

Hydrocarbons

Question1

Which of the following is obtained as major product when excess of methane is treated with limited chlorine in presence of UV light?

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Options:

A.

Chloromethane

B.

Dichloromethane

C.

Trichloromethane

D.

Tetrachloromethane

Answer: A

Solution:

Alkanes react with chlorine gas in presence of UV light to give a mixture of alkyl halides. Tetrachloromethane is a major product when excess of chlorine is used. Chloromethane is obtained as major product when excess of methane is employed.

Question2



What is the product obtained when alkene is reacted with cold and dilute alkaline potassium permanganate?

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Options:

A.

Alkanol

B.

Glycol

C.

Glycerol

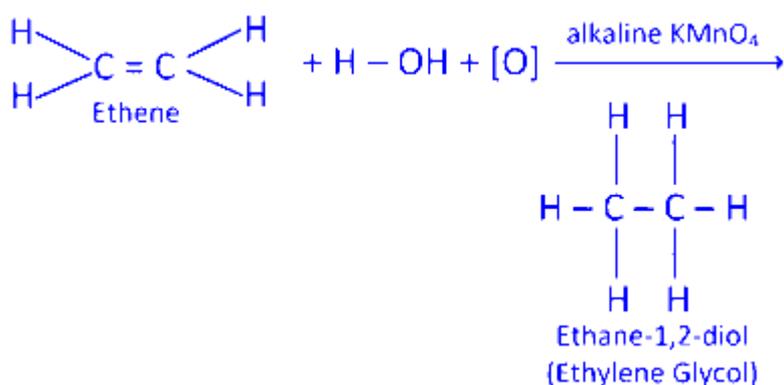
D.

Alkanoic acid

Answer: B

Solution:

Alkenes react with cold and dilute alkaline potassium permanganate to form glycols. E.g.



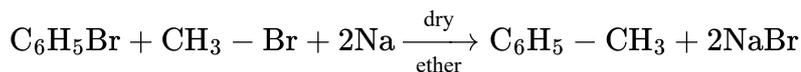
Question3

Which of the following is a Fittig reaction?

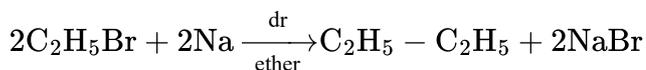
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Options:

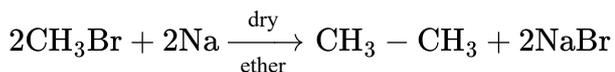
A.



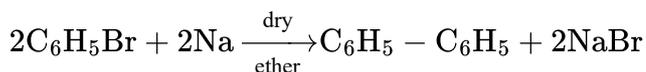
B.



C.



D.

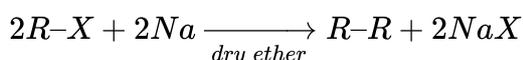


Answer: D

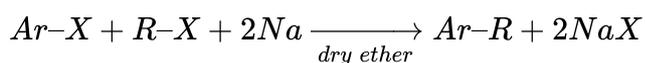
Solution:

Step 1: Recall the reactions

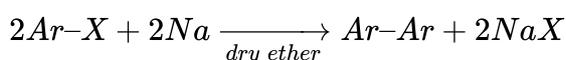
- **Wurtz reaction:** Coupling of two *alkyl halides* with sodium in dry ether \rightarrow alkane.



- **Wurtz-Fittig reaction:** Coupling of an *aryl halide* and an *alkyl halide* with sodium in dry ether \rightarrow alkyl-substituted aromatic compound (like toluene).

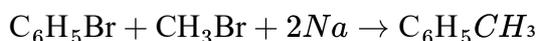


- **Fittig reaction:** Coupling of two *aryl halides* with sodium in dry ether \rightarrow biaryl compound.



Step 2: Check each option

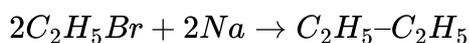
- **Option A:**



This is **Wurtz-Fittig reaction**.



- **Option B:**



This is **Wurtz reaction** (alkyl-alkyl coupling).

- **Option C:**



This is also **Wurtz reaction**.

- **Option D:**



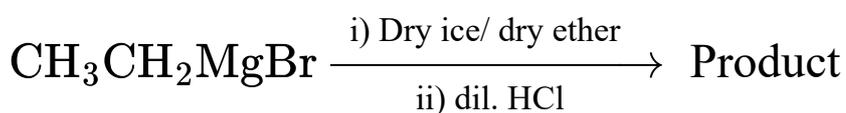
This is **Fittig reaction**.

Final Answer:

Option D is the Fittig reaction.

Question4

Identify the product formed in the following reaction.



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Options:

A.

Ethanoic acid

B.

Propanoic acid

C.

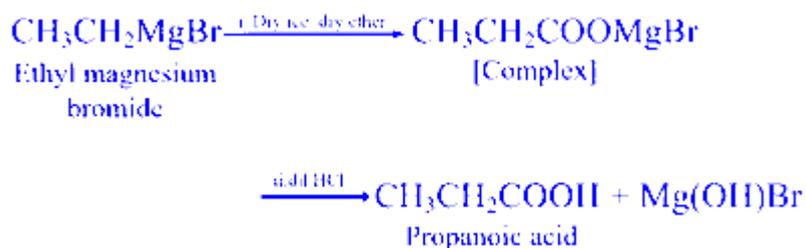
2-Methylpropanoic acid

D.

Butanoic acid

Answer: B

Solution:



Question5

Which of the following reagents is used to convert $\text{C} \equiv \text{C}$ triple bond to $\text{C} = \text{C}$ double bond to give Cis isomer of alkene?

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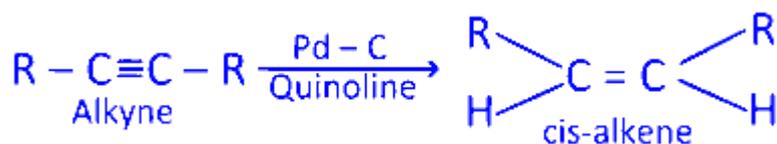
Options:

- A. ZnCl_2/HCl
- B. Pd -C/quinoline
- C. Na / liquid NH_3
- D. Na/Hg in H_2O

Answer: B

Solution:

Lindlar's catalyst (palladised charcoal deactivated partially with quinoline or sulfur compound)



Question6

What is the difference in molar mass of Undecane and Dodecane?

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Options:

A.

10 g mol⁻¹

B.

20 g mol⁻¹

C.

140 g mol⁻¹

D.

14 g mol⁻¹

Answer: D

Solution:

Undecane C₁₁H₂₄ and dodecane C₁₂H₂₆ are members of homologous series of alkanes. Successive homologues differ by one -CH₂ (methylene) unit which results in a molecular weight difference of 14 units between each successive compound.

Question7

Identify ' A ' in the following reaction.



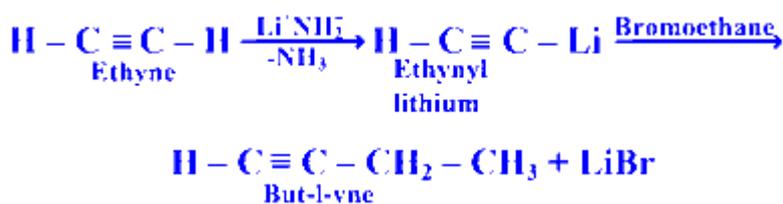
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Options:

- A. Ethene
- B. Ethyne
- C. But-1-ene
- D. But-2-ene

Answer: B

Solution:



Question8

When 2-methylbut-2-ene is treated with hydrogen chloride, the major product formed is

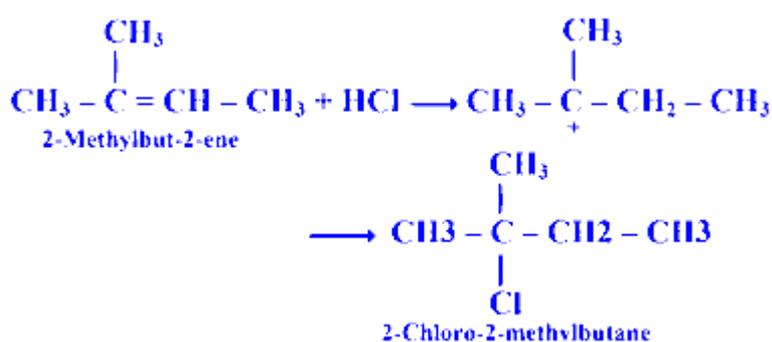
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Options:

- A. 3-chloro-2-methylbutane
- B. 2-chloro-2-methylbutane
- C. 2-chloro-3-methylbutane
- D. 2-chlorobutane

Answer: B

Solution:



Question9

Which of the following is NOT obtained when mixture of methyl bromide and ethyl bromide is treated with sodium metal in presence of dry ether?

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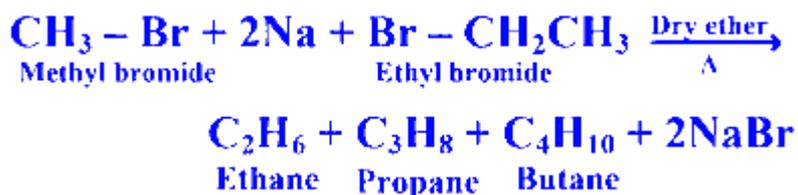
Options:

- A. Ethane
- B. Propane
- C. Butane
- D. Pentane

Answer: D

Solution:

Wurtz reaction:



Question10

Which of the following alkenes, on oxidation by KMnO_4 in dil. H_2SO_4 forms adipic acid?

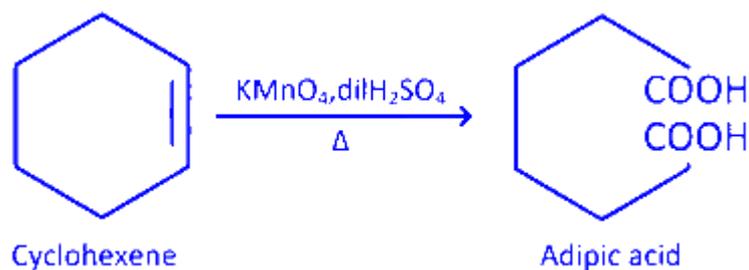
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Options:

- A. Hex-1-ene
- B. Hex-2-ene
- C. Hex-3-ene
- D. Cyclohexene

Answer: D

Solution:



Question11

Identify the alkyne formed by reaction of calcium carbide with water?

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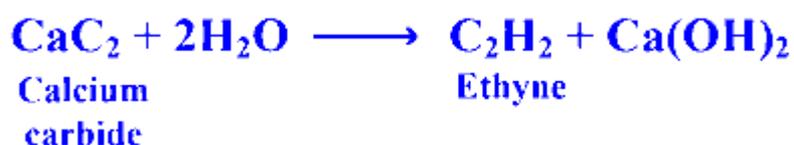
Options:

- A. Ethyne

- B. Propyne
- C. But-1-yne
- D. But-2-yne

Answer: A

Solution:



Question12

What is the difference in molar masses of third and fourth homologues of alkane series?

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Options:

- A. 28 g mol^{-1}
- B. 14 g mol^{-1}
- C. 15 g mol^{-1}
- D. 16 g mol^{-1}

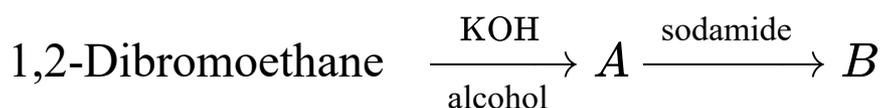
Answer: B

Solution:

Two successive homologues differ by one $-\text{CH}_2-$ (methylene) unit, i.e. by a molar mass of $(12 + 2)\text{g mol}^{-1} = 14 \text{ g mol}^{-1}$.

Question13

Identify product ' B ' in the following sequence of reactions.



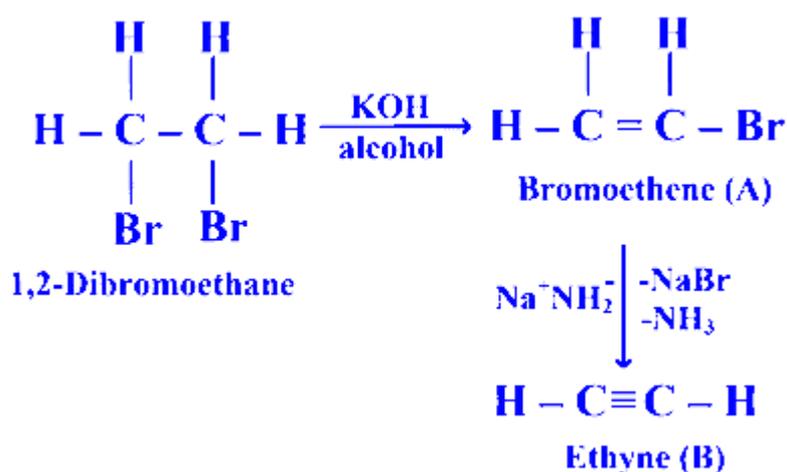
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Options:

- A. Bromoethane
- B. Bromoethene
- C. Ethene
- D. Ethyne

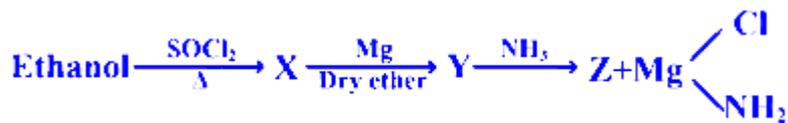
Answer: D

Solution:



Question14

Identify the product ' Z ' in the following series of reactions.



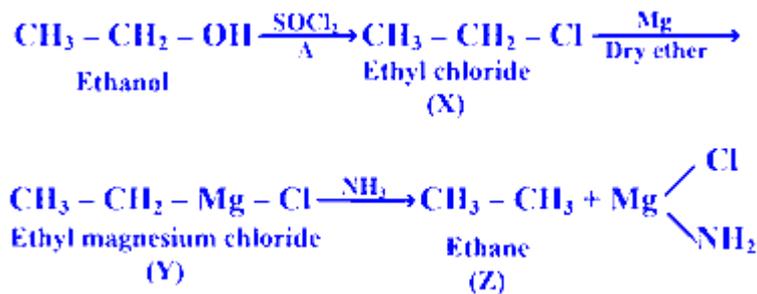
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Options:

- A. Ethyl chloride
- B. Ethyl magnesium chloride
- C. Ethyl amine
- D. Ethane

Answer: D

Solution:



Question15

The reaction of aryl halide with sodium metal in dry ether to give biphenyl is known as

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Options:

- A. Swartz reaction
- B. Wurtz reaction

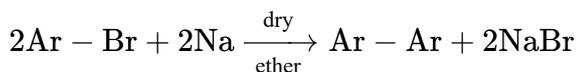
C. Fittig reaction

D. Wurtz-Fittig reaction

Answer: C

Solution:

Fittig reaction:



Question16

What is the molar mass of third homologue of alkane series?

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Options:

A. 40 g mol^{-1}

B. 58 g mol^{-1}

C. 44 g mol^{-1}

D. 46 g mol^{-1}

Answer: C

Solution:

Two successive homologues differ by one $-\text{CH}_2-$ (methylene) unit, i.e. by a molar mass of $(12 + 2)\text{g mol}^{-1} = 14 \text{ g mol}^{-1}$.

Molar mass of first member of alkane series (CH_4) = 16 g mol^{-1}

\therefore Molar mass of third member

$$= 16 + 14 + 14 = 44 \text{ g mol}^{-1}$$

Question17

What is the difference in molar masses of Undecane and Decane?

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Options:

A. 140 g mol^{-1}

B. 70 g mol^{-1}

C. 24 g mol^{-1}

D. 14 g mol^{-1}

Answer: D

Solution:

Undecane $\text{CH}_3 - (\text{CH}_2)_9 - \text{CH}_3$ and decane $\text{C}_{10}\text{H}_{22}$ are homologous series of alkanes. Two successive homologues differ by one $-\text{CH}_2$ (methylene) unit i.e., molecular weight of each successive member differs by 14 units.

Question18

The reaction of bromobenzene with bromomethane and sodium metal in dry ether to give toluene is

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Options:

A. Wurtz reaction

B. Fittig reaction

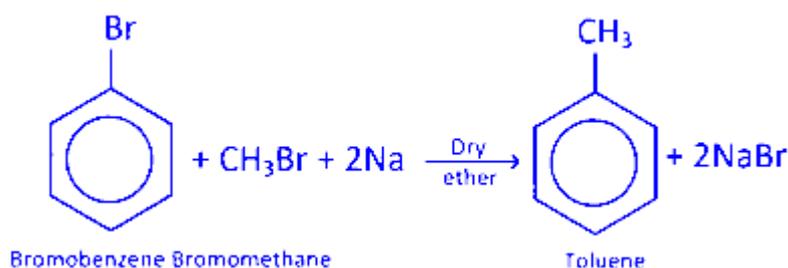
C. Friedel crafts reaction

D. Wurtz-Fittig reaction

Answer: D

Solution:

The reaction of aryl halide with alkyl halide and sodium metal in dry ether to form substituted aromatic compounds is known as Wurtz-Fittig reaction:



Question19

Hydroboration-oxidation of but-1-ene forms

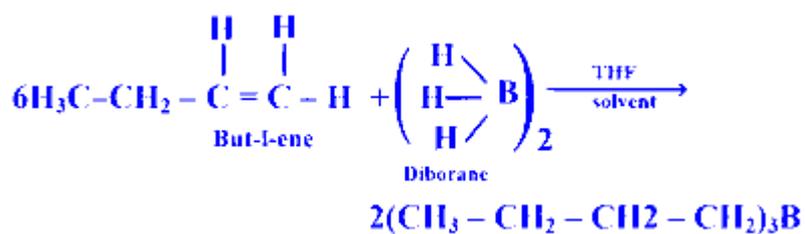
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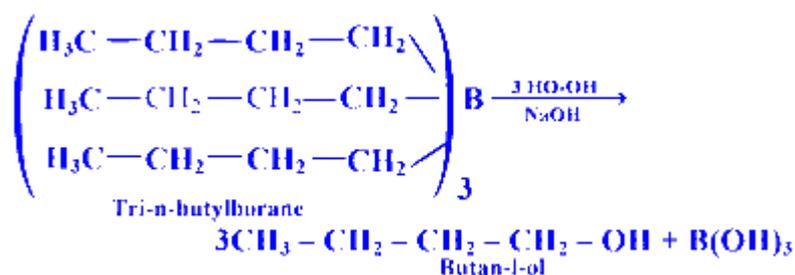
Options:

- A. Butanal
- B. Butanone
- C. Butan-1-ol
- D. Butan-2-ol

Answer: C

Solution:





Question20

Identify the name of reaction of aryl halide with alkyl halide and sodium metal in dry ether to give substituted aromatic compounds.

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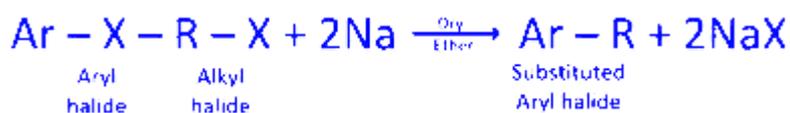
Options:

- A. Wurtz reaction
- B. Fittig reaction
- C. Wurtz-Fittig reaction
- D. Friedel Crafts reaction

Answer: C

Solution:

General reaction for Wurtz-Fittig reaction can be given as follows:



Question21

Identify the product when ethylbenzene reacts with dil nitric acid.



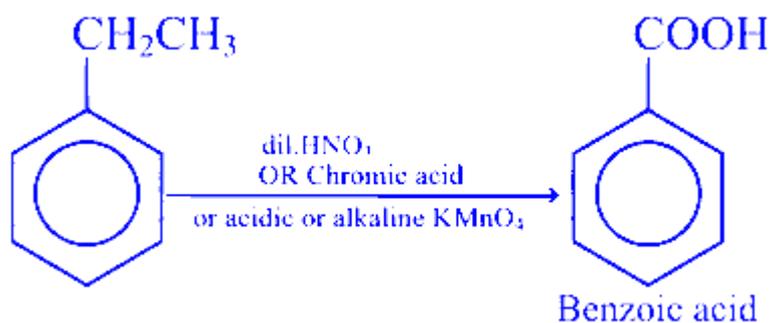
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Options:

- A. o-Nitroethylbenzene
- B. p-Nitroethylbenzene
- C. Ethoxybenzene
- D. Benzoic acid

Answer: D

Solution:



Question22

Which of the following alkanes is used for road surfacing?

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Options:

- A. Alkanes with less than 10 C atoms
- B. Alkanes having 20 C to 25 C atoms
- C. Alkanes having 25 C to 30 C atoms
- D. Alkanes having more than 35 C atoms

Answer: D

Solution:

For road surfacing, **bitumen (asphalt)** is used, which is obtained from the heavier fractions of petroleum. These consist of **very high molecular mass alkanes**, typically with carbon chain length **greater than C₃₅**.

✔ Correct Answer:

Option D – Alkanes having more than 35 C atoms

Question23

What is the total number of moles of ' C ' atoms and ' H ' atoms respectively present in following n mole molecule?



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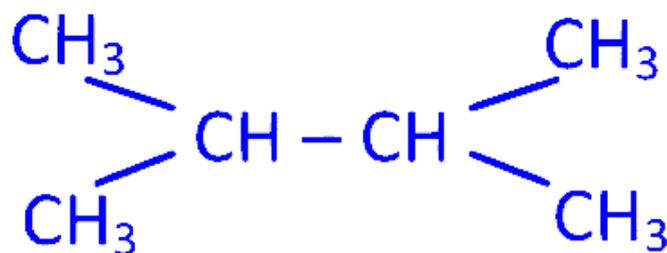
Options:

- A. $4n$ and $2n$
- B. $4n$ and $4n$
- C. $6n$ and $14n$
- D. $6n$ and $6n$

Answer: C

Solution:



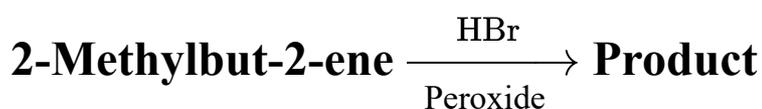


1 Molecule of given compound contains 6 C- atoms and 14 H -atoms.

∴ n moles of given compound (C₆H₁₄) will contain 6 n and 14 n moles of ' C ' atoms and ' H ' atoms respectively.

Question24

Which of the following compounds is formed as major product in the following reaction.



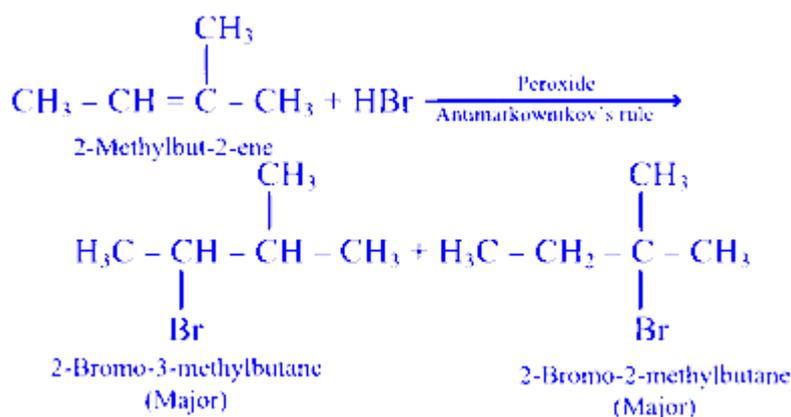
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Options:

- A. 3-Bromo-2-methylbutane
- B. 2-Bromo-2-methylbutane
- C. 2-Bromo-3-methylbutane
- D. 2-Bromobutane

Answer: C

Solution:



Question25

Identify the product obtained when alkenes are oxidised with KMnO_4 in dil. H_2SO_4 .

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Options:

- A. Alkanol
- B. Alkanal
- C. Alkanone
- D. Alkanoic acid

Answer: D

Solution:

Alkanoic acid is the most general and prevalent product formed from the strong oxidation of alkenes as KMnO_4 in dilute H_2SO_4 is a strong oxidizing agent.

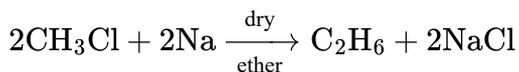
Question26

Which from the following reaction is a Fittig reaction?

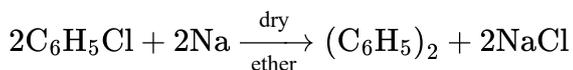
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Options:

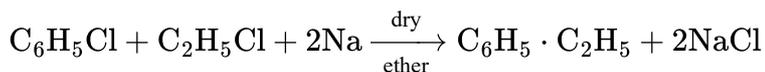
A.



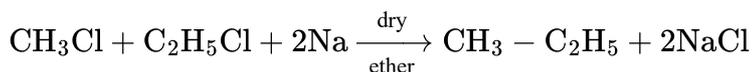
B.



C.



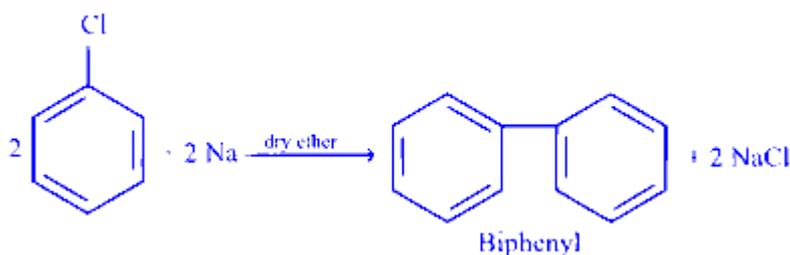
D.



Answer: B

Solution:

If only aryl halide takes part in the reaction, the product is biphenyl (or diphenyl) and the reaction is known as Fittig reaction. For example,



Question27

Which of the following compounds has highest boiling point?

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Options:

- A. *n*-Hexane
- B. 2-Methylpentane
- C. 3-Methylpentane
- D. 2,2-Dimethylbutane

Answer: A

Solution:

In straight chain alkane molecules, surface area is relatively larger as compared to branched chain alkanes and as a result, the intermolecular forces are relatively stronger in straight chain alkanes than in branched chain alkanes. Hence, straight chain alkanes have higher melting and boiling points as compared to branched alkanes.

Question28

Identify the name of reaction for aryl halide with alkyl halide and sodium metal in dry ether to give substituted aromatic compounds.

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Options:

- A. Wurtz reaction
- B. Wurtz-Fittig reaction
- C. Fittig reaction
- D. Finkelstein reaction

Answer: B

Solution:

The correct answer is **Option B: Wurtz-Fittig reaction.**

Explanation:

- When an **aryl halide** (like chlorobenzene) reacts with an **alkyl halide** (like bromoethane) in the presence of **sodium metal** and **dry ether**, a **substituted aromatic compound** is formed.
- The general reaction is:



- This reaction is called the **Wurtz-Fittig reaction**.

Other options:

- **Wurtz reaction** (Option A): Involves two alkyl halides, not aryl halide and alkyl halide.
- **Fittig reaction** (Option C): Involves only aryl halides; produces biaryl compounds.
- **Finkelstein reaction** (Option D): Is a halogen exchange reaction, not relevant here.

Therefore, the answer is **Option B**.

Question 29

Propene on hydroboration followed by oxidation with alkaline peroxide forms.

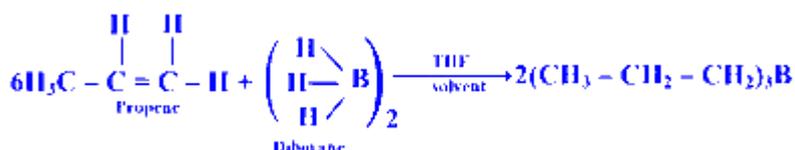
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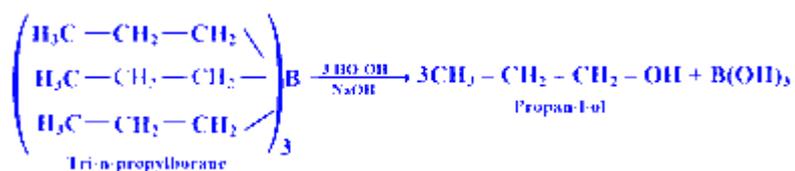
Options:

- A. Tri-n-propylborane
- B. Tri iso propylborane
- C. Propan-1-ol
- D. Propan-2-ol

Answer: C

Solution:





Question30

The reaction of propane with bromine in presence of UV light predominantly forms

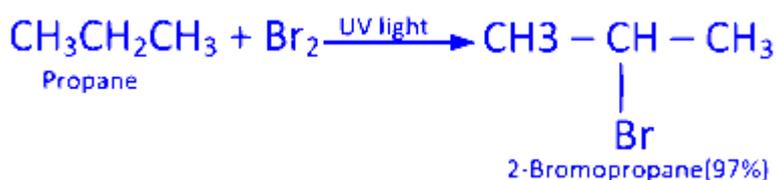
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Options:

- A. 1-Bromopropane
- B. 2-Bromopropane
- C. 1,2-dibromopropane
- D. 1,3-dibromopropane

Answer: B

Solution:



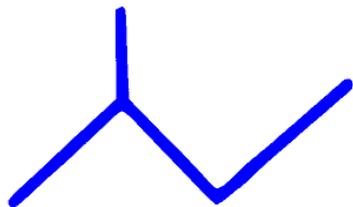
Question31

Identify the bond line formula of Neopentane.

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Options:

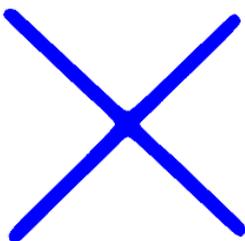
A.



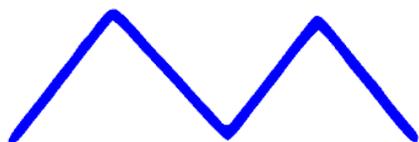
B.



C.

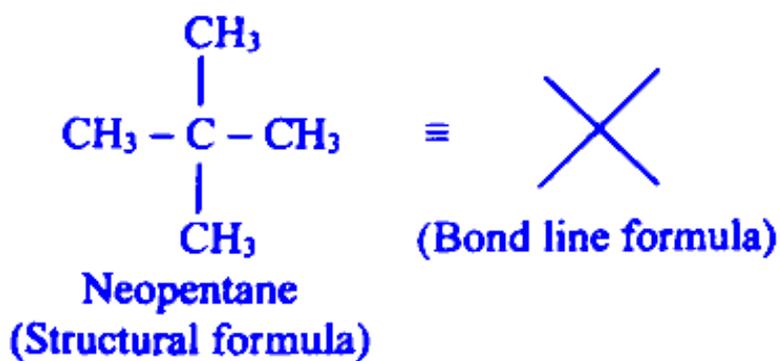


D.



Answer: C

Solution:



Question32

Which of the following is one of the product of ozonolysis?

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Options:

- A. alcohol
- B. acid
- C. aldehyde
- D. ester

Answer: C

Solution:

Ozonolysis is an organic reaction where ozone (O_3) cleaves double or triple bonds (mainly in alkenes), resulting in the formation of two carbonyl compounds.

For a simple alkene, ozonolysis generally gives **aldehydes** and/or **ketones** as products. The type depends on the substituents present at the double bond.

In the given options:

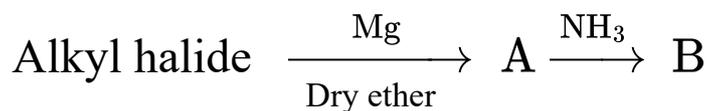
- Alcohol is not a direct product.
- Acid may form as a further oxidation product but not from simple ozonolysis.
- Aldehyde is a primary product.
- Ester is not a product of ozonolysis.

Answer:

Option C: **Aldehyde**

Question33

Identify the product ' B ' in the following reaction sequence.



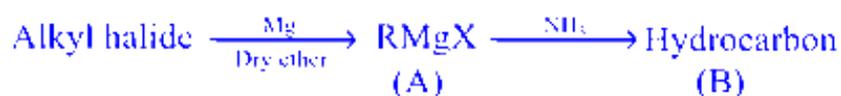
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Options:

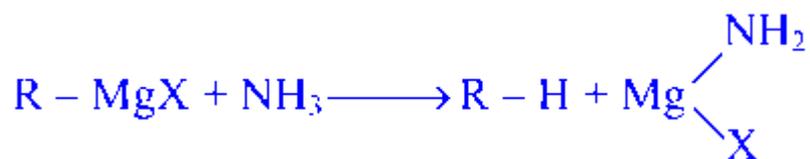
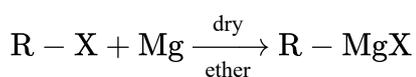
- A. Alkyl magnesium halide
- B. Alkyl amine
- C. Hydrocarbon
- D. Alkyl nitrile

Answer: C

Solution:



For example:

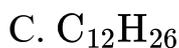


Question34

What is molecular formula of undecane?

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Options:



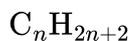
Answer: A

Solution:

The molecular formula of undecane is:



Undecane belongs to the alkane family, which follows the general formula:



For undecane, where $n = 11$:

$$H = 2(11) + 2 = 24$$

Hence, the molecular formula is $C_{11}H_{24}$, which corresponds to Option A.

Question35

What is the product of Hydroborationoxidation of but-1-ene?

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Options:

A. Butanal

B. Butanone

C. Butan-1-ol

D. Butan-2-ol

Answer: C

Solution:

The hydroboration-oxidation of an alkene involves two steps. The first step, hydroboration, adds borane (BH_3) to the alkene in a syn-addition manner, forming an organoborane intermediate. The second step, oxidation, treats this intermediate with hydrogen peroxide (H_2O_2) in the presence of a base (usually sodium hydroxide, $NaOH$), replacing the boron atom with a hydroxyl group.

For but-1-ene, the hydroboration-oxidation follows these steps:

Hydroboration (anti-Markovnikov addition): The boron atom adds to the less substituted carbon (the terminal carbon) of the but-1-ene, leading to the formation of a trialkylborane intermediate.

Oxidation: The organoborane intermediate is oxidized, replacing the boron atom with a hydroxyl group, resulting in the formation of an alcohol.

For but-1-ene, the reaction specifically yields butan-1-ol as the product, because the hydroxyl group is added to the terminal carbon (originally bonded with boron) due to the anti-Markovnikov addition pattern.

Therefore, the product of hydroboration-oxidation of but-1-ene is:

Option C: Butan-1-ol

Question36

Identify the product obtained when alkenes react with cold and dilute alkaline potassium permanganate.

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Options:

A. Alkanols

B. Glycols

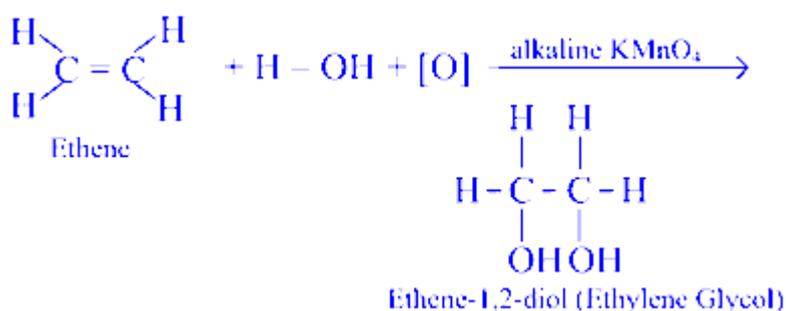
C. Glycerols

D. Alkanoic acids

Answer: B

Solution:

Alkenes react with cold and dilute alkaline potassium permanganate to form glycols.



Question37

The correct stability order of alkyl substituted alkenes is

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Options:

A. $\text{R}_2\text{C} = \text{CHR} > \text{R}_2\text{C} = \text{CH}_2 > \text{R}_2\text{C} = \text{CR}_2$

B. $\text{R}_2\text{C} = \text{CR}_2 > \text{R}_2\text{C} = \text{CHR} > \text{R}_2\text{C} = \text{CH}_2$

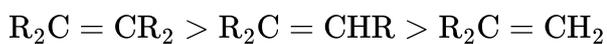
C. $\text{R}_2\text{C} = \text{CH}_2 > \text{R}_2\text{C} = \text{CR}_2 > \text{R}_2\text{C} = \text{CHR}$

D. $\text{R}_2\text{C} = \text{CR}_2 > \text{R}_2\text{C} = \text{CH}_2 > \text{R}_2\text{C} = \text{CHR}$

Answer: B

Solution:

Order of stability of alkyl substituted alkenes:



Greater is the number of alkyl groups attached to the doubly bonded carbon atoms, greater is the stability of alkene.

Question38

Which among the following is NOT a feature of S_N2 mechanism?

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Options:

- A. Single step mechanism.
- B. Backside attack of nucleophile.
- C. Formation of planar carbocation intermediate.
- D. Involves simultaneous bond breaking and bond forming.

Answer: C

Solution:

Answer: Option C (Formation of planar carbocation intermediate)

Explanation:

The S_N2 mechanism is characterized by:

A **single-step** process where the nucleophile attacks the electrophilic carbon from the side opposite to the leaving group (**backside attack**).

Simultaneous bond formation and bond breaking: As the nucleophile bonds to the carbon, the leaving group leaves in a concerted manner.

No carbocation intermediate is formed. Instead, the transition state involves both the nucleophile and the leaving group partially bonded to the central carbon.

In contrast, S_N1 mechanisms involve the formation of a planar carbocation intermediate after the leaving group departs.

Thus, the statement "Formation of planar carbocation intermediate" does not apply to the S_N2 mechanism.

Question39

What is the numerical difference in molar masses of second and third member of a homologous series?

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Options:

- A. 14
- B. 12
- C. 10
- D. 2

Answer: A

Solution:

In a homologous series, each successive member differs by a CH_2 group, which consists of one carbon atom and two hydrogen atoms. The molar mass of a carbon atom is approximately 12 g/mol and that of a hydrogen atom is approximately 1 g/mol. Therefore, the molar mass of a CH_2 group is:

$$\text{Molar mass of } CH_2 = 12 \text{ g/mol (for C)} + 2 \times 1 \text{ g/mol (for 2 H)} = 14 \text{ g/mol}$$

Thus, the numerical difference in molar masses between any two successive members of a homologous series is 14 g/mol. Therefore, the numerical difference in molar masses of the second and third member of a homologous series is 14 g/mol.

Option A: 14

Question40

Identify alkadiene molecule from following.

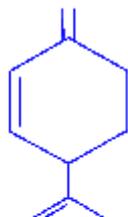
MHT CET 2024 15th May Morning Shift

Options:

- A. Isoprene
- B. β -Phellandrene
- C. But-2-ene
- D. Pent-1-ene

Answer: A

Solution:

$\begin{array}{c} \text{CH}_3 \\ \\ \text{H}_2\text{C} = \text{C} - \text{CH} = \text{CH}_2 \end{array}$ <p>Isoprene (Alkadiene)</p>	 <p>β-Phellandrene (Alkatrene)</p>
$\overset{1}{\text{H}_3\text{C}} - \overset{2}{\text{CH}} = \overset{3}{\text{CH}} - \overset{4}{\text{CH}_3}$ <p>But-2-ene</p>	$\overset{1}{\text{H}_3\text{C}} = \overset{2}{\text{CH}} - \overset{3}{\text{CH}_2} - \overset{4}{\text{CH}_3}$ <p>But-1-ene</p>

Question41

Identify the reagent R used in following conversion?

tert-butyl bromide $\xrightarrow{\text{R}}$ Isobutylene

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Options:

A. Sn/HCl

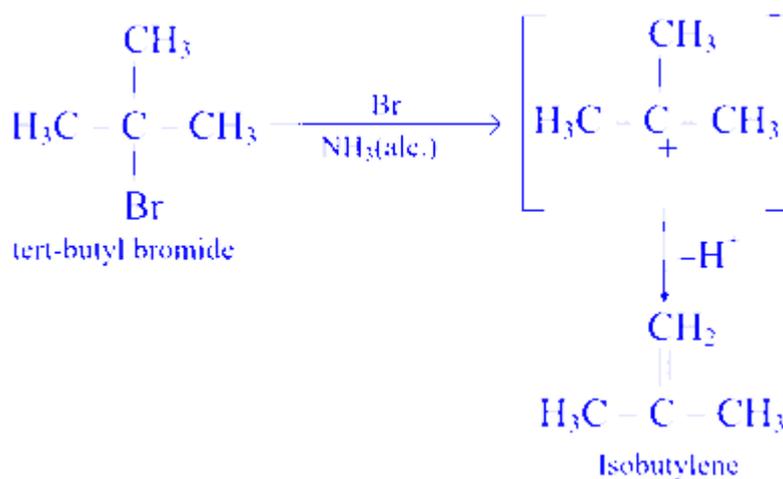
B. Na – Hg/H₂O

C. NH₃ (alc)

D. LiAlH₄

Answer: C

Solution:



Question42

Identify the correct stability order of following alkenes.

I) $(\text{CH}_3)_2\text{C} = \text{C}(\text{CH}_3)_2$

II) $(\text{CH}_3)_2\text{C} = \text{CH}_2$

III) $(\text{CH}_3)_2\text{C} = \text{CHCH}_3$

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Options:

A. III > II > I

B. I > III > II

C. II > I > III

D. I > II > III

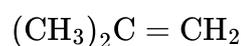
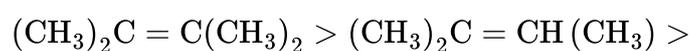
Answer: B

Solution:

The alkene that has greater number of alkyl groups attached to doubly bonded carbon atoms is more stable than other alkenes.

∴ Order of stability of alkenes with respect to Saytzeff rule is :

Saytzeff rule is :



Question43

Identify the product of ozonolysis of but-2-ene from following:

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Options:

A. Acetone and formaldehyde

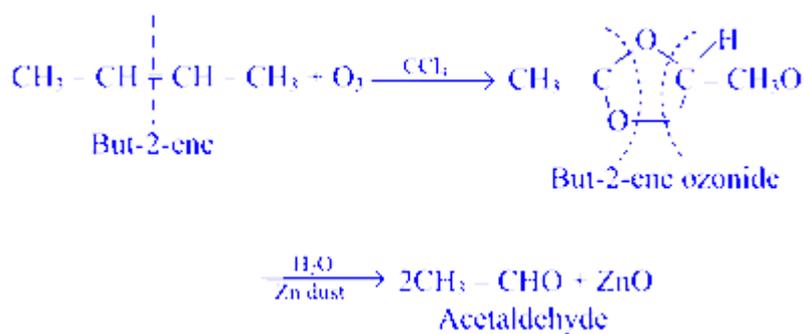
B. Acetaldehyde and formaldehyde

C. Acetone

D. Acetaldehyde

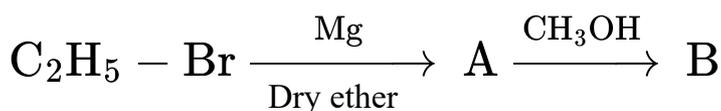
Answer: D

Solution:



Question44

Identify the product ' B ' in the following reaction sequence.



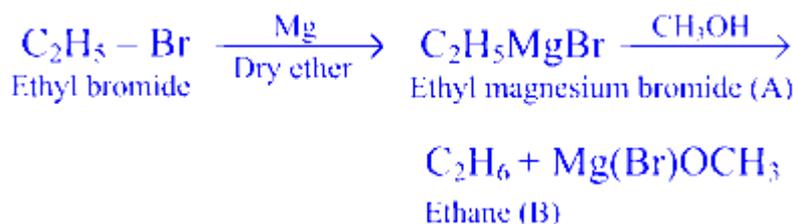
MHT CET 2024 11th May Evening Shift

Options:

- A. $\text{H}_3\text{C} - \text{CH}_2 - \text{CH}_3$
- B. $\text{C}_2\text{H}_5 - \text{O} - \text{CH}_3$
- C. C_2H_6
- D. $\text{C}_2\text{H}_5 - \text{OH}$

Answer: C

Solution:

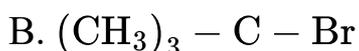
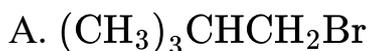


Question45

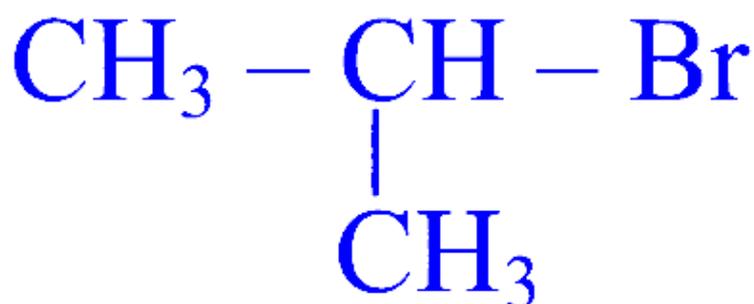
Identify the major product (99%) formed when $(\text{CH}_3)_3\text{CH}$ is treated with Br_2 in UV light.

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Options:

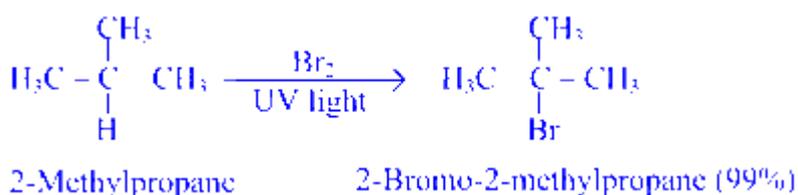


C.



Answer: B

Solution:



Question46

Which of the following is NOT obtained when a mixture of methyl bromide and ethyl bromide is treated with sodium metal in presence of dry ether?



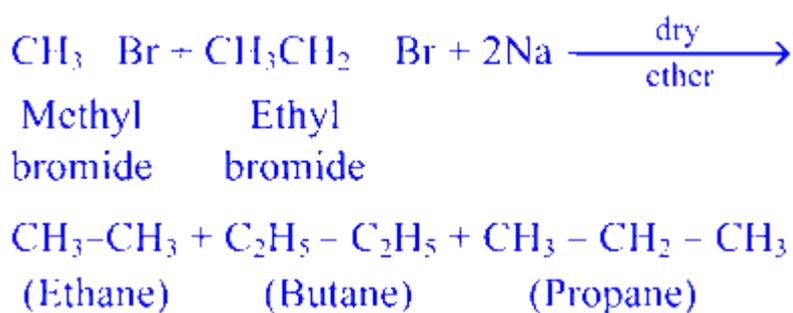
MHT CET 2024 10th May Evening Shift

Options:

- A. Ethane
- B. Propane
- C. Butane
- D. Pentane

Answer: D

Solution:



Question47

Which from following alkyl substituted alkenes is most stable?

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Options:

- A. $\text{R}_2\text{C} = \text{CR}_2$
- B. $\text{R}_2\text{C} = \text{CHR}$
- C. $\text{R}_2\text{C} = \text{CH}_2$
- D. $\text{RCH} = \text{CH}_2$

Answer: A



Solution:

Greater is the number of alkyl groups attached to the doubly bonded carbon atoms, greater is the stability of alkene.

∴ $R_2C = CR_2$ is the most stable alkene.

Question48

What is the molar mass of product hydrocarbon when 2 moles of methyl bromide reacts with large excess of sodium in dry ether?

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Options:

A. 15.0 g mol^{-1}

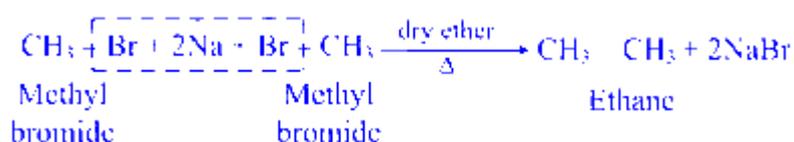
B. 30.0 g mol^{-1}

C. 7.5 g mol^{-1}

D. 40.0 g mol^{-1}

Answer: B

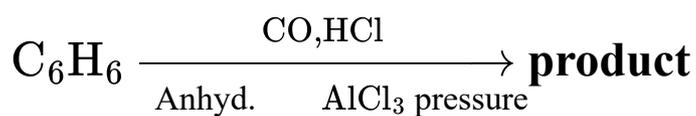
Solution:



Thus, the molar mass of the product formed, i.e., ethane is 30.0 g mol^{-1} .

Question49

Identify the product obtained in following reaction.



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Options:



Answer: B

Solution:



Question50

Identify the products obtained in the ozonolysis of propene.

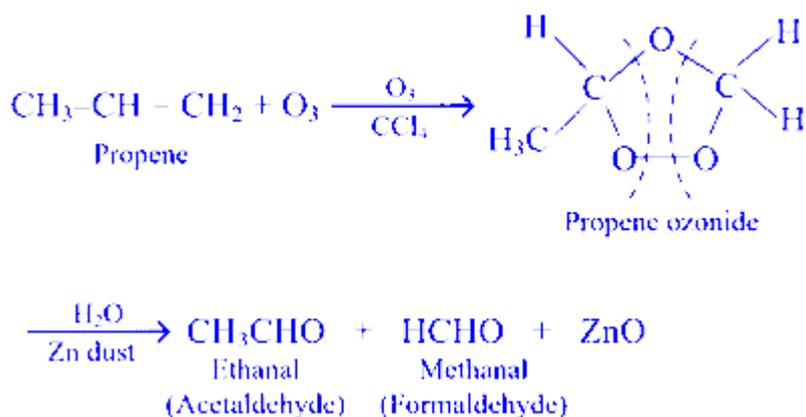
MHT CET 2024 9th May Evening Shift

Options:



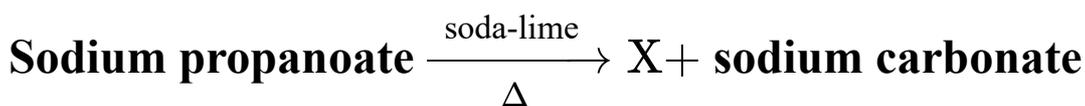
Answer: C

Solution:



Question51

Identify the product X in the following reaction.



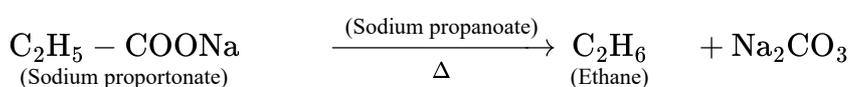
MHT CET 2024 9th May Evening Shift

Options:

- A. Propane
- B. Ethene
- C. Methane
- D. Butane

Answer: B

Solution:



Question52

Which from following reactions is not possible for benzene due to reversible nature?

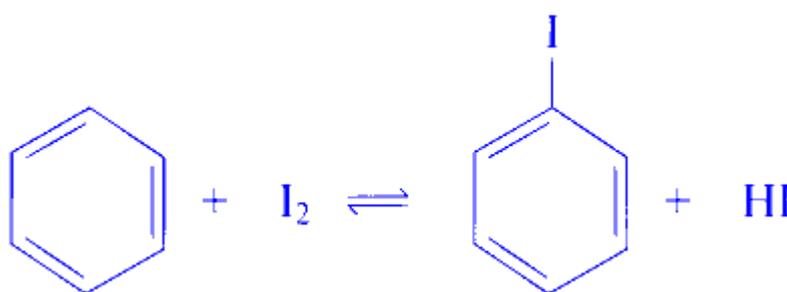
MHT CET 2024 9th May Morning Shift

Options:

- A. Hydrogenation
- B. Chlorination
- C. Bromination
- D. Iodination

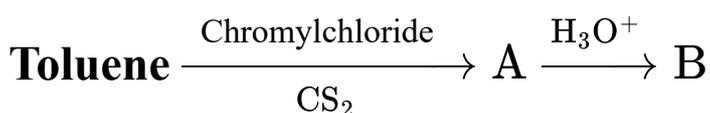
Answer: D

Solution:



Question53

Identify the product 'B' in the following reaction.



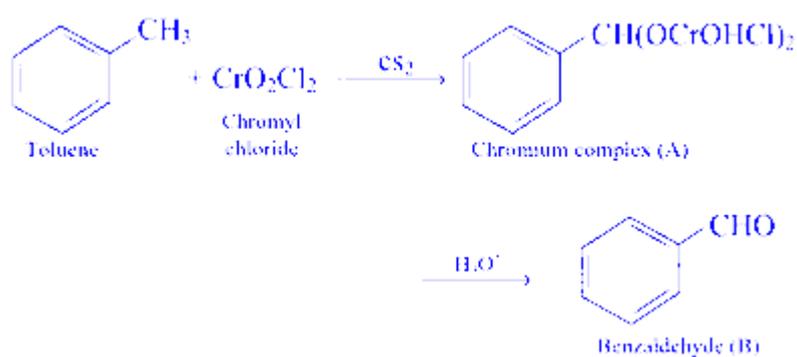
MHT CET 2024 4th May Evening Shift

Options:

- A. Benzal chloride
- B. Benzaldehyde
- C. Benzyl alcohol
- D. Benzoic acid

Answer: B

Solution:



Question 54

Which of the following is obtained on oxidation of prop-1-ene with acidic KMnO_4 ?

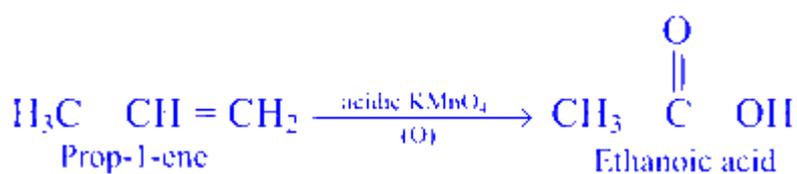
MHT CET 2024 4th May Evening Shift

Options:

- A. Ethanoic acid
- B. Propanoic acid
- C. Propanol
- D. Propanone

Answer: A

Solution:



Question55

Which from following has highest boiling point?

MHT CET 2024 3rd May Evening Shift

Options:

- A. 2-methoxy propane
- B. n-butane
- C. 2-methylbutane
- D. n-pentane

Answer: D

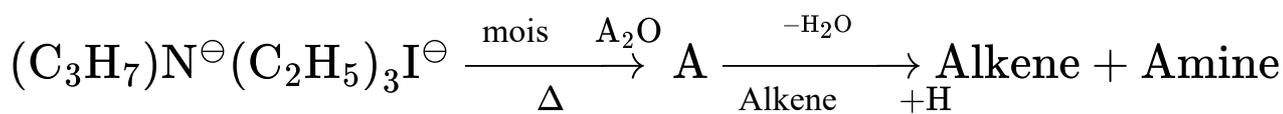
Solution:

Boiling points in hydrocarbons generally increase with the number of carbon atoms present in the molecule. This is because more carbon atoms typically mean a larger molecular size and greater van der Waals forces, which require more energy (in the form of heat) to overcome. Additionally, branching in a molecule reduces its boiling point because it decreases the surface area, leading to weaker van der Waals forces.

In the provided options, n-pentane has the highest boiling point. It consists of a straight chain of five carbon atoms, which maximizes the surface area and resulting van der Waals forces compared to its branched or shorter-chain counterparts.

Question56

Identify the alkene obtained as major product in the following Hofmann elimination reaction.



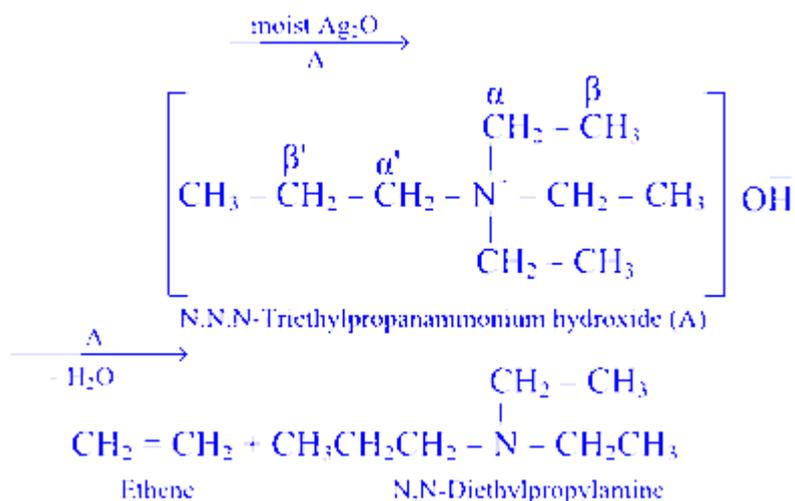
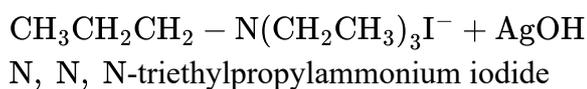
MHT CET 2024 3rd May Morning Shift

Options:

- A. Propene
- B. Ethene
- C. But-1-ene
- D. But-2-ene

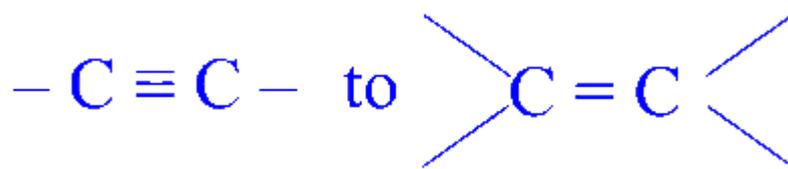
Answer: B

Solution:



Question57

Which of the following catalysts is used to convert



to form cis-alkene?

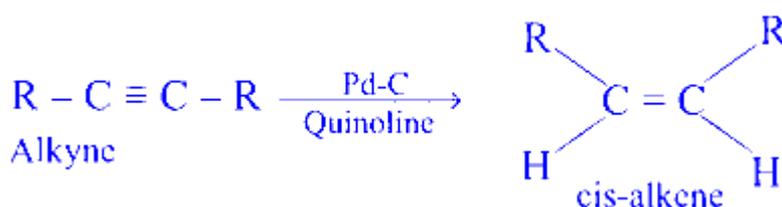
MHT CET 2024 3rd May Morning Shift

Options:

- A. $ZnCl_2/HCl$
- B. Pd – C quinoline
- C. Na / liquid NH_3
- D. Na/Hg in H_2O

Answer: B

Solution:



Question58

Which of the following is NOT obtained when a mixture of bromoethane and 1-bromopropane is treated with sodium metal in dry ether?

MHT CET 2024 2nd May Morning Shift

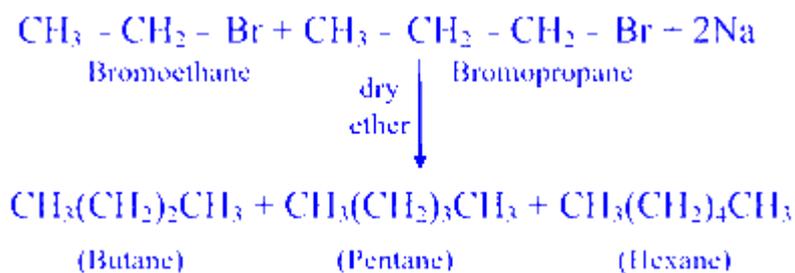
Options:

- A. Propane

- B. Butane
- C. Pentane
- D. Hexane

Answer: A

Solution:



Question59

What is the number of moles of tertiary carbon atoms in a molecule of isobutane?

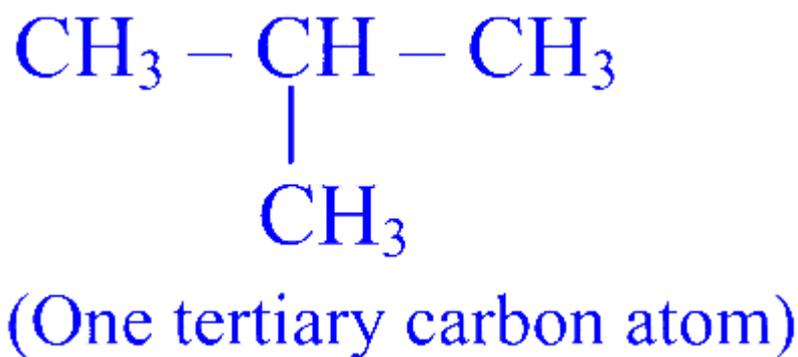
MHT CET 2023 14th May Morning Shift

Options:

- A. One
- B. Two
- C. Three
- D. Four

Answer: A

Solution:



Question60

Identify the product formed by the action of $\text{H}_2(g)$ with $\text{CO}(g)$ in presence of Ni ?

MHT CET 2023 13th May Evening Shift

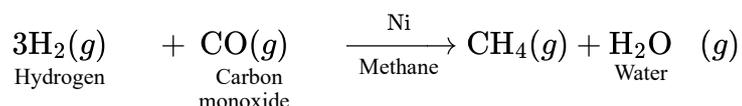
Options:

- A. Methane and water
- B. Methyl alcohol
- C. Acetaldehyde
- D. Ethylene oxide

Answer: A

Solution:

The reaction of $\text{H}_2(g)$ with $\text{CO}(g)$ in presence of Ni is as follows :



Thus, products formed are methane and water.

Question61

Which of the following is Wolf-Kishner reduction?

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Options:

A.



B.



C.



D.



Answer: D

Solution:

The reduction of carbonyl group of aldehydes and ketones to CH_2 group when treated with hydrazine followed by heating with sodium or potassium hydroxide in high boiling solvent such as ethylene glycol is called Wolf-Kishner reduction. It's reaction is as follows:



Question62

What is the number of moles of nascent hydrogen required to prepare 1 mole of methane from iodomethane?

MHT CET 2023 13th May Morning Shift

Options:

A. ,4

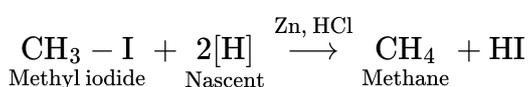
B. 3

C. 2

D. 1

Answer: C

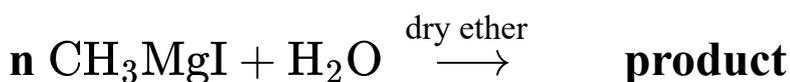
Solution:



Hence, the number of moles of nascent hydrogen required to prepare 1 mole of methane from iodomethane is 2 moles.

Question63

Identify the product obtained in following reaction.



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Options:

A. n MgI and n CH₄

B. $\frac{n}{2}$ C₂H₆

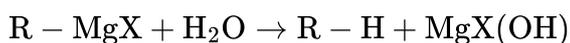
C. n CH₃OH and n MgI

D. n CH₄ and n MgI(OH)

Answer: D

Solution:

This is the reaction of methylmagnesium iodide (CH_3MgI), a Grignard reagent, with water (H_2O). The general reaction of a Grignard reagent with water is:



where R-MgX is the Grignard reagent (in this case, CH_3MgI , where $\text{R} = \text{CH}_3$ and $\text{X} = \text{I}$) and R-H is the corresponding hydrocarbon (in this case, CH_4).

So, when CH_3MgI reacts with water, the product will be methane (CH_4) and magnesium hydroxide iodide ($\text{MgI}(\text{OH})$).

Therefore, the correct option is :

Option D : $n \text{CH}_4$ and $n \text{MgI}(\text{OH})$.

Question64

Which among the following is NOT a feature of $\text{S}_{\text{N}}2$ mechanism?

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Options:

- A. Single step mechanism
- B. Backside attack of nucleophile
- C. Formation of planar carbocation intermediate
- D. Involves simultaneous bond breaking and bond forming

Answer: C

Solution:

The one that is NOT a feature of an $\text{S}_{\text{N}}2$ mechanism is:

C) Formation of planar carbocation intermediate

Why: $\text{S}_{\text{N}}2$ is a **single-step, concerted** reaction with **backside attack** and **simultaneous bond breaking/forming**, so it **does not** form a carbocation intermediate (that's characteristic of $\text{S}_{\text{N}}1$).

Question65

What is the number of moles of secondary carbon atoms in n mole isopentane?

MHT CET 2023 11th May Evening Shift

Options:

A. $4n$

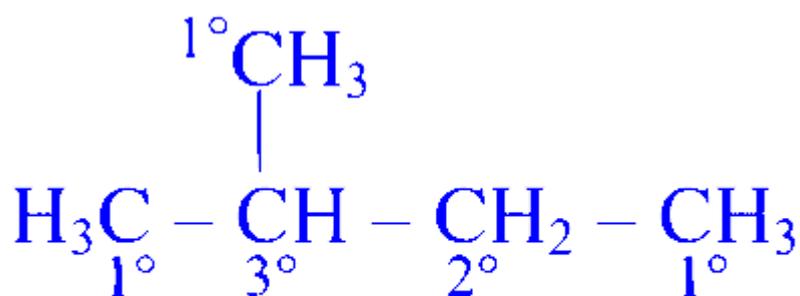
B. $3n$

C. $2n$

D. n

Answer: D

Solution:



Isopentane

1 molecule of isopentane has 1 secondary carbon atom.

\therefore 1 mol isopentane = 1 mol secondary carbon atoms

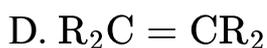
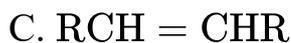
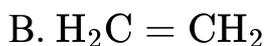
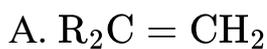
\therefore n mol isopentane = n mol secondary carbon atoms

Question66

Which among the following alkenes is most stable?

MHT CET 2023 11th May Morning Shift

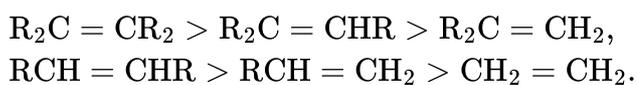
Options:



Answer: D

Solution:

Order of stability of alkyl substituted alkenes:



Greater is the number of alkyl groups attached to the doubly bonded carbon atoms, greater is the stability of alkene.

Question67

Which of the following compounds has highest boiling point?

MHT CET 2023 11th May Morning Shift

Options:

A. Chloromethane

B. Fluoromethane

C. Iodomethane

D. Bromomethane

Answer: C

Solution:

Molecules with higher molecular mass have higher boiling points.

So, for given alkyl group ($-\text{CH}_3$) boiling point decreases as, $\text{CH}_3\text{I} > \text{CH}_3\text{Br} > \text{CH}_3\text{Cl} > \text{CH}_3\text{F}$.

Question68

Which of the following is obtained as product when ethylene reacts with oxygen in presence of Pd/Al₂O₃ ?

MHT CET 2023 10th May Evening Shift

Options:

A. Acetaldehyde

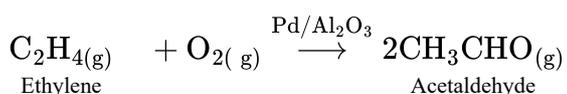
B. Acetic acid

C. Methane

D. Methyl alcohol

Answer: A

Solution:



Question69

Which of the following is general representation of Grignard reagent?

MHT CET 2023 10th May Evening Shift

Options:



Answer: C

Solution:

Grignard reagents are a class of organomagnesium compounds typically represented by the general formula $R - Mg - X$, where R is an organic group (like an alkyl or aryl group) and X is a halogen (such as chlorine, bromine, or iodine). Therefore, the correct option for the general representation of a Grignard reagent is :

Option C : $R - Mg - X$

Question 70

Identify the product P obtained in following reaction.



MHT CET 2023 10th May Morning Shift

Options:

A. Benzoic acid

B. Benzaldehyde

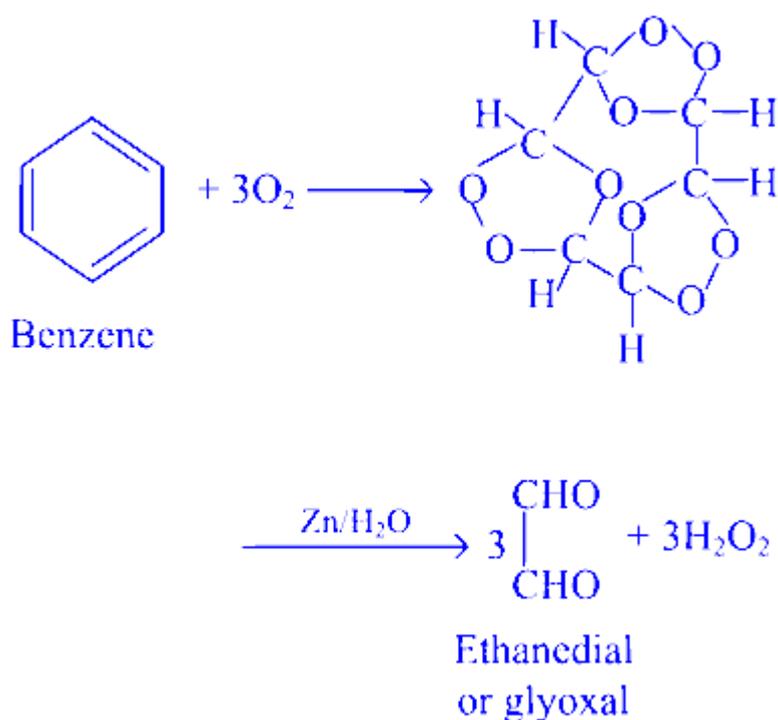


- C. Phenol
- D. Glyoxal

Answer: D

Solution:

When benzene is treated with ozone in presence of an inert solvent such as carbon tetrachloride, benzene triozonide is formed which is then decomposed by zinc dust and water to give glyoxal.



Question 71

What is the number of moles of sp^2 hybrid carbon atoms present in n moles of isopentane?

MHT CET 2023 9th May Evening Shift

Options:

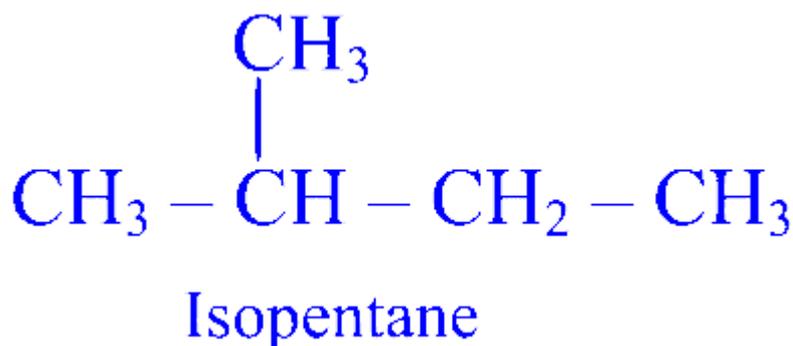
- A. zero
- B. one

C. two

D. three

Answer: A

Solution:



There are no sp^2 hybridized carbon atoms in isopentane.

Question 72

Which of the following compounds has the highest boiling point?

MHT CET 2023 9th May Evening Shift

Options:

A. Chloromethane

B. Fluoromethane

C. Iodomethane

D. Bromomethane

Answer: C

Solution:

Molecules with higher molecular mass generally have higher boiling points. So, for given alkyl group (here $-\text{CH}_3$) boiling point decreases as, $\text{RI} > \text{RBr} > \text{RCl} > \text{RF}$.

Question73

What is the number of moles of sp^2 hybrid carbon atoms in one mole of hexa-1,4-diyne?

MHT CET 2023 9th May Morning Shift

Options:

A. 5

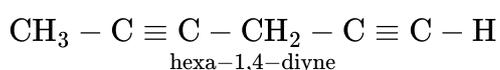
B. 3

C. 4

D. Zero

Answer: D

Solution:



It does not contain sp^2 hybridized carbon atom. Hence, the number of moles of sp^2 hybrid carbon atoms in one mole of hexa-1,4-diyne is zero.

Question74

What is the number of moles of water molecules required to prepare n moles of methane from n moles of methyl magnesium iodide?

MHT CET 2023 9th May Morning Shift

Options:

A. n

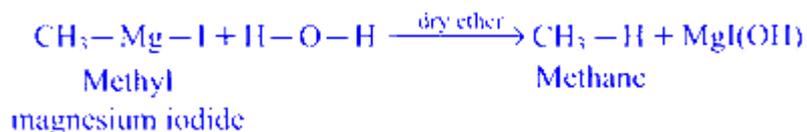
B. $2n$

C. 0.5n

D. 0.1n

Answer: A

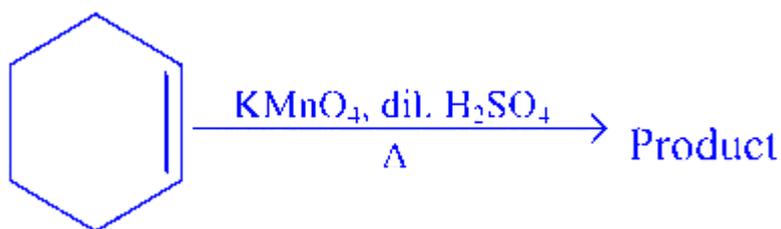
Solution:



From the reaction, n moles water molecules are required to prepare n moles of methane from n moles of methyl magnesium iodide.

Question 75

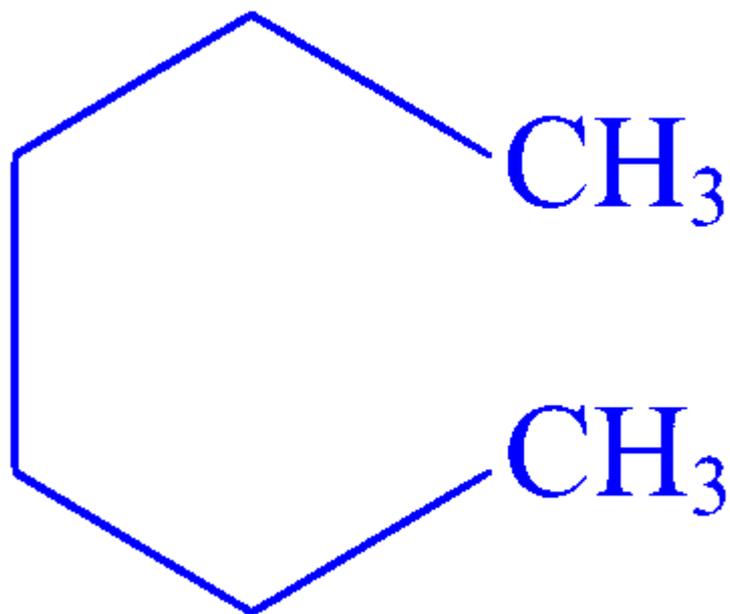
Identify the product in the following reaction.



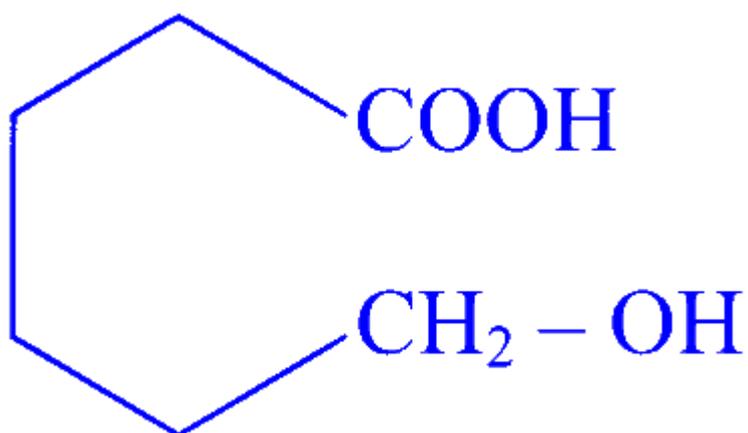
MHT CET 2022 11th August Evening Shift

Options:

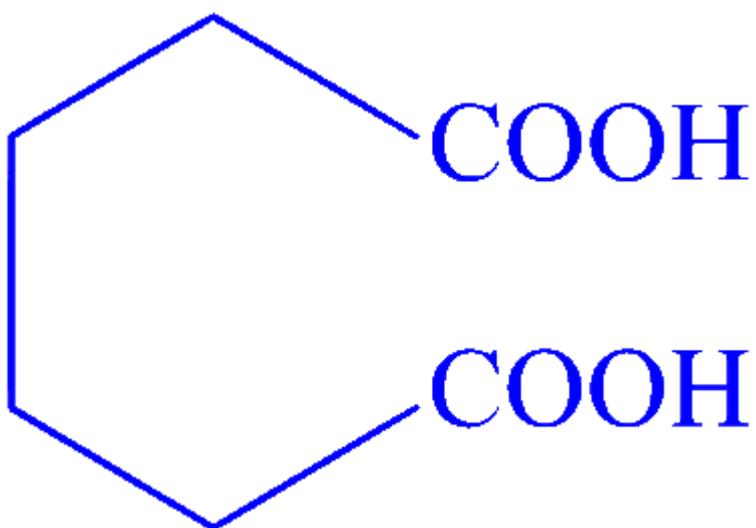
A.



B.

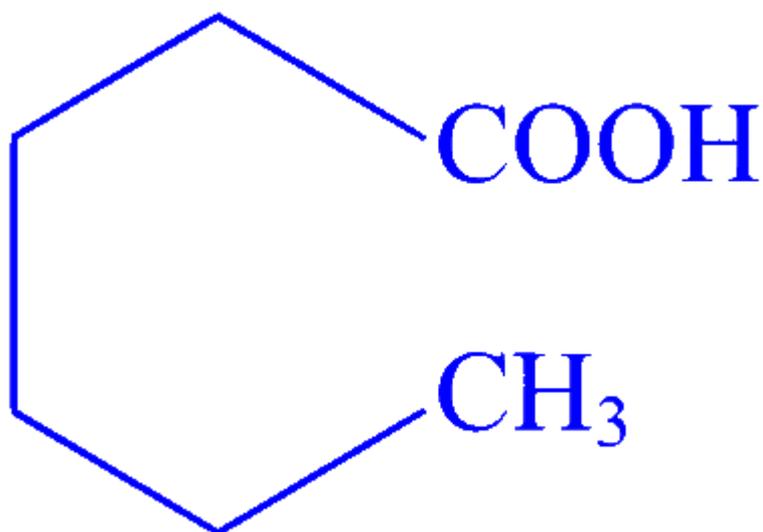


C.



D.





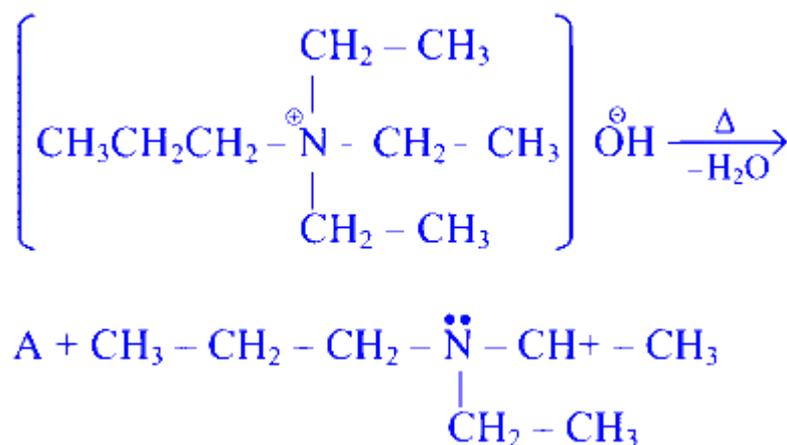
Answer: C

Solution:

The carbon atoms of double bond will form -COOH on oxidation.

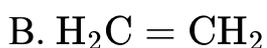
Question 76

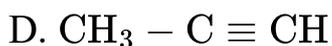
Identify the product A in the following reaction.



MHT CET 2022 11th August Evening Shift

Options:





Answer: B

Solution:

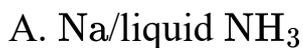
Hoffmann's β -elimination reaction.

Question77

Which of the following catalyst/reagent is used to convert $\text{C} \equiv \text{C}$ triple bond to $\text{C} = \text{C}$ double bond to form cis isomer of alkene?

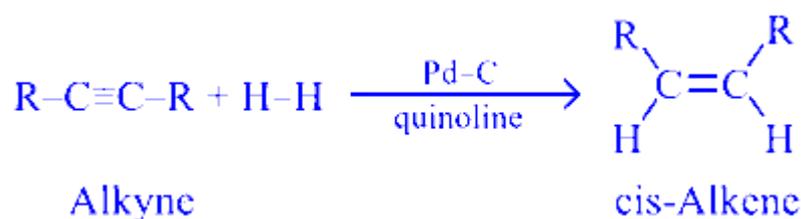
MHT CET 2021 24th September Evening Shift

Options:



Answer: B

Solution:



Question78



Identify the product formed when ethyl benzene reacts with nitric acid.

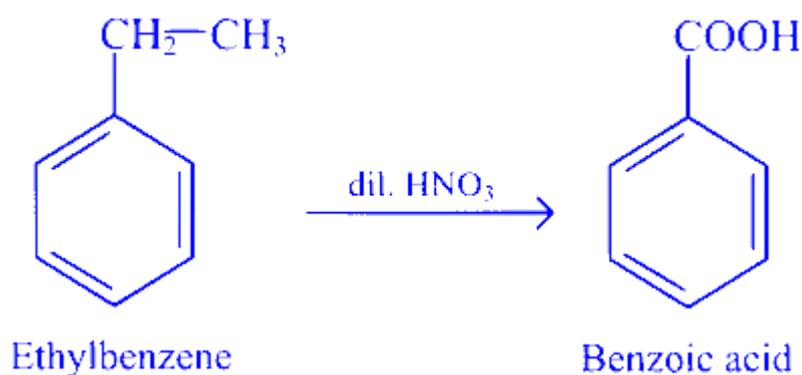
MHT CET 2021 23rd September Evening Shift

Options:

- A. o-Nitro ethylbenzene
- B. Ethoxybenzene
- C. p-Nitro ethylbenzene
- D. Benzoic acid

Answer: D

Solution:



Question 79

Which of following reactions yields biphenyl from chlorobenzene?

MHT CET 2021 23th September Morning Shift

Options:

- A. Swartz reaction

Methane can not be prepared by Wurtz reaction.

Question81

Which of the following alkyl halide is treated with sodium metal to obtain 2, 2, 3, 3 - tetramethyl butane?

MHT CET 2021 22th September Evening Shift

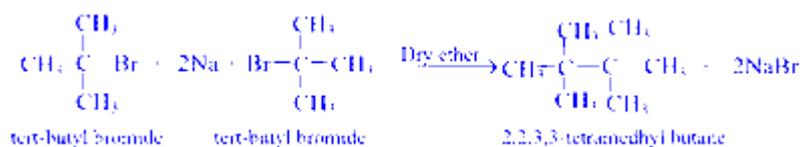
Options:

- A. tert-Butyl bromide
- B. n-Propyl bromide
- C. sec-Butyl bromide
- D. n-Butyl bromide

Answer: A

Solution:

Wurtz reaction



Question82

What are the final products obtained by ozonolysis of propene?

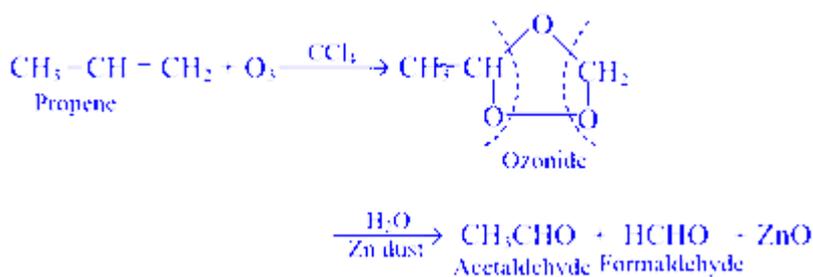
MHT CET 2021 22th September Morning Shift

Options:

- A. 2 molecules of acetaldehyde
- B. acetone
- C. 2 molecules of formaldehyde
- D. formaldehyde and acetaldehyde

Answer: D

Solution:



Question83

Which among the following molecules exhibits strong London forces?

MHT CET 2021 21th September Evening Shift

Options:

- A. neo-pentane
- B. n-pentane
- C. isobutane
- D. isopentane

Answer: B

Solution:

n-pentane is a straight chain alkane, exhibits strong London forces as compared to other branched chain alkanes.

Question84

Which isomer of C_6H_{14} has highest boiling point?

MHT CET 2021 21th September Evening Shift

Options:

- A. Hexane
- B. 3-Methylpentane
- C. 2-Methylpentane
- D. 2,2-Dimethylbutane

Answer: A

Solution:

Straight chain isomer, i.e., hexane has highest boiling point as compared to branched chain isomers of C_6H_{14} .

Question85

Select the catalyst used in hydrogenation of ethene.

MHT CET 2021 21th September Morning Shift

Options:

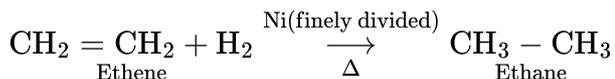
- A. Fe - Cr
- B. MnO_2

C. Ni (finely divided)

D. Co - Th alloy

Answer: C

Solution:



Question86

What is the number of $-\text{CH}_2$ - groups present in dodecane?

MHT CET 2021 21th September Morning Shift

Options:

A. 12

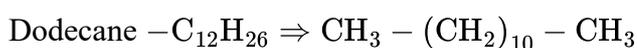
B. 10

C. 15

D. 13

Answer: B

Solution:



Question87

The reaction of propane with bromine in presence of UV light predominantly forms



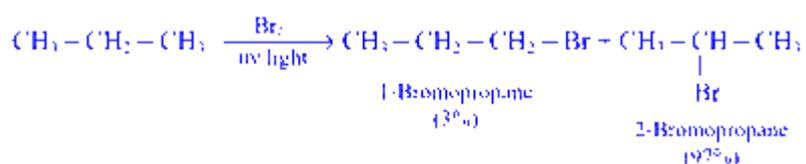
MHT CET 2021 21th September Morning Shift

Options:

- A. 2 - bromopropane
- B. 1, 2 - dibromopropane
- C. 1, 3 - dibromopropane
- D. 1 - bromopropane

Answer: A

Solution:



The ease of replacement of hydrogen atoms from the carbon is in the order of $3^\circ > 2^\circ > 1^\circ$.

Question88

When 2-Methylbut-2-ene is treated with hydrogen chloride, the major product obtained is

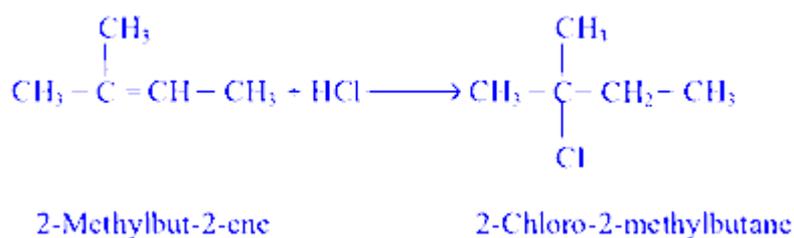
MHT CET 2021 20th September Morning Shift

Options:

- A. 2-Chlorobutane
- B. 2-Chloro-2-methylbutane
- C. 3-Chloro-2-methylbutane
- D. 2-Chloro-3-methylbutane

Answer: B

Solution:



Question89

Identify total number carbon atoms present in undecane.

MHT CET 2021 20th September Morning Shift

Options:

- A. 9
- B. 11
- C. 10
- D. 20

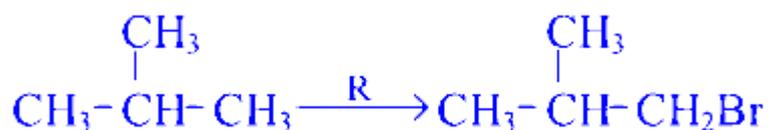
Answer: B

Solution:

Undecane \rightarrow $\text{C}_{11}\text{H}_{24}$

Question90

Identify the reagent R used in following reaction?



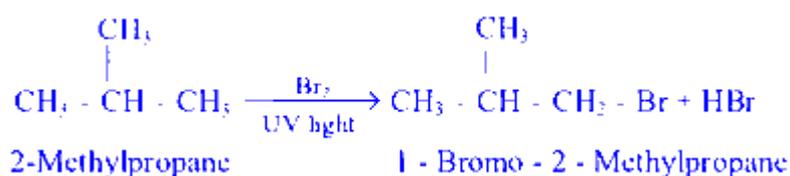
MHT CET 2021 20th September Morning Shift

Options:

- A. HBr/UV light
- B. HBr
- C. Br₂
- D. Br₂/UV light

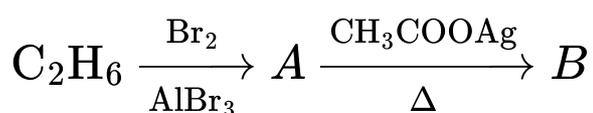
Answer: D

Solution:



Question91

Identify ' B ' in the following reaction.



MHT CET 2020 19th October Evening Shift

Options:

- A. C₂H₅COOCH₃

Carbon twenty (C_{20}) to carbon thirty (C_{30}) range of carbon atoms in alkanes found in paraffin wax. It is a soft colourless solid derived from petroleum, coal or shale oil that consists of a mixture of hydrocarbon molecules. It is used in candles, wax paper, polishes, cosmetics and electrical insulators.

Question93

Identify the hydrocarbon compound from following containing carbon atoms in the range of C_6 to C_8 ?

MHT CET 2020 16th October Evening Shift

Options:

- A. Petrol
- B. CNG
- C. Diesel
- D. Waxes

Answer: A

Solution:

Petrol hydrocarbon compound containing carbon atom in the range of C_6 to C_8 . It is a mixture of several different hydrocarbons. The most commonly found molecules are alkanes (linear or branched), cycloalkanes. Each petroleum variety has a unique mixture of molecules, which define its physical and chemical properties. The alkanes from pentane (C_5H_{12}) to octane (C_8H_{18}) are refined into petrol.

Question94

The alkane formed on heating sodium butanoate with sodalime is

MHT CET 2019 3rd May Morning Shift

Options:



Question97

How many gram of sodium (atomic mass $23u$) is required to prepare one mole of ethane from methyl chloride by Wurtz reaction?

MHT CET 2019 2nd May Evening Shift

Options:

A. 2

B. 23

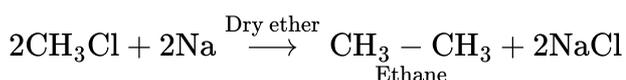
C. 11.5

D. 46

Answer: D

Solution:

The Wurtz reaction between methyl chloride and sodium metal in presence of dry ether can be written as :



\Rightarrow 2 moles of sodium metal reacts to give 1 mole of ethane.

Also,

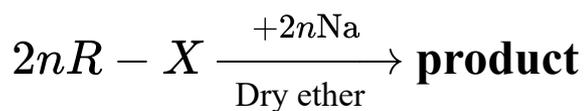
1 mole of Na metal = 23 g

\therefore 2 moles of Na metal = $23 \times 2 = 46$ g

Thus, 46 g of sodium is required to prepare one mole of ethane from methyl chloride by Wurtz reaction.

Question98

In the reaction,



The product obtained is

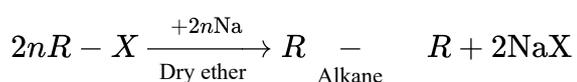
MHT CET 2019 2nd May Morning Shift

Options:

- A. 2n-alkene
- B. n-sodium halide
- C. n-alcohol
- D. n-alkane

Answer: D

Solution:



The above given reaction is known as Wurtz reaction.

Question99

α - butylene when subjected to hydroboration oxidation reaction, yields

MHT CET 2019 2nd May Morning Shift

Options:

- A. iso-butyl alcohol
- B. sec-butyl alcohol



D. 1, 2-dichloro propane

Answer: C

Solution:

When propene reacts with HCl in presence of peroxide, the reaction proceeds via Markovnikov's rule because some of the steps in chain reaction are endothermic in nature. The product obtained is 2-chloropropane.

The reaction is as follow:

