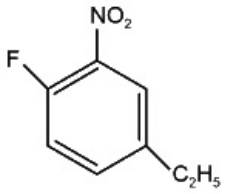
Organic Chemistry Some Basic Principles & Techniques

Question1

The correct IUPAC name of the compound



[NEET 2024 Re]

Options:

A.

4-ethyl-1-fluoro-2-nitrobenzene

B.

4-ethyl-1-fluoro-6-nitrobenzene

C.

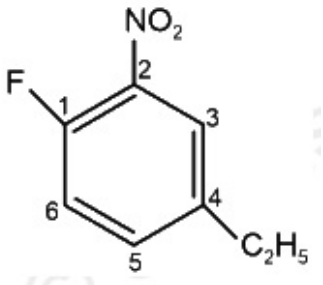
3-ethyl-6-fluoro-1-nitrobenzene

D.

1-ethyl-4-fluoro-3-nitrobenzene

Answer: A

Solution:



4-ethyl-1-fluoro-2-nitrobenzene

Question2

A steam volatile organic compound which is immiscible with water has a boiling point of 250◦C. During steam distillation, a mixture of this

organic compound and water will boil :

[NEET 2024 Re]

Options:

A.

above 100°C but below 250°C

B.

above 250°C

C.

at 250°C

D.

close to but below 100°C

Answer: D

Solution:

If one of the substances in the mixture is water and the other, a water insoluble substance, then the mixture will boil close to but below, 373K(100°C) .

Question3

Match List-I with List-II :

	List-I (Test/reagent)		List-II (Radical identified)
A.	Lake Test	I.	NO_3^-
B.	Nessler's Reagent	II.	Fe^{3+}
C.	Potassium sulphocyanide	III.	Al^{3+}
D.	Brown Ring Test	IV.	NH_4^+

Choose the correct answer from the options given below

[NEET 2024 Re]

Options:

A.

A-IV, B-II, C-III, D-I

B.

A-II, B-IV, C-III, D-I

C.

A-II, B-III, C-IV, D-I

D.

A-III, B-IV, C-II, D-I

Answer: D

Solution:

Lake test – Al^{3+}

Nessler's reagent – NH_4^+

Potassium sulphocyanide – Fe^{3+}

Brown ring test – NO_3^-

Question4

Methyl group attached to a positively charged carbon atom stabilizes the carbocation due to

[NEET 2024 Re]

Options:

A.

-I inductive effect

B.

electromeric effect

C.

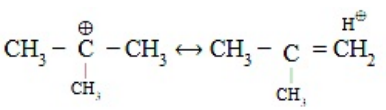
hyperconjugation

D.

mesomeric effect

Answer: C

Solution:



Methyl group attached to a positively charged carbon atom stabilizes the carbocation due to hyperconjugation and +1 effect.

Question5

Given below are two statements:

Statement I : The boiling point of three isomeric pentanes follows the order
n-pentane > isopentane > neopentane

Statement II : When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak, thereby lowering the boiling point.

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

[NEET 2024]

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:

Both statement I and statement II are correct.

Boiling point of n -pentane $= 309K$

isopentane $= 301K$

neopentane $= 282.5$

As branching increases molecules attain the shape of a sphere results in smaller area of contact thus weak intermolecular forces between spherical molecules, which are overcome at relatively lower temperature. Leading to decrease in boiling point.

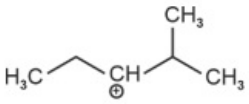
Question6

The most stable carbocation among the following is :

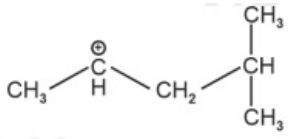
[NEET 2024]

Options:

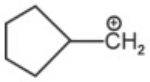
A.



B.



C.

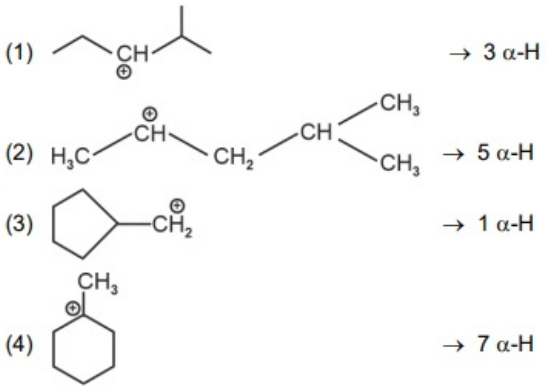


D.

Answer: D

Solution:

The stability of carbocation can be described by the hyperconjugation. Greater the extent of hyperconjugation, more is the stability of carbocation.



Stability order of carbocations = (4) > (2) > (1) > (3)

Question7

A compound with a molecular formula of C_6H_{14} has two tertiary carbons. Its IUPAC name is :

[NEET 2024]

Options:

A.

n-hexane

B.

2-methylpentane

C.

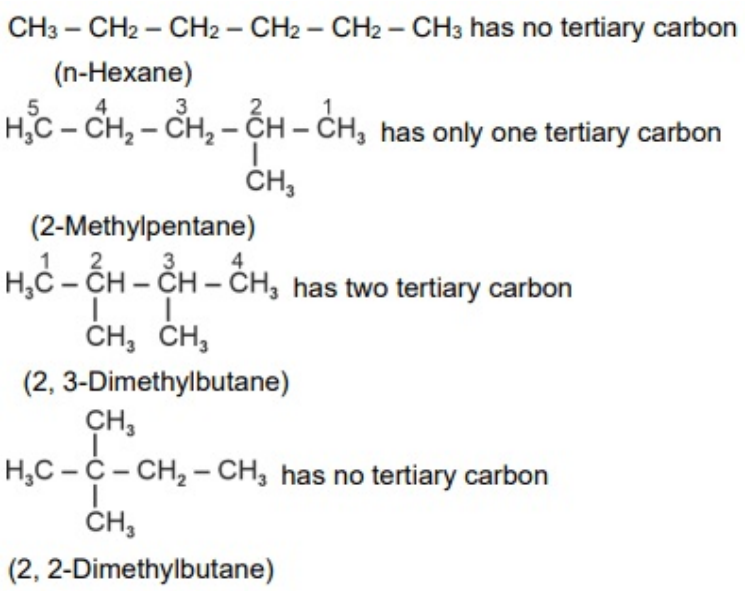
2,3-dimethylbutane

D.

2,2-dimethylbutane

Answer: C

Solution:



Question8

On heating, some solid substances change from solid to vapour state without passing through liquid state. The technique used for the purification of such solid substances based on the above principle is known as

[NEET 2024]

Options:

A.

Crystallization

B.

Sublimation

C.

Distillation

D.

Chromatography

Answer: B

Solution:

(1) Crystallization : It is based on difference in the solubilities of the compound and impurities in a suitable solvent.

(2) Sublimation : It is the purification technique based on principle that on heating, some solid substances change from solid to vapour state without passing through liquid state.

(3) Distillation : It is used to separate volatile liquids from non-volatile impurities and the liquids having sufficient difference in their boiling point.

(4) Chromatography : It is based on separation by using stationary and mobile phase.

Question9

In Lassaigne's extract of an organic compound, both nitrogen and sulphur are present, which gives blood red colour with Fe^{3+} due to the formation of

[NEET 2023]

Options:

A.

NaSCN

B.

$[Fe(CN)_5NOS^{4-}$.

C.

$[Fe(SCN)]^{2+}$

D.

$Fe_4[Fe(CN)_6]\cdot\times xH_2O$

Answer: C

Solution:

Solution

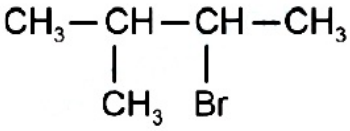
In case, nitrogen and sulphur both are present in organic compound, sodium thiocyanate is formed. It gives blood red colour and no Prussian blue since there are no free cyanide ions.

$$Na + C + N + S \rightarrow NaSCN$$

$$Fe^{3-} + SCN^{-} \rightarrow \left[Fe\left(\underset{\text{Blood red}}{SCN}\right)\right]^{2+}$$

Question10

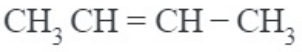
Consider the following reaction and identify the product (P).



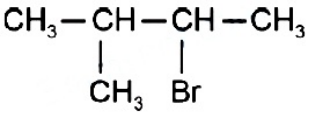
[NEET 2023]

Options:

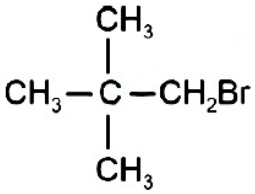
A.



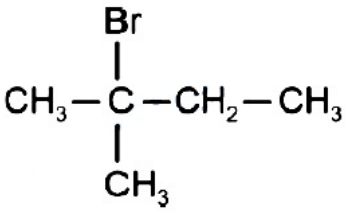
B.



C.



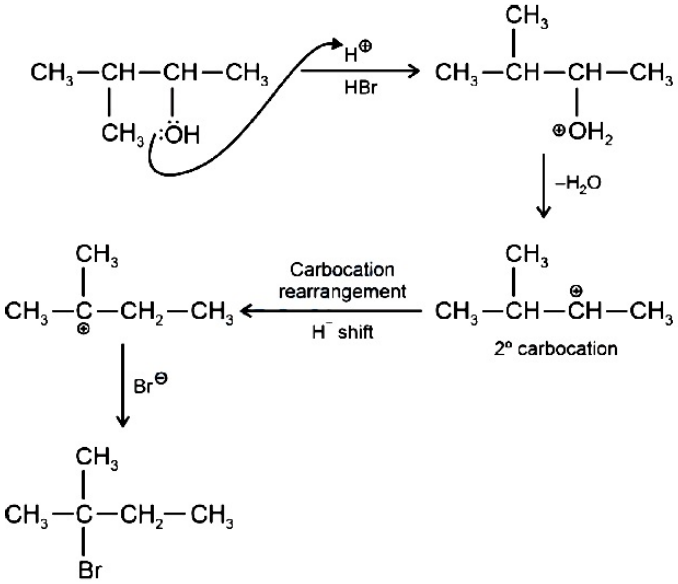
D.



Answer: D

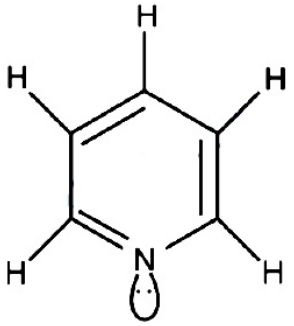
Solution:

Solution



Question11

The number of σ bonds, π bonds and lone pair of electrons in pyridine, respectively are:



[NEET 2023]

Options:

A.

12, 3, 0

B.

11, 3, 1

C.

12, 2, 1

D.

11, 2, 0

Answer: B

Solution:

No. of σ bonds $= 11$

No. of π bonds $= 3$

No. of lone pair of $e^- = 1$

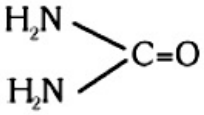
Question12

Which amongst the following compounds/species is least basic?

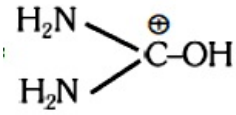
[NEET 2023 mpr]

Options:

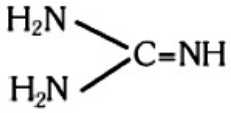
A.



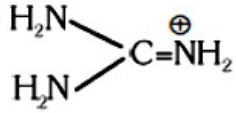
B.



C.



D.



Answer: B

Question13

Which amongst the following compounds will show geometrical isomerism?

[NEET 2023 mpr]

Options:

A.

Pent-1-ene

B.

2, 3-Dimethylbut-2-ene

C.

2-Methylprop-1-ene

D.

3, 4-Dimethylhex-3-ene

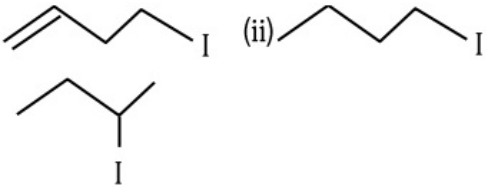
Answer: D

Solution:

$CH_3 - H_2C - C = C - CH_2 - CH_3$

Question14

The correct order for the rate of α, β-dehydrohalogenation for the following compounds is



[NEET 2023 mpr]

Options:

A.

(i) < (ii) < (iii)

B.

(ii) < (i) < (iii)

C.

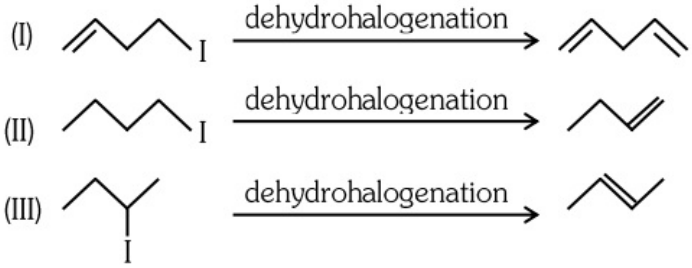
(iii) < (ii) < (i)

D.

(ii) < (iii) < (i)

Answer: D

Solution:



Question15

Given below are two statements:

Statement I :
In an organic compound, when inductive and electromeric effects operate in opposite directions, the inductive effect predominates.

Statement II :
Hyperconjugation is observed in o-xylene.

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

[NEET 2023 mpr]

Options:

A.

Statement-I is true but Statement-II is false.

B.

Statement-I is false but Statement-II is true.

C.

Both Statement-I and Statement-II are true.

D.

Both Statement-I and Statement-II are false.

Answer: B

Question16

The IUPAC name of an element with atomic number 119 is [NEET-2022]

Options:

A. ununennium

B. unnilennium

C. unununnium

D. ununoctium

Answer: A

Solution:

Solution

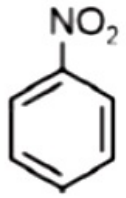
IUPAC name of element : 119 : ununennium

Question17

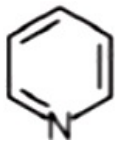
The Kjeldahl's method for the estimation of nitrogen can be used to estimate the amount of nitrogen in which one of the following compounds?
[NEET-2022]

Options:

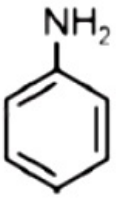
A.



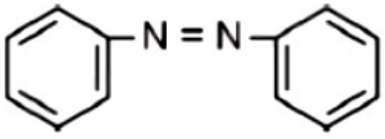
B.



C.



D.



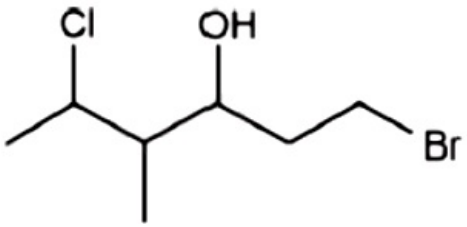
Answer: C

Solution:

Kjeldahl method is not applicable to compounds containing nitrogen in nitro group, azo groups and nitrogen present in the ring (e.g., pyridine) as nitrogen of these compounds does not change to ammonium sulphate under these conditions.

Question18

The correct IUPAC name of the following compound is



[NEET-2022]

Options:

A. 1-bromo-5-chloro-4-methylhexan-3-ol

B. 6-bromo-2-chloro-4-methythexan-4-ol

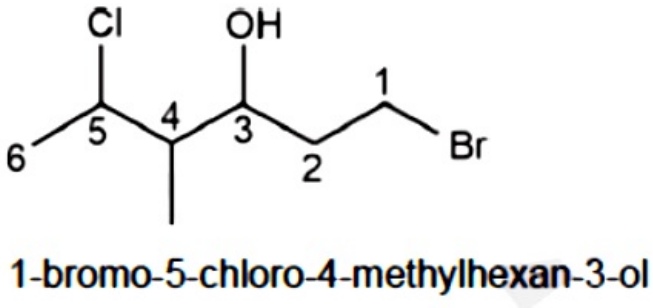
C. 1-bromo-4-methyl-5-chlorohexan-3-ol

D. 6-bromo-4-methyl-2-chlorohexan-4-ol

Answer: A

Solution:

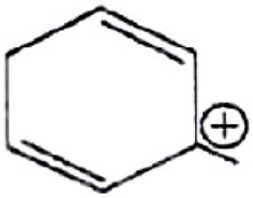
Solution

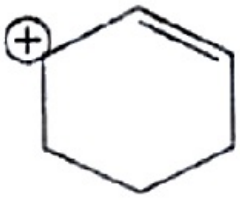


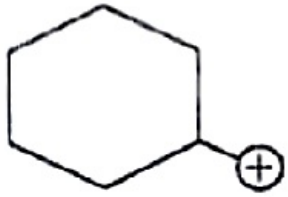
1-bromo-5-chloro-4-methylhexan-3-ol

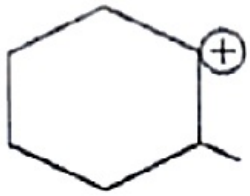
Question19

Which of the following is the most stable carbocation?

(1) 

(2) 

(3) 

(4) 

[NEET Re-2022]

Options:

A. (1)

B. (2)

C. (3)

D. (4)

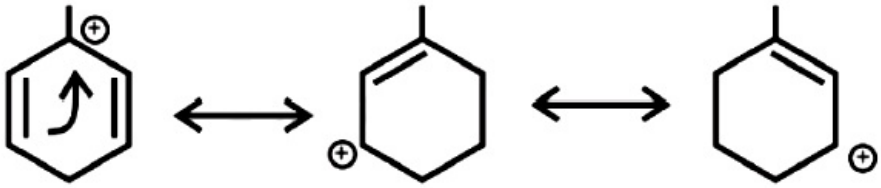
Answer: A

Solution:

Solution

Stability of carbocation $\propto$No of $\alpha-\mathrm{H}$

$\propto$ No of resonating structures



Question20

Dihedral angle of least stable conformer of ethane is : [NEET 2021]

Options:

A. 120°

B. 180°

C. 60°

D. 0°

Answer: D

Solution:

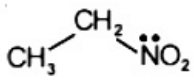
Ethane has two conformers (i) Eclipsed
(ii) Staggered
Eclipsed conformer is least stable while staggered conformer is most stable. In eclipsed conformer the dihedral angle is 0°

Question21

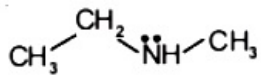
Identify the compound that will react with Hinsberg's reagent to give a solid which dissolves in alkali.
[NEET 2021]

Options:

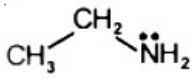
A.



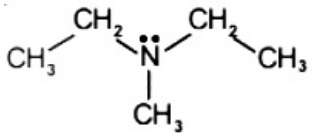
B.



C.



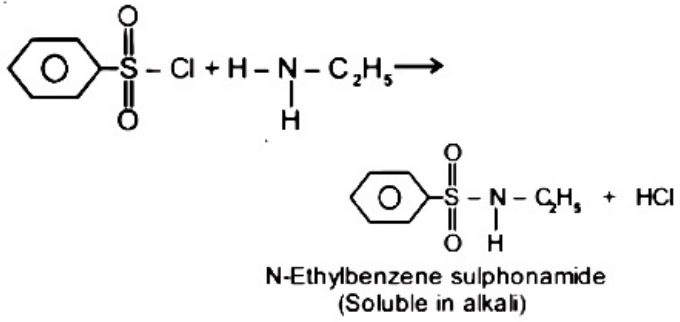
D.



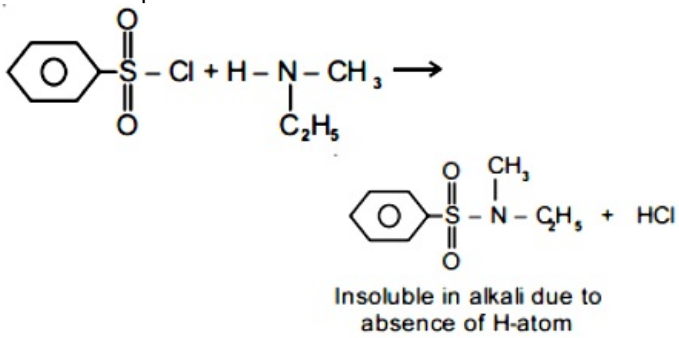
Answer: C

Solution:

Solution:
● Benzenesulphonyl chloride ($C_6H_5SO_2Cl$) is also known as Hinsberg's reagent.
● The reaction of Hinsberg's reagent ($C_6H_5SO_2Cl$) with primary amine ($CH_3CH_2NH_2$) yields N-ethylbenzene sulphonamide.



● The reaction of Hinsberg's reagent ($C_6H_5SO_2Cl$) with secondary amine ($C_2H_5NHCH_3$) gives, N-Ethyl-N-Methyl benzene sulphonamide



Insoluble in alkali due to absence of H-atom

● 3° amine do not react with Hinsberg reagent

Question22

A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following ? [2020]

Options:

A. + R effect of – CH_3 groups

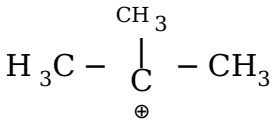
B. – R effect of – CH_3 groups

C. Hyperconjugation

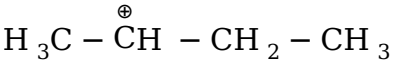
D. – I effect of – CH_3 groups

Answer: C

Solution:



Tertiary butyl carbocation (9α − H atoms)



Secondary butyl carbocation (5 α-H atom)

t-Butyl carbocation is more stable due to hyperconjugation.

Question23

Paper chromatography is an example of [2020]

Options:

A. Partition chromatography

B. Thin layer chromatography

C. Column chromatography

D. Adsorption chromatography

Answer: A

Solution:

Solution:
(a) Paper chromatography is a type of partition chromatography.

Question24

The number of sigma (σ) and pi (π) bonds in pent- 2 -en-4-yne is (NEET 2019)

Options:

A. 13σ bonds and no π bond

B. 10σ bonds and 3π bonds

C. 8σ bonds and 5π bonds

D. 11σ bonds and 2π bonds.

Answer: B

Question25

The most stable carbocation, among the following is (Odisha NEET 2019)

Options:

A.

$(CH_3)_3C-\overset{\oplus}{C}H-CH_3$

B.

$(CH_3)CH_2 - \overset{\oplus}{C}H - CH_2 - CH_3$

C.

$CH_3 - \overset{\oplus}{C}H - CH_2 - CH_2 - CH_3$

D.

$CH_3 - CH_2 - \overset{\oplus}{C}H_2$

Answer: C

Solution:

Solution:
Among the given carbocations,
$CH_3 - \overset{\oplus}{C}H - CH_2 - CH_2 - CH_3$
is most stable carbocation. Being a secondary carbocation they consist of maximum number of α -hydrogen and stablise by hyper conjugation.

Question26

Which of the following is correct with respect to $-I$ effect of the substituents? (R = alkyl)
(NEET 2018)

Options:

A. $-NH_2 < -OR < -F$

B. $-NR_2 < -OR < -F$

C. $-NH_2 > -OR > -F$

D. $-NR_2 > -OR > -F$

Answer: A

Solution:

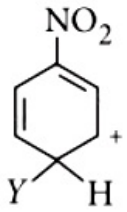
Solution:
$-NH_2 < -OR < -F$ is correct order with respect to $-I$ effect of the substituents.
F is most electronegative element. It very strongly attracts bond pair of electrons.
O is second most electronegative element. It strongly attracts bond pair of electrons.
The electronegativity of N is least. It attracts bond pair of electrons.
Thus, the electronegativity order is $N

Question27

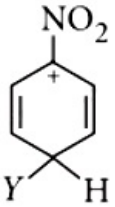
Which of the following carbocations is expected to be most stable? (NEET 2018)

Options:

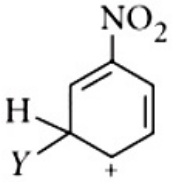
A.



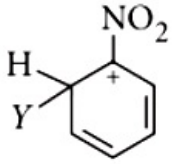
B.



C.



D.



Answer: C

Solution:

Solution:
$-\mathrm{N\,O_2}$ group shows electron-withdrawing $(-\mathrm{I})$ effect. The carbocations directly attached to the nitro group are highly unstable. As we can see in option (B) and (D) are highly unstable. In option A also after resonance the carbocation formed is directly attached to the nitro so, it is also unstable. Option A the carbocation is at para position w.r.t nitro group and even after resonance the carbocation forms at ortho position only. Thus the most stable carbocations is shown in option AC

Question28

Which of the following molecules represents the order of hybridisation sp^2, sp^2, sp, sp from left to right atoms?

(NEET 2018)

Options:

A. $H C \equiv C - C \equiv CH$

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

C. $CH_2 = CH - CH = CH_2$

D. $CH_3 - CH = CH - CH_3$

Answer: B

Solution:

Solution:

$\overset{sp^2}{CH_2} = \overset{sp^2}{CH} - \overset{sp}{C} \equiv \overset{sp}{CH}$

Question29

The most suitable method of separation of 1: 1 mixture of ortho and para-nitrophenols is
(NEET 2017,1999,1993)

Options:

A. chromatography

B. crystallisation

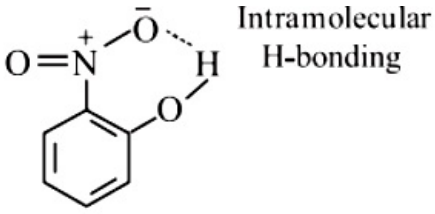
C. steam distillation

D. sublimation.

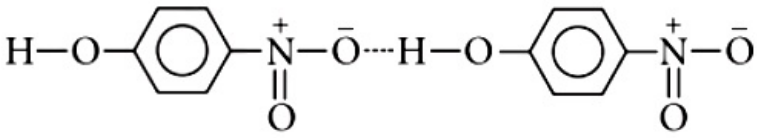
Answer: C

Solution:

Solution:
The o - and p -nitrophenols are separated by steam distillation since o -isomer is steam volatile due to intramolecular H-bonding while p -isomer is not steam volatile due to association of molecules by intermolecular H-bonding.



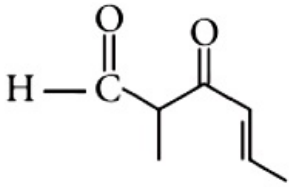
(*o*-Nitrophenol)



Intermolecular
H-bonding
(*p*-Nitrophenol)

Question30

The IUPAC name of the compound



is _____
(NEET 2017)

Options:

A. 5 -formylhex- 2 -en- 3 -one

B. 5 -methyl- 4 -oxohex-2-en-5-al

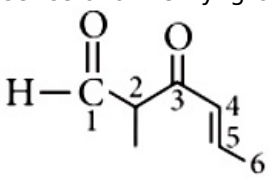
C. 3 -keto- 2 -methylhex-5-enal

D. 3 -keto- 2 -methylhex-4-enal

Answer: D

Solution:

Solution:
The longest carbon chain is of 6 carbon containing aldehyde, alkene and ketone groups. The priority order of aldehyde is greater than ketone. Hence the parent chain will start from aldehyde. Suffix used will be ‘al’ , ’ene’ and ‘one’. There is a presence of a methyl group we will take it as a prefix. Now apply the lowest number rule



3-Keto-2-methylhex-4-enal

Question31

The correct statement regarding electrophile is

(NEET 2017)

Options:

A. electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from another electrophile

B. electrophiles are generally neutral species and can form a bond by accepting a pair of electrons from a nucleophile

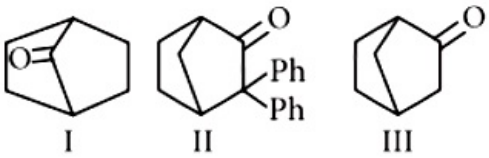
C. electrophile can be either neutral or positively charged species and can form a bond by accepting a pair of electrons from a nucleophile

D. electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from a nucleophile.

Answer: C

Question32

Which among the given molecules can exhibit tautomerism?



(NEET- II 2016)

Options:

A. III only

B. Both I and III

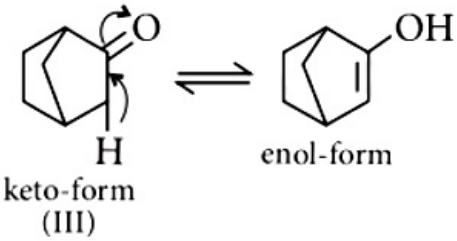
C. Both I and II

D. Both II and III

Answer: A

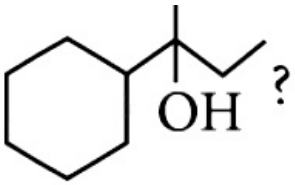
Solution:

Solution:
α - Hydrogen at bridge carbon never participate in tautomerism. Thus, only (III) exhibits tautomerism.



Question33

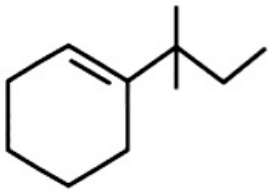
Which of the following is not the product of dehydration of



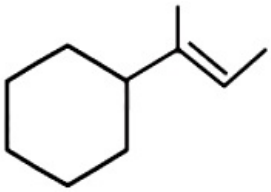
(2015)

Options:

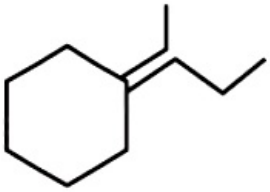
A.



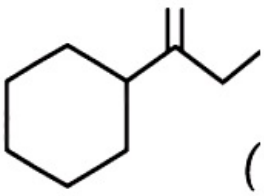
B.



C.

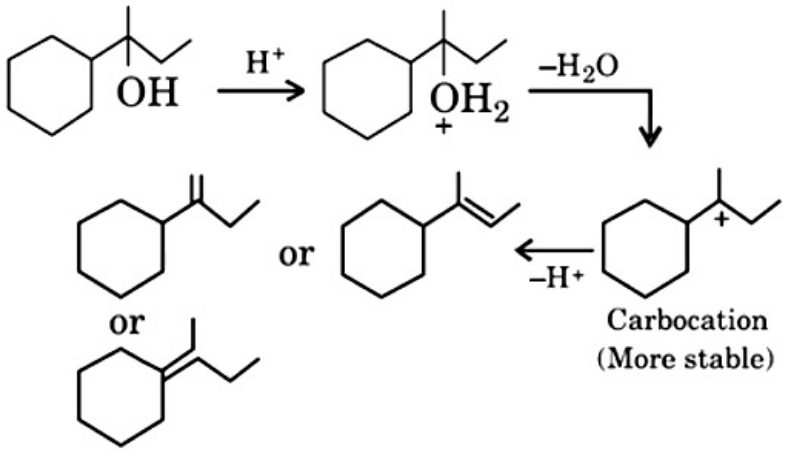


D.



Answer: A

Solution:



Question34

Which of the following statements is not correct for a nucleophile? (2015)

Options:

A. Ammonia is a nucleophile.

B. Nucleophiles attack low e^- density sites.

C. Nucleophiles are not electron seeking.

D. Nucleophile is a Lewis acid.

Answer: D

Solution:

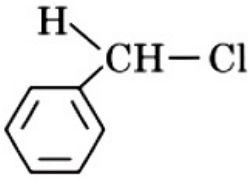
Solution:
Nucleophiles are electron rich species hence, they are Lewis bases.

Question35

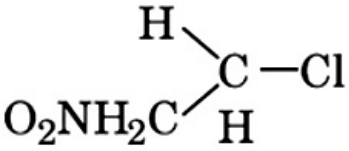
In which of the following compounds, the C—Cl bond ionisation shall give most stable carbonium ion? (2015 Cancel)

Options:

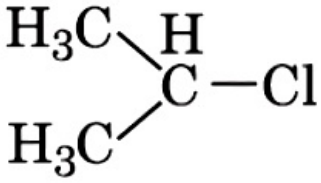
A.



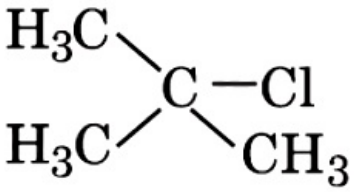
B.



C.



D.



Answer: D

Solution:

$H_3C-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C^+}}$ is most stable due to hyperconjugation.

Question36

The enolic form of ethyl acetoacetate as shown below has (2015 Cancelled)

Options:

A. 9 sigma bonds and 2 pi-bonds

B. 9 sigma bonds and 1 pi-bond

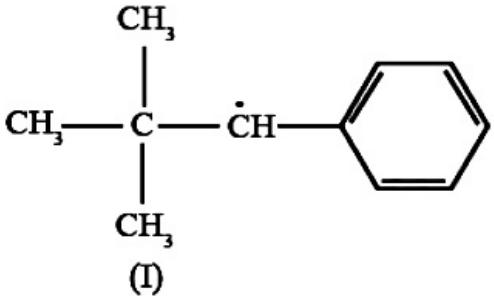
C. 18 sigma bonds and 2 pi-bonds

D. 16 sigma bonds and 1 pi-bond.

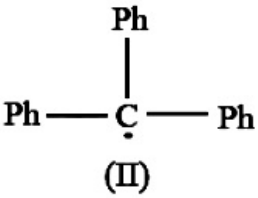
Answer: C

Question37

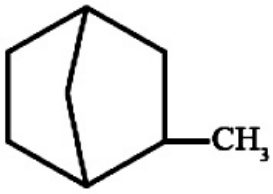
Consider the following compounds :



(I)



(II)



(III)

Hyperconjugation occurs in (2015 Cancelled)

Options:

A. III only

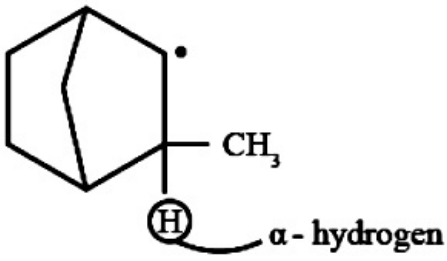
B. I and III

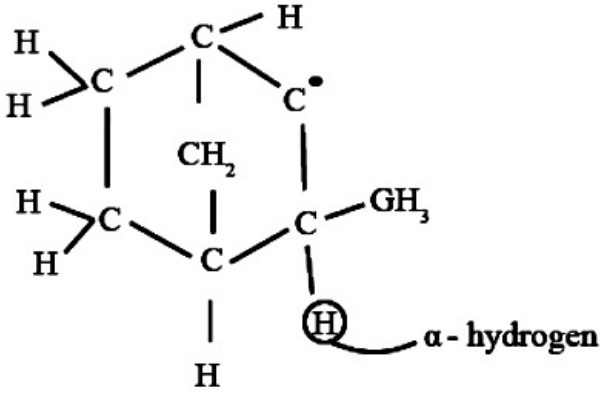
C. I only

D. II only

Answer: A

Solution:





Hyperconjugation requires a presence of H atom on C alpha to double bond or a radical.
Hyperconjugation occurs in compound III (radical derived from 2-methylbicyclo[2.2.1]heptane) only.

Question38

In Duma's method for estimation of nitrogen, 0.25 g of an organic compound gave 40 mL of nitrogen collected at 300 K temperature and 725 mm pressure. If the aqueous tension at 300 K is 25 mm, the percentage of nitrogen in the compound is (2015 Cancelled)

Options:

A. 16.76

B. 15.76

C. 17.36

D. 18.20

Answer: A

Solution:

Mass of organic compound = 0.25g

Experimental values	At STP,
$V_1 = 40\text{mL}$	$V_2 = ?$
$T_1 = 300K$	$T_2 = 273K$
$P_1 = 725 - 25 = 700mm$	$P_2 = 760mm$

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$V_2 = \frac{P_1V_1T_2}{T_1P_2} = \frac{700 \times 40 \times 273}{300 \times 760} = 33.52$ mL

22400 mL of N_2 at STP weighs = 28 g

$\therefore$ 33.52 mL of N_2 at STp weighs $= \frac{28 \times 33.52}{22400}$

$= 0.0419$g

% of N $= \frac{\text{Mass of nitrogen at STP}}{\text{Mass of organic compound taken}} \times 100$

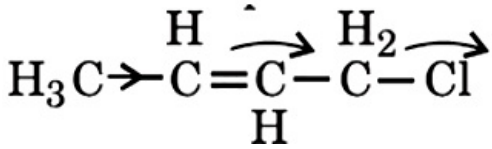
$= \frac{0.0419}{0.25} \times 100 = 16.76\%$

Question39

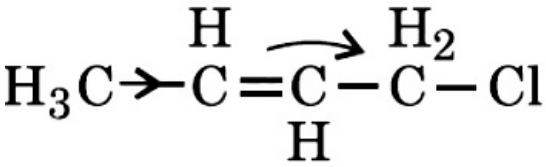
Which of the following is the most correct electron displacement for a nucleophilic reaction to take place? (2015 Cancelled)

Options:

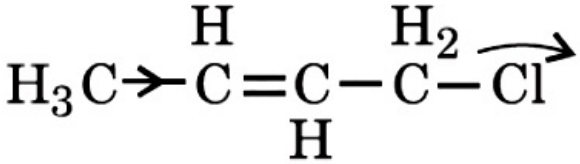
A.



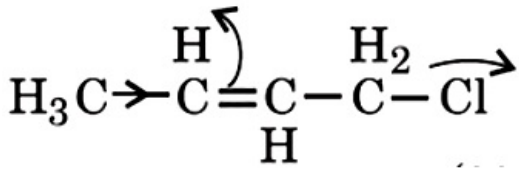
B.



C.



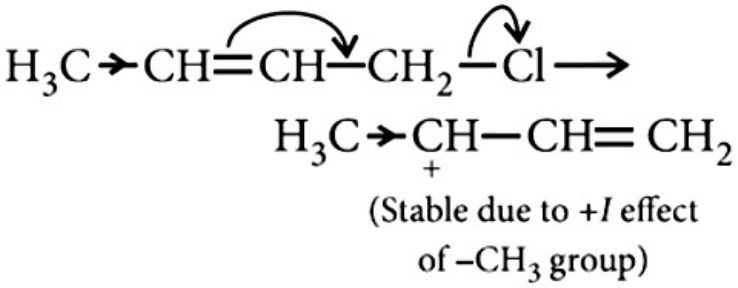
D.



Answer: A

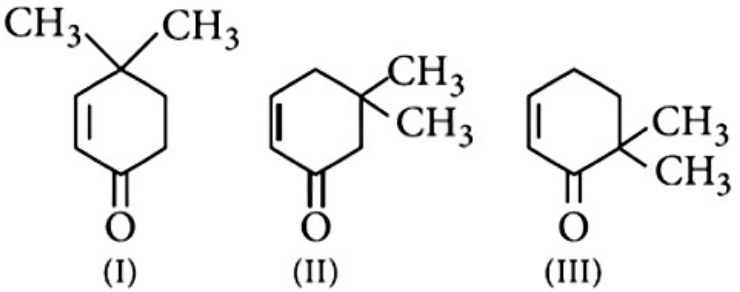
Solution:

Nucleophile will attack a stable carbocation (S_N1 reaction)



Question40

Given Which of the given compounds can exhibit tautomerism?



(2015 Cancelled)

Options:

A. II and III

B. I, II and III

C. I and II

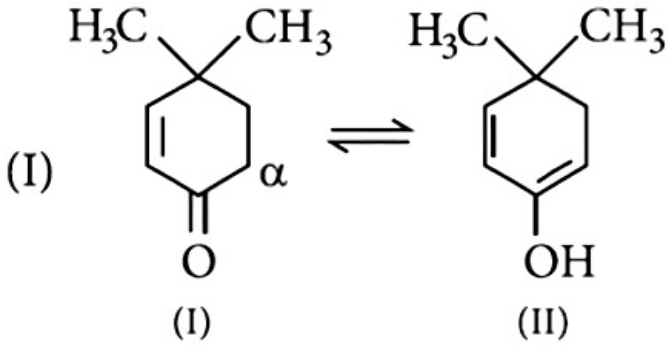
D. I and III

Answer: B

Solution:

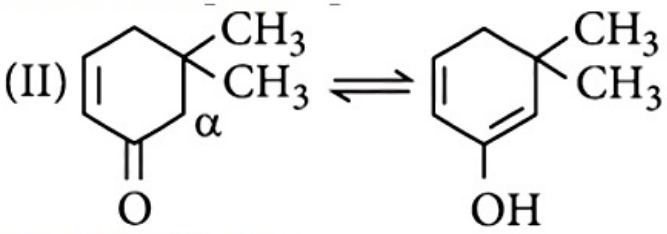
Solution:

In keto-enol tautomerism.

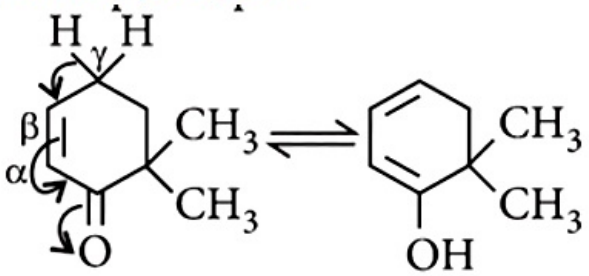


(I) (II)

here, α-H participates.



here, α-H participates.



here, γ-H participates (p-tautomerism)

Question41

Which of the following species contains equal number of σ and π-bonds (2015 Cancelled)

Options:

A. $(CN)_2$

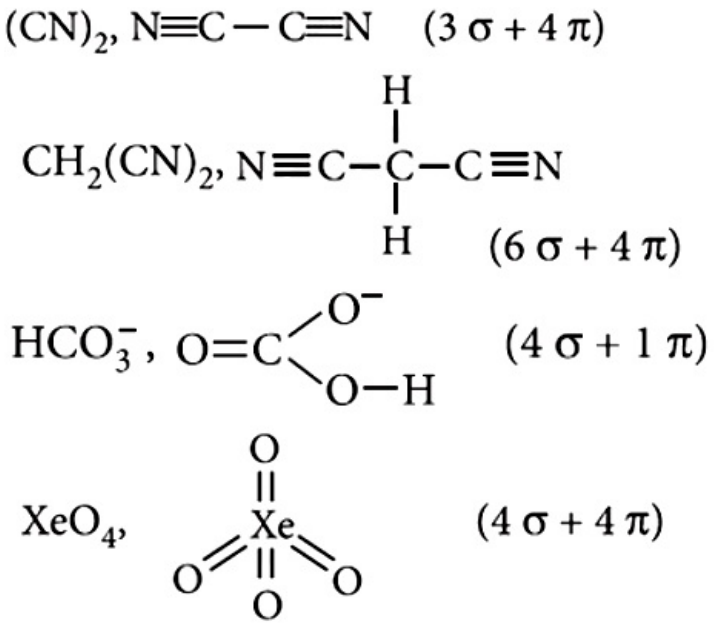
B. $CH_2(CN)_2$

C. HCO_3^-

D. XeO_4

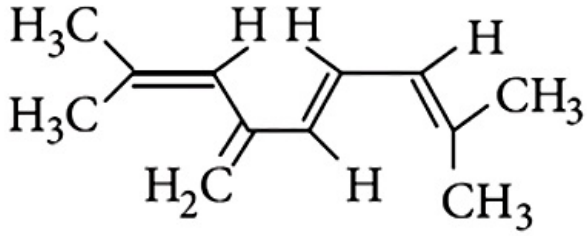
Answer: D

Solution:



Question42

The total number of π-bond electrons in the following structure is



(2015)

Options:

A. 12

B. 16

C. 4

D. 8

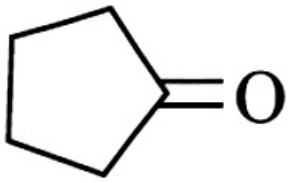
Answer: D

Solution:

Solution:
There are four double bonds. Hence, no. of π-electrons
= 2 × 4 = 8

Question43

Treatment of cyclopentanone



with methyllithium gives which of the following species?
(2015 Cancelled)

Options:

A. Cyclopentanonyl radical

B. Cyclopentanonyl biradical

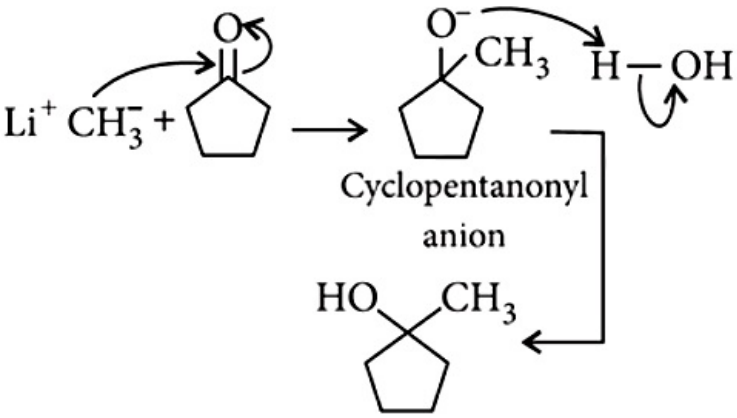
C. Cyclopentanonyl anion

D. Cyclopentanonyl cation

Answer: C

Solution:

Solution:



Question44

In the Kjeldahl's method for estimation of nitrogen present in a soil sample, ammonia evolved from 0.75 g of sample neutralized 10 mL of 1 M H_2SO_4.The percentage of nitrogen in the soil is
(2014)

Options:

A. 37.33

B. 45.33

C. 35.33

D. 43.33

Answer: A

Solution:

$H_2SO_4 + 2NH_3 \rightarrow (NH_4)_2SO_4$
10 mL of 1 M H_2SO_4 = 10m mol [$\because$ M $\times V_{(mL)}$ = m mol]
Acid used for the absorption of ammonia
= 10 mL of 2N (or 1 M) H_2SO_4
% of N $= \frac{1.4 \times N \times V}{W} = \frac{1.4 \times 2 \times 10}{0.75} = 37.33\%$

Question45

Some meta-directing substituents in aromatic substitution are given. Which one is most deactivating?
(2013 NEET)

Options:

A. —COOH

B. $-NO_2$

C. $-C \equiv N$

D. $-SO_3H$

Answer: B

Solution:

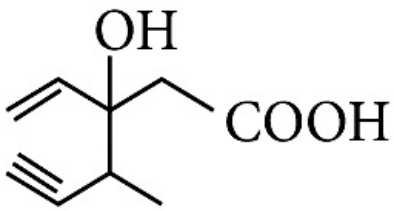
Solution:
$-NO_2$ is most deactivating due to $-I$ and $-M$ effect,

Question46

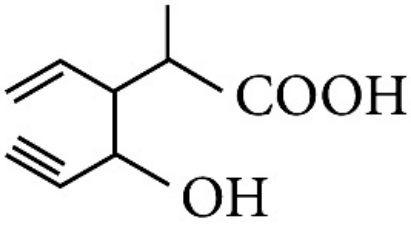
Structure of the compound whose IUPAC name is 3-Ethyl-2-hydroxy-4-methylhex-3-en-5-ynoic acid is
(2013 NEET)

Options:

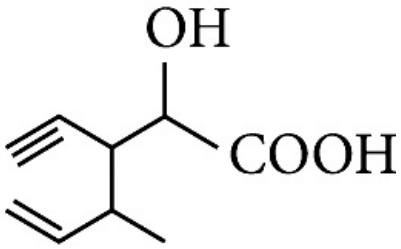
A.



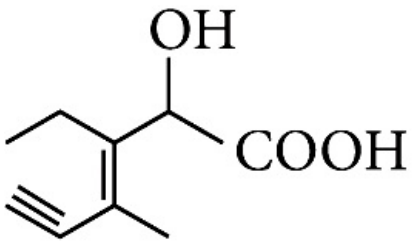
B.



C.

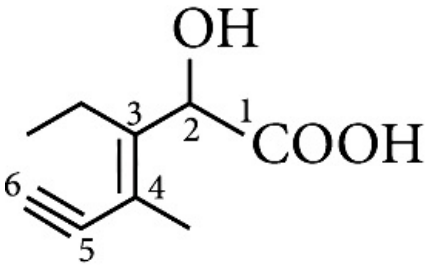


D.



Answer: D

Solution:



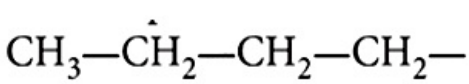
IUPAC name of the structure is 3-Ethyl-2-hydroxy-4-methylhex-3-en-5-ynoic acid.

Question47

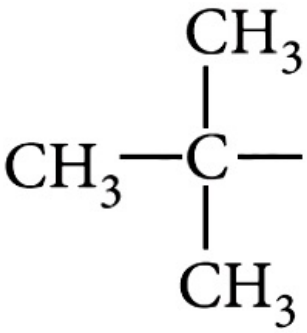
The structure of isobutyl group in an organic compound is (2013 NEET)

Options:

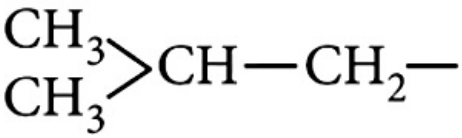
A.



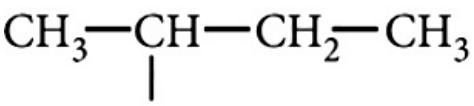
B.



C.



D.



Answer: C

Question48

The radical,
is aromatic because it has
(2013 NEET)

Options:

A. 7 p-orbitals and 7 unpaired electrons

B. 6 p-orbitals and 7 unpaired electrons

C. 6 p-orbitals and 6 unpaired electrons

D. 7 p-orbitals and 6 unpaired electrons

Answer: C

Solution:

Solution:
As per Huckel's rule aromatic radical has $(4n + 2) = 6\pi$
The radical is aromatic because it has 6 p-orbitals and 6 unpaired electrons. 6p orbitals and 6 unpaired electrons contributes to aromaticity.

Question49

Arrange the following in increasing order of stability.

1. $(CH_3)_2 - \overset{+}{C} - CH_2 - CH_3$

2. $(CH_3)_3 - \overset{+}{C}$

3. $(CH_3)_2 - \overset{+}{C}H$

4. $CH_3 - \overset{+}{C}H_2$

5. $\overset{+}{C}H_3$

(Karnataka NEET 2013)

Options:

A. 5 < 4 < 3 < 1 < 2

B. 4 < 5 < 3 < 1 < 2

C. 1 < 5 < 4 < 3 < 2

D. 5 < 4 < 3 < 2 < 1

Answer: A

Solution:

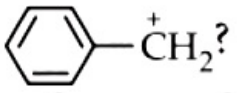
Greater the number of electron donating alkyl groups (+I effect), greater is the stability of carbocations. +I effect is in the order :
+I effect is in the order :

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

Hence, the order of stability of carbocations is 5 < 4 < 3 < 1 < 2

Question50

What is the hybridisation state of benzyl



(Karnataka NEET 2013)

Options:

A. sp^2

B. spd^2

C. sp^2d

D. sp^3

Answer: A

Question51

Nitrogen detection in an organic compound is carried out by Lassaigne's test. The blue colour formed corresponds to which of the following formulae?
(Karnataka NEET 2013)

Options:

A. $Fe_3[Fe(CN)_6]_2$

B. $Fe_4[Fe(CN)_6]_3$

C. $Fe_4[Fe(CN)_6]_2$

D. $Fe_3[Fe(CN)_6]_3$

Answer: B

Solution:

$$3Na_4[Fe(CN)_6] + 2Fe_2(SO_4)_3 \longrightarrow Fe_4[Fe(CN)_6]_3 + 6Na_2SO_4$$

Sodium ferrocyanide — Ferric ferrocyanide (Prussian blue)

Question52

Homolytic fission of the following alkanes forms free radicals CH_3-CH_3, $CH_3-CH_2-CH_3$, $(CH_3)_2CH-CH_3$, $CH_3-CH_2-CH(CH_3)_2$.
Increasing order of stability of the radicals is
(KN NEET 2013)

Options:

A.

$$(CH_3)_2\overset{\bullet}{C}-CH_2-CH_3 < CH_3-\overset{\bullet}{C}H-CH_3 < CH_3-\overset{\bullet}{C}H_2 < (CH_3)_3\overset{\bullet}{C}$$

B.

$CH_3 - \overset{\bullet}{C}H_2 < CH_3 - \overset{\bullet}{C}H - CH_3 < (CH_3)_2\overset{\bullet}{C} - CH_2 - CH_3 < (CH_3)_3\overset{\bullet}{C}$

C.

$CH_3 - \overset{\bullet}{C}H_2 < CH_3 - \overset{\bullet}{C}H - CH_3 < (CH_3)_3\overset{\bullet}{C} < (CH_3)_2\overset{\bullet}{C} - CH_2 - CH_3$

D.

$(CH_3)_3\overset{\bullet}{C} < (CH_3)_2\overset{\bullet}{C} - CH_2 - CH_3 < CH_3 - \overset{\bullet}{C}H - CH_3 < CH_3 - \overset{\bullet}{C}H_2$

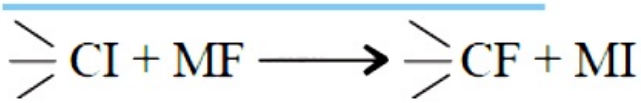
Answer: B

Solution:

Solution:
More the number of hyperconjugative structures, the greater is the stability.

Question53

In the replacement reaction



The reaction will be most favourable if M happens to be (2012 Mains)

Options:

A. Na

B. K

C. Rb

D. Li

Answer: C

Solution:

Solution:
Tertiary halide shows S_N1 mechanism i.e., ionic mechanism. In the given reaction negative ion will attack on carbocation. Thus greater the tendency of ionisation (greater ionic character in M— F bond) more favourable will be reaction. The most ionic bond is Rb—F in the given examples thus most favourable reaction will be with Rb—F

Question54

Which of the following acids does not exhibit optical isomerism? (2012)

Options:

A. Maleic acid

B. α-amino acids

C. Lactic acid

D. Tartaric acid

Answer: A

Solution:

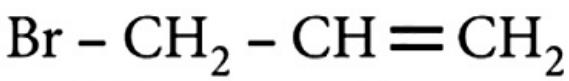
Solution:
Maleic acid shows geometrical isomerism and not optical isomerism.

Question55

Which nomenclature is not according to IUPAC system? (2012)

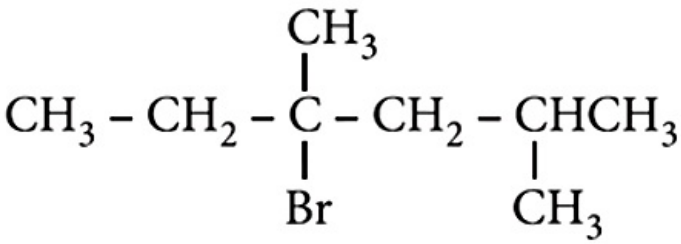
Options:

A.



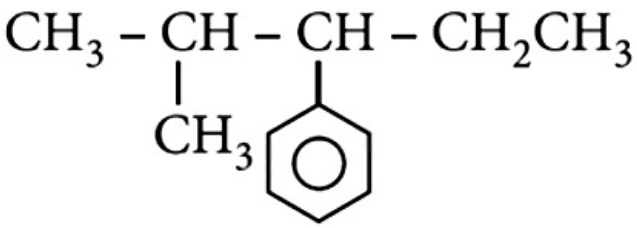
1-Bromoprop-2-ene

B.



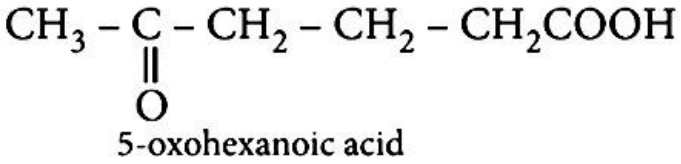
4-Bromo-2,4-dimethylhexane

C.



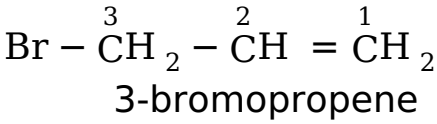
2-Methyl-3-phenylpentane

D.



Answer: A

Solution:



Question56

Among the following compounds the one that is most reactive towards electrophilic nitration is (2012,1992)

Options:

A. benzoic acid

B. nitrobenzene

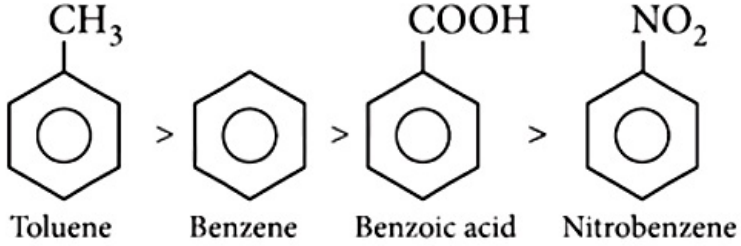
C. toluene

D. benzene

Answer: C

Solution:

As the $+I$ effect increases reactivity towards electrophilic reactions increases and as $-I$ or $-M$ effect increases reactivity towards electrophilic reactions decreases.Thus, the order is



Question57

Consider the reactions

(i) $(CH_3)_2CH - CH_2Br \xrightarrow{C_2H_5OH} (CH_3)_2CH - CH_2OC_2H_5 + HBr$

(ii) $(CH_3)_2CH - CH_2Br \xrightarrow{C_2H_5O^-} (CH_3)_2CH - CH_2OC_2H_5 + Br^-$

The mechanisms of reactions (i) and (ii) are respectively
(2011 Mains)

Options:

A. S_N1 and S_N2

B. S_N1 and S_N1

C. S_N2 and S_N2

D. S_N2 and S_N1

Answer: C

Solution:

Solution:
If reaction is S_N1 there will be the formation of carbocation and the rearrangement takes place. In these reactions there is no rearrangement hence both are S_N2 mechanism

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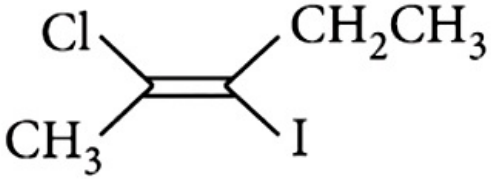
Question58

The IUPAC name of the following compound is



(2011 Mains)

Options:

A. trans-2-chloro-3-iodo-2-pentene

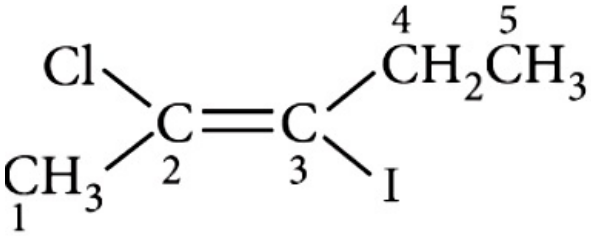
B. cis-3-iodo-4-chloro-3-pentane

C. trans-3-iodo-4-chloro-3-pentene

D. cis-2-chloro-3-iodo-2-pentene

Answer: A

Solution:



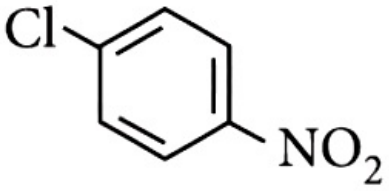
trans-2-chloro-3-iodo-2-pentene

Question59

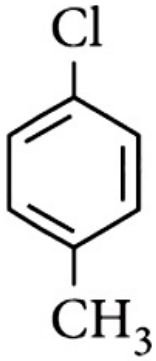
Which of the following compounds undergoes nucleophilic substitution reaction most easily?
(2011 Mains)

Options:

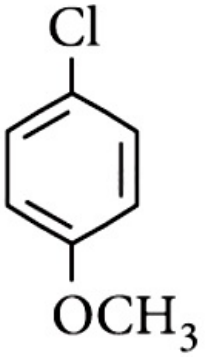
A.



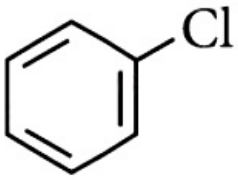
B.



C.



D.



Answer: A

Solution:

Solution:
Electron withdrawing groups like $-NO_2$ facilitates nucleophilic substitution reaction in chlorobenzene.

Question60

In Dumas' method of estimation of nitrogen 0.35 g of an organic compound gave 55 mL of nitrogen collected at 300 K temperature and 715 mm pressure. The percentage composition of nitrogen in the compound would be (aqueous tension at 300 K = 15 mm). (2011)

Options:

A. 15.45

B. 16.45

C. 17.45

D. 14.45

Answer: B

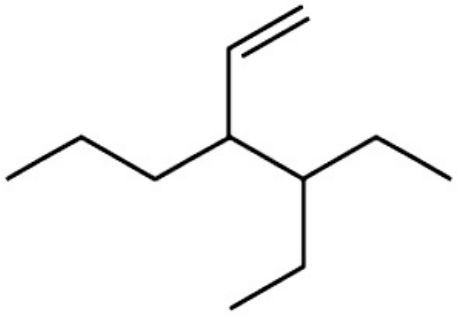
Solution:

Given $V_1 = 55mL$, $V_2 = ?$
$P_1 = 715 - 15 = 700mm$, $P_2 = 760mm$
$T_1 = 300K$, $T_2 = 273K$
General gas equation, $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
Volume of nitrogen at STP
$V_2 = \frac{P_1V_1T_2}{P_2T_1} = \frac{700 \times 55 \times 273}{760 \times 300} = 46.099mL$

% of nitrogen $= \frac{V_2}{8W}$, were W=the mass of organic compound
% of N $= \frac{46.099}{8 \times 0.35} = 16.46$

Question61

The correct IUPAC name for the compound



is

(2011)

Options:

A. 4-ethyl-3-propyl hex-1-ene

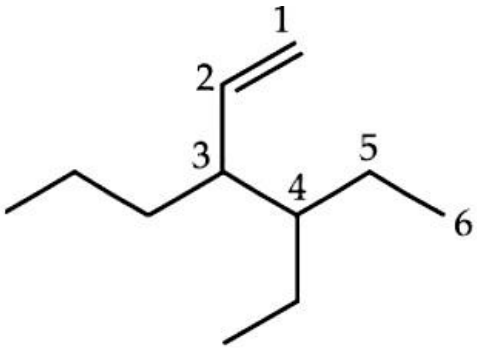
B. 3-ethyl-4-ethenylheptane

C. 3-ethyl-4-propylhex-5-ene

D. 3-(l-ethylpropyl)hexy-1-ene

Answer: A

Solution:



4-ethyl-3-propyl hex-1-ene

Question62

Considering the state of hybridization of carbon atoms, find out the molecule among the following which is linear ?
(2011)

Options:

A. $CH_3 - CH = CH - CH_3$

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

C. $CH_2 = CH - CH_2 - C \equiv CH$

D. $CH_3 - CH_2 - CH_2 - CH_3$

Answer: B

Solution:

$CH_3 - C \equiv C - CH_3$
In case of sp^3 hybridised carbon,bond angle is 109° 28'; $sp^2$2 hybridised carbon, bond angle is 120° and sp hybridised carbon, bond angle is 180°
So only $CH_3 - \underset{\downarrow}{\overset{sp}{C}} \equiv \underset{\downarrow}{\overset{sp}{C}} - CH_3$ is linear

---

Question63

Which one is a nucleophilic substitution reaction among the following? (2011)

Options:

A.

$$CH_3 - CH = CH_2 + H_2O \xrightarrow{H^+} CH_3 - \underset{OH}{\overset{|}{C}}H - CH_3$$

B.

$$RCHO + R'MgX \longrightarrow R - \underset{OH}{\overset{|}{C}}H - R'$$

C.

$$CH_3 - CH_2 - \underset{C}{\overset{CH_3}{|}}H - CH_2Br + NH_3 \rightarrow CH_3 - CH_2 - \underset{C}{\overset{CH_3}{|}}H - CH_2NH_2$$

D.

$$CH_3CHO + HCN \longrightarrow CH_3CH(OH)CN$$

Answer: C

Solution:

Solution:
Nucleophilic substitution reaction involves the displacement of a nucleophile by another.

Question64

The Lassaigne's extract is boiled with conc. HNO_3 while testing for halogens. By doing so it

(2011)

Options:

A. decomposes Na_2S and NaCN , formed

B. helps in the precipitation of AgCl

C. increases the solubility product of AgCl

D. increases the concentration of NO_3^- ions.

Answer: A

Solution:

Solution:
In case of Lassaigne's test of halogens, it is necessary to remove sodium cyanide and sodium sulphide from the sodium extract if nitrogen and sulphur are present. This is done by boiling the sodium extract with conc. HNO_3.

$NaCN + HNO_3 \rightarrow NaNO_3 + HCN \uparrow$

$Na_2S + 2HNO_3 \rightarrow 2NaNO_3 + H_2S \uparrow$

Question65

The IUPAC name of the compound

$\overset{5}{C}H_3\overset{4}{C}H = \overset{3}{C}H\overset{2}{C} \equiv \overset{1}{C}H$

(2010 Mains)

Options:

A. Pent-4-yn-2-ene

B. Pent-3-en-l-yne

C. Pent-2-en-4-yn

D. Pent-l-yn-3-ene

Answer: B

Solution:

Solution:

$\overset{5}{C}H_3\overset{4}{C}H = \overset{3}{C}H\overset{2}{C} \equiv \overset{1}{C}H$

Pent-3-en-1-yne

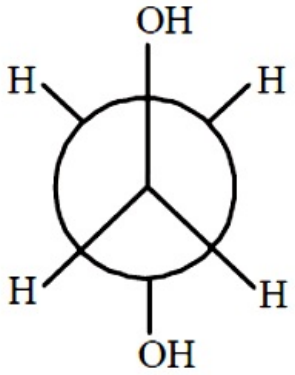
If a molecule contains both carbon-carbon double or triple bonds, the two are treated at par in seeking the lowest number combination. However, if the sum ofnumbers turns out to be the same starting from either of the carbon chain, then lowest number is given to the C = C double bond.

Question66

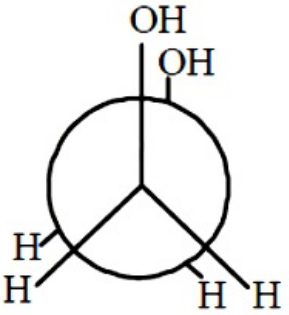
Which of the following conformers for ethylene glycol is most stable? (2010 Mains)

Options:

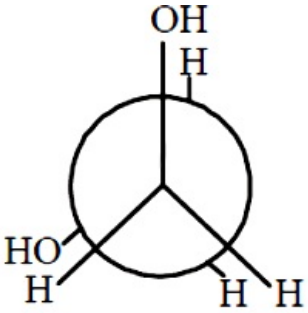
A.



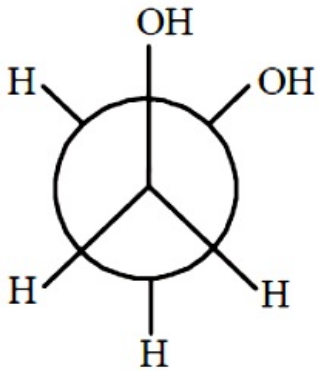
B.



C.



D.



Answer: D

Solution:

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

---

Question67

Which of the following species is not electrophilic in nature? (2010 Mains)

Options:

A. $\overset{\oplus}{C}l$

B. BH_3

C. $H_3\overset{\oplus}{O}$

D. $\overset{\oplus}{N}O_2$

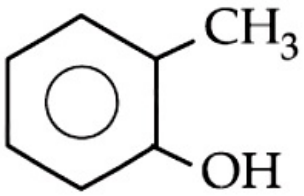
Answer: C

Question68

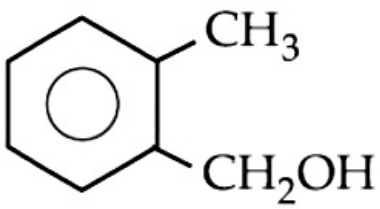
Which is most reactive towards electrophilic reagent? (2010,2011)

Options:

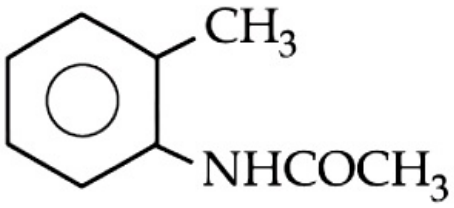
A.



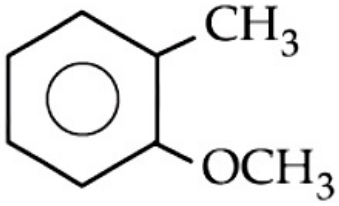
B.



C.



D.



Answer: A

Solution:

Solution:
$+\mathrm{R}$ effect of $-\mathrm{OH}$ group is greater than that of $-\mathrm{OCH}_3$ group.

Question69

Which one is most reactive towards $S_N I$ reaction? (2010)

Options:

A. $C_6H_5CH(C_6H_5)Br$

B. $C_6H_5CH(CH_3)Br$

C. $C_6H_5C(CH_3)(C_6H_5)Br$

D. $C_6H_5CH_2Br$

Answer: C

Solution:

S_N1 reactions involve the formation of carbocations, hence higher the stability of intermediate carbocation, more will be reactivity of the parent alkyl halide. The tertiary carbocation formed from (c) is stabilized by two phenyl groups and one methyl group, hence most stable

---

Question70

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

Options:

A. Butanol

B. 2-Butyne

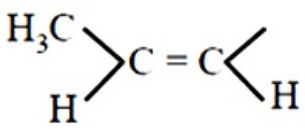
C. 2-Butenol

D. 2-Butene

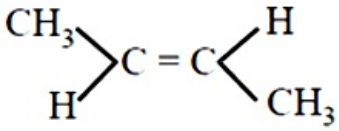
Answer: D

Solution:

Solution:
Alkenes with double bonds cannot undergo free rotation and can have different geometrical shapes with two different groups on each end of the double bond.



cis-But-2-ene



trans-But-2-ene

Question71

The IUPAC name of the compound having the formula $CH \equiv C - CH = CH_2$ is
(2009)

Options:

A. 1 - butyne - 3 - ene

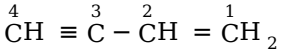
B. but - 1- yne - 3- ene

C. 1 - butene - 3 - yne

D. 3 - butene - 1 -yne

Answer: C

Solution:



1-butene-3-yne

Since the sum of numbers starting from either side of the carbon chain turns out to be the same, so lowest number is given to the C = C end

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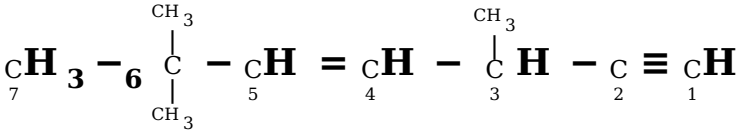
Question72

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



is in the following sequence
(2009)

Options:

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

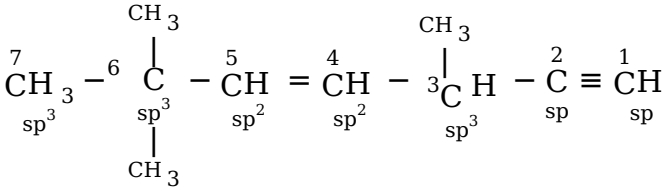
B. sp, sp^2, sp^2 and sp^3

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

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

Answer: D

Solution:



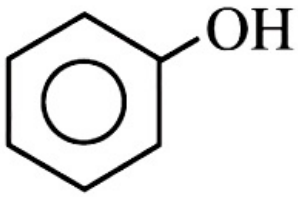
$\therefore C_2 - sp$, $C_3 - sp^3$, $C_5 - sp^2$ and $C_6 - sp^3$

Question73

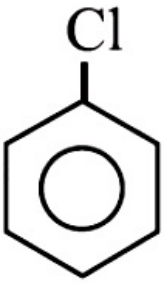
Which one of the following is most reactive towards electrophilic attack?
(2008)

Options:

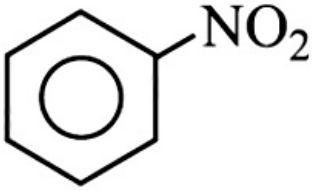
A.



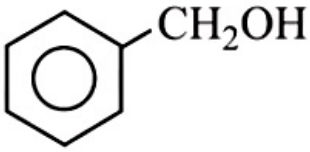
B.



C.



D.



Answer: A

Solution:

Solution:
Groups like, -C l and $-NO_2$ shows $-I$ effect,$-I$ groups attached to the benzene ring decrease the electron density and hence less prone to electrophilic attack. $-OH$ not only shows $-I$ effect but also $+M$ effect which predominates the - I character and electron density is increased in the benzene ring which facilitates electrophilic attack.

Question74

How many stereoisomers does this molecule have?
$CH_3CH = CHCH_2CHBrCH_3$
(2008)

Options:

A. 8

B. 2

C. 4

D. 6

Answer: C

Solution:

Solution:

$CH_3CH = CHCH_2\underset{\underset{Br}{|}}{CH} - CH_3$

the number of stereoisomers is given by sum of geometrical isomers (because of presence of C = C)and optical isomers (because of presence of chiral carbon atom).
Number of geometrical isomers = 2 (one C = C is present).
Number of optical isomers = 2 (one chiral carbon atom).
Total number of stereoisomers = 2 + 2 = 4

Question75

Base strength of $\underset{(i)}{H_3C\overset{\ominus}{C}H_2}$, $\underset{(ii)}{H_2C=\overset{\ominus}{C}H}$ and $\underset{(iii)}{H-C\equiv\overset{\ominus}{C}}$ is in the order of (2008)

Options:

A. (i) > (iii) > (ii)

B. (i) > (ii) > (iii)

C. (ii) > (i) > (iii)

D. (iii) > (ii) > (i)

Answer: B

Solution:

$\underset{sp}{H-C}\equiv\underset{sp}{C}-H > \underset{sp^2}{CH_2} = \underset{sp^2}{CH_2} > \underset{sp^3}{CH_3}\underset{sp^3}{CH_3}$

(Acidic Character)

Conjugate base of the given acid :

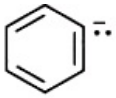
$\overset{\ominus}{C}\equiv C-H < \overset{\ominus}{C}H=CH_2 < \overset{\ominus}{C}H_2CH_3$

(Basic Character)

Conjugate base of stronger acid is weaker and vice versa.

Question76

The stability of carbanions in the following:
(i) $RC\equiv\overline{C}$
(ii)



(iii) $R_2C = \overline{CH}$
(iv) $R_3C - \overline{C}H_2$ is in the order of
(2008)

Options:

A. (iv) > (ii) > (iii) > (i)

B. (i) > (iii) > (ii) > (iv)

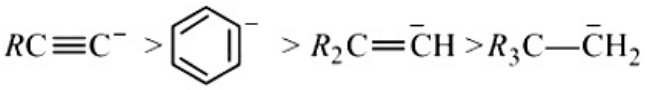
C. (i) > (ii) > (iii) > (iv)

D. (ii) > (iii) > (iv) > (i)

Answer: C

Solution:

Solution:
Higher the no. of electron releasing group lower will be stability of carbanion, and vice-versa. So, the order of stability of carbanions is



Question77

The order of decreasing reactivity towards an electrophilic reagent, for the following would be
(i) benzene
(ii) toluene
(iii) chlorobenzene
(iv) phenol
(2007)

Options:

A. (ii) > (iv) > (i) > (iii)

B. (iv) > (iii) > (ii) > (i)

C. (iv) > (ii) > (i) > (iii)

D. (i) > (ii) > (iii) > (iv)

Answer: C

Solution:

Benzene having any activating group i.e., $-OH$, $-R$ undergoes electrophilic substitution easily as compared to benzene itself. Thus, toluene and phenol undergo electrophilic substitution easily. Chlorine due to $-I$ -effect deactivates the ring. So, it is difficult to carry out the electrophilic substitution in chlorobenzene. Hence, the order is
$C_6H_5OH > C_6H_5CH_3 > C_6H_6 > C_6H_5Cl$

Question78

For (i) I^-, (ii) Cl^-, (iii) Br^-,the increasing order of nucleophilicity would be
(2007)

Options:

A. $Cl^- < Br^- < I^-$

B. $I^- < Cl^- < Br^-$

C. $Br^- < Cl^- < I^-$

D. $I^- < Br^- < Cl^-$

Answer: A

Solution:

Solution:
In case of different nucleophiles, but present in the same group in the periodic table, then larger is the atomic mass,higher is the nucleophilicity. Hence the decreasing order of nucleophilicity of the halide ions is
$I^- > Br^- > Cl^- > F^-$.

