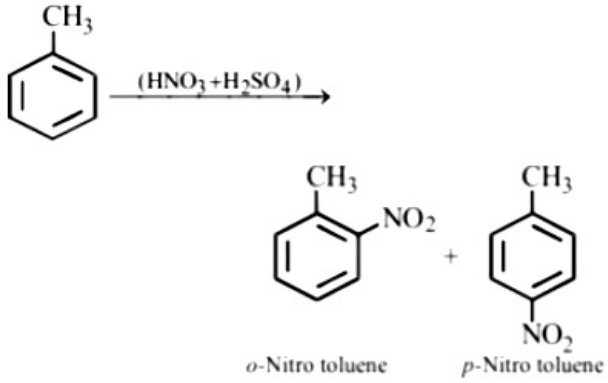
C. mixture of o - and p -bromoanilines

D. mixture of o - and m -bromotoluenes

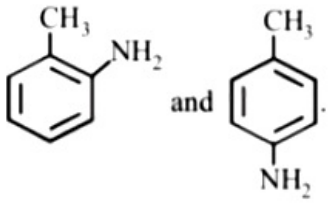
Answer: A

Solution:

Solution:
Note: Toluene ($C_6H_5CH_3$) contains $-CH_3$ group which is o−, p - directing group so on nitration of toluene the $=NO_2$ group will occupy o−, p - positions.



On reduction with Sn / HCl they will form corresponding anilines in which $-NO_2$ group changes to $-NH_2$. The mixture now contains



These anilines when diazotized and then treated with $CuBr$ form o−, p - bromotoluenes (Sandmeyer reductions).

Question156

Which of the following reactions will yield 2, 2-dibromopropane? [2007]

Options:

A. $CH_3 - CH = CH_2 + HBr \rightarrow$

B. $CH_3 - C \equiv CH + 2HBr \rightarrow$

C. $CH_3CH = CHBr + HBr \rightarrow$

D. $CH = CH + 2HBr \rightarrow$

Answer: B

Solution:

Solution:
The reaction follows Markownikoff rule which states that when unsymmetrical reagent adds across unsymmetrical double or triple bond, the negative part adds to carbon atom having lesser number of hydrogen atoms.

$$CH_3 - C \equiv CH + HBr \longrightarrow CH_3 - \underset{\underset{Br}{|}}{C} = CH_2 \xrightarrow{HBr} CH_3 - \underset{\underset{Br}{|}}{\overset{\overset{Br}{|}}{C}} - CH_3$$

2, 2 − Dibromopropane

Question157

The compound formed as a result of oxidation of ethyl benzene by $KMnO_4$ is
[2007]

Options:

A. benzyl alcohol

B. benzophenone

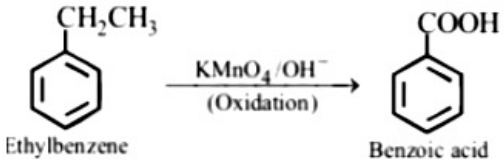
C. acetophenone

D. benzoic acid.

Answer: D

Solution:

Solution:
When alkyl benzenes are oxidised with alkaline $KMnO_4$ (strong oxidising agent), the entire alkyl group is oxidised to -COOH group regardless of length of side chain.



Question158

The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives predominantly
[2007]

Options:

A. m -chlorobenzene

B. benzoyl chloride

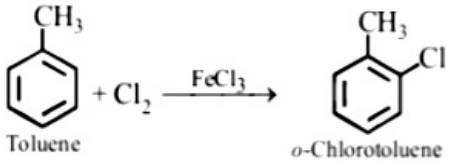
C. benzyl chloride

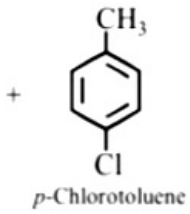
D. o - and p -chlorotoluenes.

Answer: D

Solution:

Solution:
$FeCl_3$ is Lewis acid. In presence of $FeCl_3$ and Cl_2 toluene undergoes electrophilic substitution in o - and p positions.





Question159

The major product obtained in the photo catalysed bromination of 2 -methylbutane is:
[2005, Online May 19, 2012; Online April 12,2014]

Options:

A. 1 -bromo-2-methylbutane

B. 1 -bromo- 3 -methylbutane

C. 2 -bromo- 3 -methylbutane

D. 2-bromo-2-methylbutane

Answer: D

Solution:

The order of substitution in different alkanes is
$3^{\circ} > 2^{\circ} > 1^{\circ}$
Thus the bromination of 2 -methyl butane mainly gives 2 Bromo- 2 - methyl butane

$$\underset{2-\text{Methyl butane}}{CH_3-CH_2-\overset{\overset{CH_3}{|}}{C}H-CH_3} \xrightarrow{Br_2} \underset{1-\text{Bromo}-2\text{ methyl butane(minor)}}{CH_3-CH_2-\overset{\overset{CH_3}{|}}{C}H-CH_2Br} + \underset{2-\text{Bromo}-2-\text{methyl butane(major)}}{CH_3-CH_2-\overset{\overset{CH_3}{|}}{C}-CH_3}$$