Question79

If there is no rotation of plane polarised light by a compound in a specific solvent, though to be chiral, it may mean that
(2007)

Options:

A. the compound is certainly meso

B. there is no compound in the solvent

C. the compound may be a racemic mixture

D. the compound is certainly a chiral

Answer: A

Solution:

Meso compound does not rotate plane polarised light.Compound which contains tetrahedral atoms with four different groups but the whole molecule is achiral, is known as meso compound. It possesses a plane of symmetry and is optically inactive. One of the asymmetric carbon atoms turns the plane of polarised light to the right and other to the left and to the same extent so that the rotation due to upper half is compensated by the lower half, i.e., internally compensated, and finally there is no rotation of plane polarised light.

Question80

Which of the following is not chiral?
(2006)

Options:

A. 2-hydroxypropanoic acid

B. 2-butanol

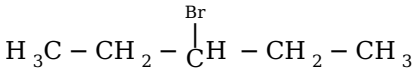
C. 2,3-dibromopentane

D. 3-Bromopentane

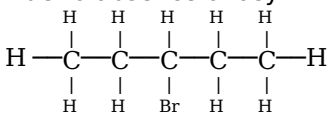
Answer: D

Solution:

Solution:
An asymmetric carbon atom (chiral carbon) is a carbon atom that is attached to four different types of atoms or groups of atoms



Due to absence of asymmetric carbon atom



Question81

The general molecular formula, which represents the homologous series of alkanols is
(2006)

Options:

A. $C_nH_{2n}O$

B. $C_nH_{2n}O_2$

C. $C_nH_{2n+2}O$

D. $C_nH_{2n+1}O$

Answer: C

Solution:

Solution:
General molecular formula for alkanols is
$C_nH_{2n+2}O$ or $[C_nH_{2n+1}OH]$.

Question82

The IUPAC name of
(2006)

Options:

A. 1 -chloro- 1 -oxo- 2,3 -dimethylpentane

B. 2 -ethyl- 3 -methylbutanoyl chloride

C. 2,3 -dimethylpentanoyl chloride

D. 3,4 -dimethylpentanoyl chloride.

Answer: C

Solution:

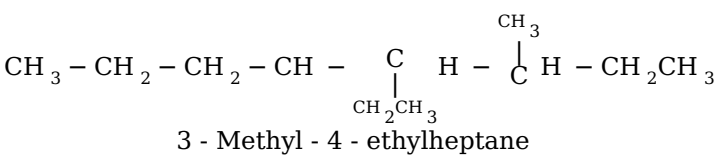
Solution:
It is 2,3 -dimethylpentanoyl chloride.

Question83

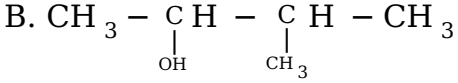
Names of some compounds are given. Which one is not in IUPAC system?
(2005)

Options:

A.

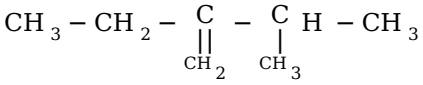


3 - Methyl - 4 - ethylheptane

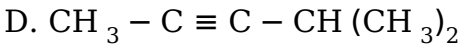
B. 

3 - Methyl - 2 - Butanol

C.



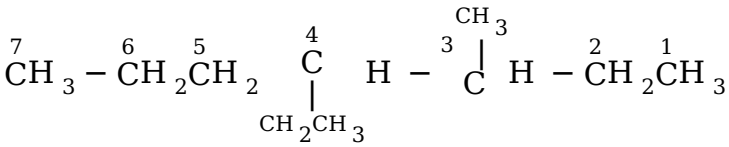
2-Ethyl-3-methylbut-l-ene

D. 

4-Methyl-2-pentyne

Answer: A

Solution:

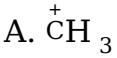


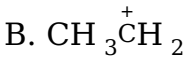
4 -Ethyl- 3 -methylheptane

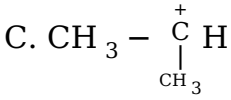
Question84

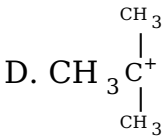
Which amongst the following is the most stable carbocation? (2005)

Options:

A. 

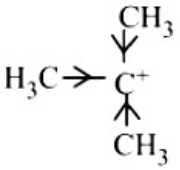
B. 

C. 

D. 

Answer: D

Solution:



3˚C is more stable due to the stabilization ofthe charge by three methyl groups (or inductive effect). It can also be

explained on the basis of hyperconjugation.

Question85

Which one of the following pairs represents stereoisomerism? (2005)

Options:

A. Structural isomerism and geometrical isomerism

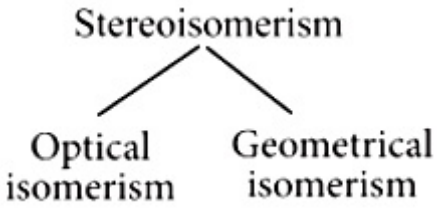
B. Optical isomerism and geometrical isomerism

C. Chain isomerism and rotational isomerism

D. Linkage isomerism and geometrical isomerism

Answer: B

Solution:



Question86

The best method for the separation of naphthalene and benzoic acid from their mixture is (2005)

Options:

A. distillation

B. sublimation

C. chromatography

D. crystallisation.

Answer: B

Solution:

Sublimation method is used for those organic substances which pass directly from solid to vapour state on heating and vice-versa on cooling. e.g. benzoic acid, naphthalene, camphor, anthracene, etc. Naphthalene is volatile and benzoic acid is non-volatile due to the formation of the dimer.

Question87

The $-OH$ group of an alcohol or the - COOH group of a carboxylic acid can be replaced by - Cl using
(2004)

Options:

A. phosphorus pentachloride

B. hypochlorous acid

C. chlorine

D. hydrochloric acid.

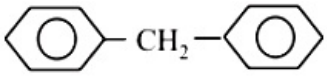
Answer: A

Solution:

$$ROH + PCl_5 \rightarrow RCl + POCl_3 + HCl$$
$$RCOOH + PCl_5 \rightarrow RCOCl + POCl_3 + HCl$$

Question88

The molecular formula of diphenyl methane



is $C_{13}H_{12}$.
How many structural isomers are possible when one of the hydrogen is replaced by a chlorine atom?
(2004)

Options:

A. 6

B. 4

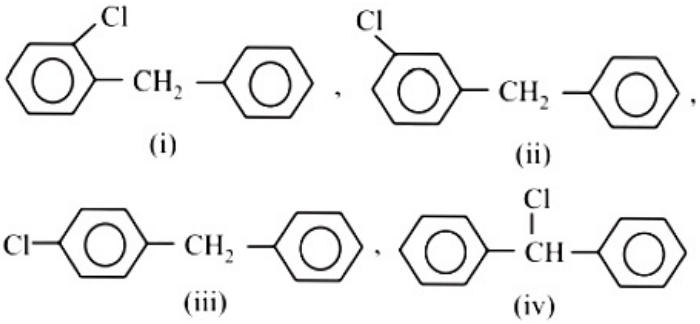
C. 8

D. 7

Answer: B

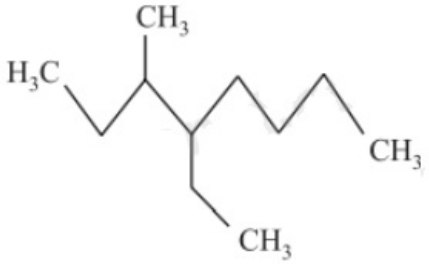
Solution:

Only four structural isomers are possible for diphenyl methane.



Question89

Name of the compound given below is



(2003)

Options:

A. 4 -ethyl- 3 -methyloctane

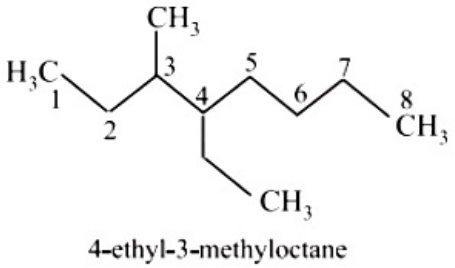
B. 3 -methyl- 4 -ethyloctane

C. 2,3 -diethylheptane

D. 5 -ethyl- 6 -methyloctane.

Answer: A

Solution:



4-ethyl-3-methyloctane

Question90

Which one of the following orders of acid strength is correct? (2003)

Options:

A.

$RCOOH > ROH > HOH > HC \equiv CH$

B.

$RCOOH > HOH > ROH > HC \equiv CH$

C.

$RCOOH > HOH > HC \equiv CH > ROH$

D.

$RCOOH > HC \equiv CH > HOH > ROH$

Answer: B

Solution:

Solution:
Carboxylic acid is much stronger than water and alcohol. since the carboxylate ion after the removal of proton is stabilized by resonating structures. The $-OH$ in alcohols is almost neutral. Acetylene is also weakest acid.

Question91

IUPAC name of the following is $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$ (2002)

Options:

A. 1,5 -hexenyne

B. 1 -hexene-5-yne

C. 1 -hexyne-5-ene

D. 1,5 -hexynene.

Answer: B

Solution:

$\overset{1}{C}H_2 = \overset{2}{C}H - \overset{3}{C}H_2 - \overset{4}{C}H_2 - \overset{5}{C} \equiv \overset{6}{C}H$
The double bond gets priority over triple bond. Therefore correct IUPAC name is 1 -hexene-5-yne.

Question92

Geometrical isomers differ in (2002)

Options:

A. position of functional group

B. position of atoms

C. spatial arrangement of atoms

D. length of carbon chain.

Answer: C

Solution:

Solution:
Geometrical isomers are those isomers which possess the same molecular and structural formula but differ in the arrangement of atoms or groups in space due to hindered rotation around the double bonded atoms.

Question93

The incorrect IUPAC name is (2001)

Options:

A. $CH_3-\underset{\underset{O}{||}}{C}-\underset{\underset{CH_3}{|}}{C}H-CH_3$
-2 -methyl-3-butanone

B. $CH_3-\underset{\underset{CH_3}{|}}{C}H-\underset{\underset{CH_2CH_3}{|}}{C}H-CH_3$
-2,3 -dimethylpentane

C. $CH_3-C\equiv CCH(CH_3)_2$ -4 -methyl- 2 -pentyne

D. $CH_3\underset{\underset{Cl}{|}}{C}H\underset{\underset{Br}{|}}{C}HCH_3$
-3 -bromo- 2 -chlorobutane.

Answer: A

Solution:

$\overset{4}{C}H_3-\overset{\overset{3}{C}}{\underset{\underset{O}{||}}{}}-\overset{\overset{2}{C}}{\underset{\underset{CH_3}{|}}{}}H-\overset{1}{C}H_3$ (wrong numbering)

The $-\overset{\overset{O}{\|}}{C}-$ group should get priority over methyl group

$\therefore$ Correct IUPAC name is

$\overset{1}{C}H_3-\underset{\underset{O}{\|}}{\overset{2}{C}}-\underset{\underset{CH_3}{|}}{\overset{3}{C}}H-\overset{4}{C}H_3$: 3 -Methyl-2-butanone

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Question94

In steam distillation of toluene, the pressure of toluene in vapour is (2001)

Options:

A. equal to pressure of barometer

B. less than pressure of barometer

C. equal to vapour pressure of toluene in simple distillation

D. more than vapour pressure of toluene in simple distillation.

Answer: B

Solution:

Solution:
In steam distillation of toluene, the pressure of toluene in vapour is less than pressure of barometer, because it is carried out when a solid or liquid is insoluble in water and is volatile with steam but the impurities are non-volatile.

Question95

Which one of the following orders is correct regarding the $-I$ effect of the substituents?
(1998)

Options:

A. $-NR_2 < -OR < -F$

B. $-NR_2 > -OR > -F$

C. $-NR_2 < -OR > -F$

D. $-NR_2 > -OR < -F$

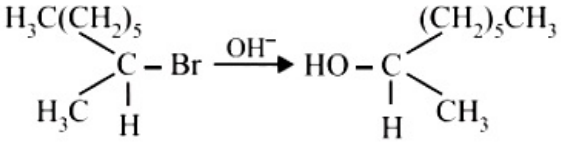
Answer: A

Solution:

Alkyl is an electron releasing group has +I inductive effect. −F has −I inductive effect. Oxygen is more electronegative than nitrogen. Therefore the order of −I effect is $-NR_2 < -OR < -F$

Question96

The following reaction is described as



(1997)

Options:

A. $S_N 2$

B. $S_N 0$

C. $S_E 2$

D. $S_N 1$

Answer: A

Solution:

Solution:
$S_N 2$ reaction are bimolecular reactions where rate of reaction depends on the concentration of both substrate and nucleophile. When OH^- attacks the substrate from the opposite side of the leaving group i.e., Br^- a transition state results, to which both OH and Br are partially bonded to carbon atom.

Question97

Tautomerism is exhibited by
(1997)

Options:

A. R_3CNO_2

B. RCH_2NO_2

C. $(CH_3)_3CNO$

D. $(CH_3)_2NH$

Answer: B

Solution:

It is a special type of functional isomerism, in which both the isomers are represented by one and the same substance and are always present in equilibrium. It is exhibited by nitroalkane (RCH_2NO_2) and isonitro alkane

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Question98

Which of the following technique is most suitable for purification of cyclohexanone from a mixture containing benzoic acid, isoamyl alcohol, cyclohexane and cyclohexanone?
(1997)

Options:

A. Sublimation

B. Evaporation

C. Crystallisation

D. IR spectroscopy

Answer: D

Solution:

Solution:
In the IR spectroscopy, each functional group appears at a certain peak (in cm^{-1}). So, cyclohexanone can be identified by carbonyl peak.

Question99

The number of isomers in $C_4H_{10}O$ will be
(1996)

Options:

A. 7

B. 8

C. 5

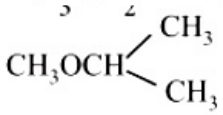
D. 6

Answer: A

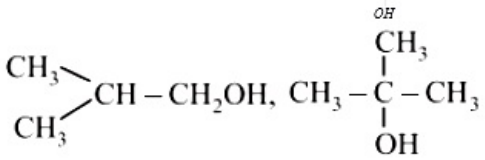
Solution:

There are 7 isomers in $C_4H_{10}O$. Out of these, 4 are alcohols and 3 are ethers.

$CH_3CH_2-O-CH_2CH_3$, $CH_3OCH_2CH_2CH_3$,



$CH_3CH_2CH_2CH_2OH$, $CH_3CH_2CH(OH)-CH_3$



Question100

The IUPAC name of $(CH_3)_2CH-CH_2-CH_2Br$ is (1996)

Options:

A. 1 -bromo- 3 -methylbutane

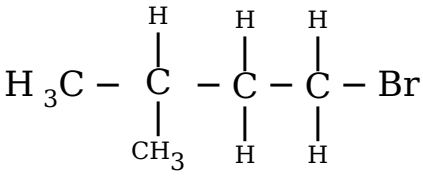
B. 2 -methyl-3-bromopropane

C. 1 -bromopentane

D. 2 -methyl- 4 -bromobutane.

Answer: A

Solution:



1 - Bromo - 3 - methylbutane

Question101

Which of the following is used as an anti knocking material? (1996)

Options:

A. Glyoxal

B. Freon

C. T.E.L.

D. Ethyl alcohol

Answer: C

Solution:

Tetraethyl lead $(C_2H_5)_4Pb$, is used as an antiknocking agent in gasoline used for running automobiles.

Question102

In which of the following compounds there is more than one kind of hybridization (sp, sp^2, sp^3) for carbon?
(1995)

Options:

A. $CH_2 = CH - CH = CH_2$

B. $H - C \equiv C - H$

C. $CH_3CH_2CH_2CH_3$

D. $CH_3 - CH = CH - CH_3$

Answer: D

Solution:

$$\underset{sp^3}{CH_3} - \underset{sp^2}{CH} = \underset{sp^2}{CH} - \underset{sp^3}{CH_3}$$

Question103

The IUPAC name for
$CH_3CH = CHCH_2\overset{\overset{NH_2}{|}}{C}HCH_2COOH$ is

(1995)

Options:

A. 3 -amino-5-heptenoic acid

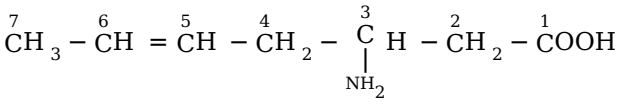
B. β -amino- δ -heptenoic acid

C. 5 -amino-2-heptenoic acid

D. 5 -amino-hex-2-enecarboxylic acid.

Answer: A

Solution:



As - COOH group is highest priority group, it is numbered one. So, the IUPAC name is 3 -amino-5-heptenoic acid.

Question104

Which of the following statements is not correct? (1993)

Options:

A. Double bond is shorter than a single bond.

B. Sigma bond is weaker than a π(pi) bond.

C. Double bond is stronger than a single bond.

D. Covalent bond is stronger than hydrogen bond.

Answer: B

Solution:

Solution:
Sigma bond is stronger than π -bond because of better overlap. All single bonds are σ -bonds and all multiple bonds contain one σ - and other π -bonds.

Question105

When the hybridization state of carbon atom changes from sp^3 to sp^2 and finally to sp, the angle between the hybridized orbitals (1993)

Options:

A. decreases gradually

B. decreases considerably

C. is not affected

D. increases progressively.

Answer: D

Solution:

Solution:
Angle increases progressively, $sp^3(109^\circ 28')$, $sp^2(120^\circ)$, $sp(180^\circ)$

Question106

Which of the following fertilizers has the highest nitrogen percentage? (1993)

Options:

A. Ammonium sulphate

B. Calcium cyanamide

C. Urea

D. Ammonium nitrate

Answer: C

Solution:

Solution:
Urea (46.6%N) . % of N in other compounds are :$(NH_4)_2SO_4$ = 21.2%; $CaCN_2$ = 35.0% and NH_4NO_3 = 35.0%

Question107

2-Methyl-2-butene will be represented as (1992)

Options:

A. $CH_3-\overset{CH_3}{\overset{|}{C}}H-CH_2CH_3$

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

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

D. $CH_3 - \underset{\underset{CH_3}{|}}{C}H - CH = CH_2$

Answer: B

Solution:

$^{1}CH_3 - ^{2}\underset{\underset{CH_3}{|}}{C} = ^{3}CH - ^{4}CH_3$

2-Methyl-2-butene

Question108

The IUPAC name of $CH_3 - \underset{\underset{OH}{|}}{C}H - CH = \underset{\underset{CH_3}{|}}{C} - CHO$ is

(1992)

Options:

A. 4 -hydroxy-1-methylpentanal

B. 4 -hydroxy- 2 -methylpent- 2 -en -1 -al

C. 2 -hydroxy-4-methylpent-3-en-5-al

D. 2 -hydroxy- 3 -methylpent- 2 -en-5-al.

Answer: B

Solution:

$^{5}CH_3 - ^{4}\underset{\underset{OH}{|}}{C}H - ^{3}CH = ^{2}\underset{\underset{CH_3}{|}}{C} - ^{1}CHO$

4 - Hydroxy - 2 -methylpent - 2 - en - 1- al

Question109

Isomers of a substance must have the same
(1991)

Options:

A. structural formula

B. physical properties

C. chemical properties

D. molecular formula.

Answer: D

Solution:

Solution:
Isomers must have same molecular formula but different structural formula.

Question110

Which of the following is the most stable carbocation (carbonium ion)? (1991)

Options:

A. $CH_3\overset{+}{C}H_2$

B. $(CH_3)_2\overset{+}{C}H$

C. $(CH_3)_3\overset{+}{C}$

D. $C_6H_5\overset{+}{C}H_2$

Answer: C

Solution:

Solution:
$3^{\circ} > 2^{\circ} > 1^{\circ}$ more the delocalisation of positive charge, more is its stability.

Question111

In sodium fusion test of organic compounds, the nitrogen of the organic compound is converted into (1991)

Options:

A. sodamide

B. sodium cyanide

C. sodium nitrite

D. sodium nitrate.

Answer: B

Solution:

Solution:
Sodium cyanide ($Na + C + N \rightarrow NaCN$)

Question112

The shortest C - C bond distance is found in (1991)

Options:

A. diamond

B. ethane

C. benzene

D. acetylene.

Answer: D

Solution:

Solution:
Shortest C- C distance (1.20Å) is in acetylene.

Question113

A sp^3 hybrid orbital contains (1991)

Options:

A. 1/4s -character

B. 1/2s -character

C. 1/3s -character

D. 2/3s -character.

Answer: A

Solution:

sp^3 orbital has 1/4(25%) s -character

Question114

A straight chain hydrocarbon has the molecular formula C_8H_{10}. The hybridization of the carbon atoms from one end of the chain to the other are respectively sp^3, sp^2, sp^2, sp^3, sp^2, sp^2, sp and sp. The structural formula of the hydrocarbon would be
(1991)

Options:

A.

$CH_3C \equiv CCH_2 - CH = CHCH = CH_2$

B.

$CH_3CH_2 - CH = CHCH = CHC \equiv CH$

C.

$CH_3CH = CHCH_2 - C \equiv CCH = CH_2$

D.

$CH_3CH = CHCH_2 - CH = CHC \equiv CH$

Answer: D

Solution:

$$\overset{sp^3}{CH_3}\overset{sp^2}{CH} = \overset{sp^2}{CH}\overset{sp^3}{CH_2} - \overset{sp^2}{CH} = \overset{sp^2}{CH}\overset{sp}{C} \equiv \overset{sp}{CH}$$

Question115

Kjeldahl's method is used in the estimation of
(1990)

Options:

A. nitrogen

B. halogens

C. sulphur

D. oxygen.

Answer: A

Question116

An organic compound X (molecular formula $C_6H_7O_2N$) has six carbon atoms in a ring system, two double bonds and a nitro group as substituent, X is (1990)

Options:

A. homocyclic but not aromatic

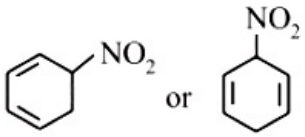
B. aromatic but not homocyclic

C. homocyclic and aromatic

D. heterocyclic and aromatic.

Answer: A

Solution:



Hence, it is homocyclic (as the ring system is made of one type of atoms, i.e., carbon) but not aromatic.

Question117

Which one of the following can exhibit cis-trans isomerism? (1989)

Options:

A. $CH_3 - CHCl - COOH$

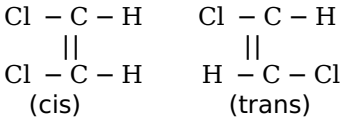
B. $H - C \equiv C - Cl$

C. $ClCH = CHCl$

D. $Cl\,CH_2 - CH_2Cl$

Answer: C

Solution:



1,2 -dichloroethene exhibits cis-trans (geometrical) isomerism.

Question118

Which of the following possesses a sp− carbon in its structure? (1989)

Options:

A. $CH_2 = CCl - CH = CH_2$

B. $CCl_2 = CCl_2$

C. $CH_2 = C = CH_2$

D. $CH_2 = CH - CH = CH_2$

Answer: C

Solution:

$sp^2 \quad sp \quad sp^2$
$CH_2 = C = CH_2$

Question119

Cyclic hydrocarbon 'A' has all the carbon and hydrogen atoms in a single plane. All the carbon - carbon bonds have the same length, less than 1.54Å, but more than 1.34Å The bond angle will be (1989)

Options:

A. $109^\circ 28'$

B. 100°

C. 180°

D. 120°

Answer: D

Solution:

Solution:
All the properties mentioned in the question suggest that it is a benzene molecule. since in benzene all carbons are sp^2 - hybridized, therefore, $C-C-C$ angle is 120°.

Question120

Lassaigne's test is used in qualitative analysis to detect (1989)

Options:

A. nitrogen

B. sulphur

C. chlorine

D. all of these.

Answer: D

Solution:

Solution:
All the three (N, S , halogens) .

Question121

How many chain isomers could be obtained from the alkane C_6H_{14} ? (1988)

Options:

A. Four

B. Five

C. Six

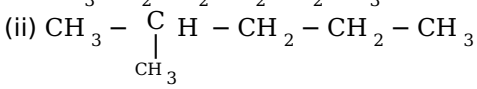
D. Seven

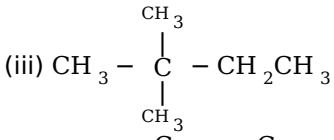
Answer: B

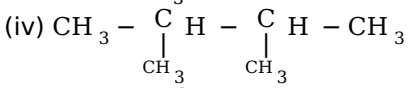
Solution:

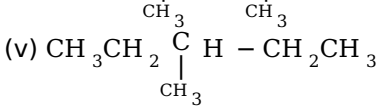
5-chain isomers are obtained from alkane C_6H_{14}.

(i) $CH_3CH_2CH_2CH_2CH_2CH_3$

(ii) 

(iii) 

(iv) 

(v) 

Question122

The Cl-C-Cl angle in 1,1,2,2 -tetrachloroethene and tetrachloromethane respectively will be about
(1988)

Options:

A. 120° and 109.5°

B. 90° and 109.5°

C. 109.5° and 90°

D. 109.5° and 120°

Answer: A

Solution:

Tetrachloroethene being an alkene has sp^2 -hybridized C-atoms and hence the angle $Cl - C - Cl$ is 120° while in tetrachloromethane, carbon is sp^3 hybridized, therefore the angle $Cl - C - Cl$ is $109^\circ 28'$