Question160

Of the five isomeric hexanes, the isomer which can give two monochlorinated compounds is
[2005]

Options:

A. 2 -methylpentane

B. 2,2 -dimethylbutane

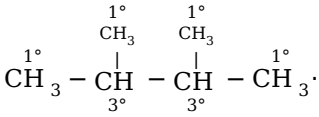
C. 2,3 -dimethylbutane

D. n -hexane

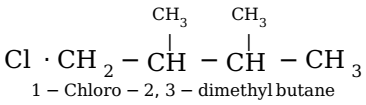
Answer: C

Solution:

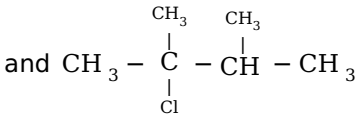
Solution:



Since it contains only two types of H -atoms hence it will give only two monochlorinated compounds viz.



1 − Chloro − 2, 3 − dimethyl butane

and 

2 − Chloro − 2, 3 − dimethylbutane

Question161

Which one of the following has minimum boiling point? [2004]

Options:

A. 1 - Butene

B. 1 - Butyne

C. n - Butane

D. Isobutane

Answer: D

Solution:

Solution:
Note: Among isomeric alkanes, the straight chain isomer has higher boiling point than the branched chain isomer. The greater the branching of the chain, the lower is the boiling point. Further due to the presence of π electrons, these molecular slightly polar and hence have higher boiling points than the corresponding alkanes.
Thus B.pt. follows the order
alkynes > alkenes > alkanes (straight chain) > branched chain alkanes.

Question162

On mixing a certain alkane with chlorine and irradiating it with ultraviolet light, it forms only one monochloroalkane. This alkane could be [2003]

Options:

A. pentane

B. isopentane

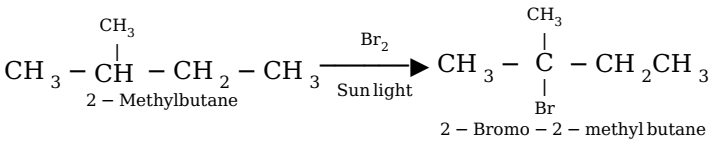
C. neopentane

D. propane

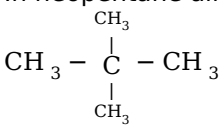
Answer: C

Solution:

Solution:



Ease of replacement of H-atoms $3^{\circ} > 2^{\circ} > 1^{\circ}$.
In neopentane all H atoms are equivalent (1°) .



Question163

Reaction of one molecule of H Br with one molecule of 1 . 3-butadiene at 40˚C gives predominantly [2003]

Options:

A. 1 -bromo-2-butene under kinetically controlled conditions

B. 3-bromobutene under thermodynamically controlled conditions

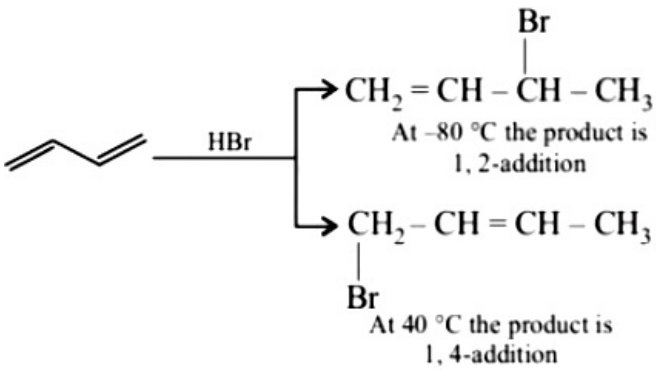
C. 1-bromo-2-butene under thermodynamically controlled conditions

D. 3-bromobutene under kinetically controlled conditions

Answer: C

Solution:

Solution:



Question164

Butene- 1 may be converted to butane by reaction with [2003]

Options:

A. $Sn - HCl$

B. $Zn - Hg$

C. Pd / H_2

D. $Zn - HCl$

Answer: C

Solution:

Solution:
Alkenes combine with hydrogen under pressure and in presence of a catalyst (Ni, Pt or Pd) and form alkanes.

$$\text{Butene} - 1 \xrightarrow{H_2 / Pd} \text{Butane}$$

Question165

Which of these will not react with acetylene? [2002]

Options:

A. dil. NaOH

B. ammonical $AgNO_3$

C. Na in lig. NH_3

D. HCl .

Answer: A

Solution:

Solution:
Acetylene reacts with the other three reagents as:

$$CH \equiv CNa \xleftarrow[\text{liq . } NH_3]{Na} CH \equiv CH \xrightarrow{+HCl} \underset{CHCl}{CH_2 =} \xrightarrow{+HCl} \underset{CHCl_2}{CH_3 -}$$

$$CH \equiv CH \xrightarrow{[AgNO_3 + NH_4OH]} \underset{\text{White ppt.}}{AgC \equiv CAg} + NH_4NO_3$$

Question166

What is the product when acetylene reacts with hypochlorous acid? [2002]

Options:

A. CH_3COCl

B. $ClCH_2CHO$

C. Cl_2CHCHO

D. $ClCH_2COOH$

Answer: C

Solution: