CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (HINGLISH)

ALKYNES

Illustrations

1. Give Structural formula for the following compounds:

a. Z-Pent-3-en-1-yne

b. E-Hept-5-en-1, 3-diyne

c. E-1-Ethynl-2-methyl cyclopropane

d. Progargyl cyclobutene or (2-Propynyl) cyclo-but-1-ene

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2. What is the smallest ring that can accommodate a triple bond?

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3. Which isomer is chiral?

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4. Give the structural formula of an unsaturated hydrocarbon with the lowest number of C atoms (or with lowest molecular mass) which shows:

a. Optical isomers

b. Geometrical isomers

c. Both optical and geometrical isomers

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5. Give the structural formula of a cyclic alkyne with the lowest number of C atoms and showing:

a. Both geometrical and optical isomerisms.

b. Geometrical isomerism with meso stereoisomers.

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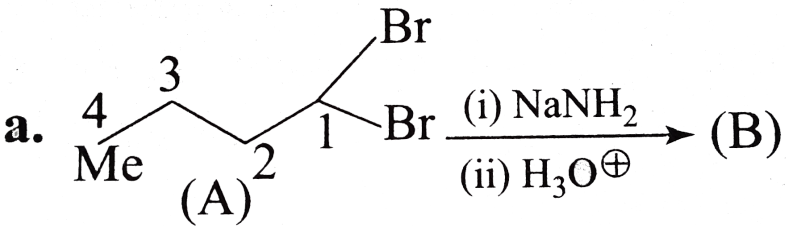
6. a.



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7. Which of the following acid-base reactions will occur?

f. $H - C \equiv CNa + CH_3OH$

g. $H - C \equiv CH + CH_3Li$

h. $H - C \equiv CH + NaH$

i. $H - C \equiv CH + NaCN$

j. $H - C \equiv CNa + CH_3COOH$

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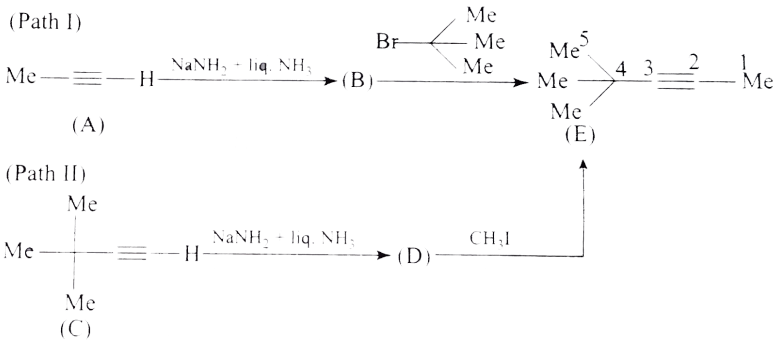
8. Explain which path is feasible for the preparaation of compound 4, 4-Dimethyl pent-2-yne (E).



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9. How are terminal alkynes distinguished and separated from internal alkynes?

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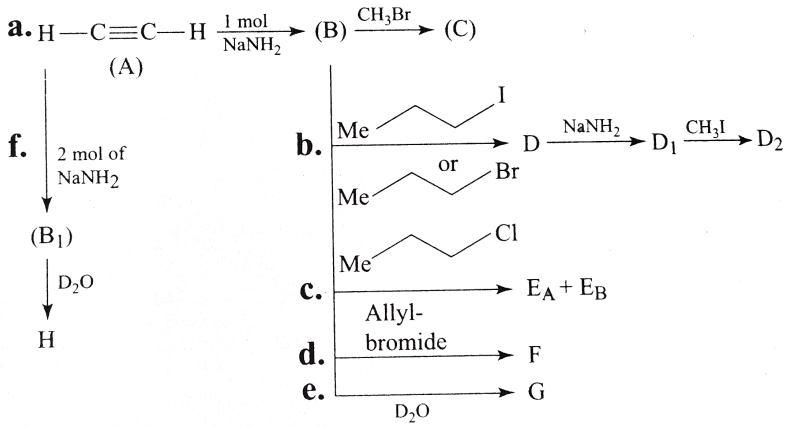
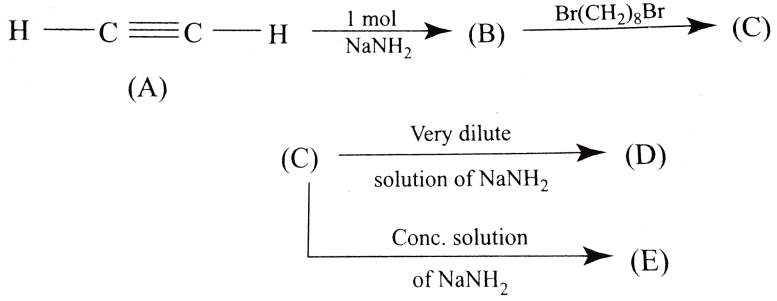
10. Complete the following reactions: a. $H-\underset{(A)}{C}\equiv C-H \xrightarrow[NaNH_2]{1mol} (B) \xrightarrow{CH_3Br} (C)$



g. $H - C \equiv C - H \xrightarrow[NaNH_2]{1mol} (B) \xrightarrow{Br(CH_2)_8Br} (C)$



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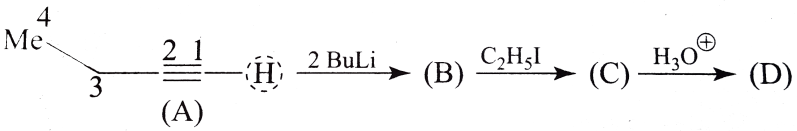
11. Explain the formation of products (B), (C), and (D) in the following reaction.



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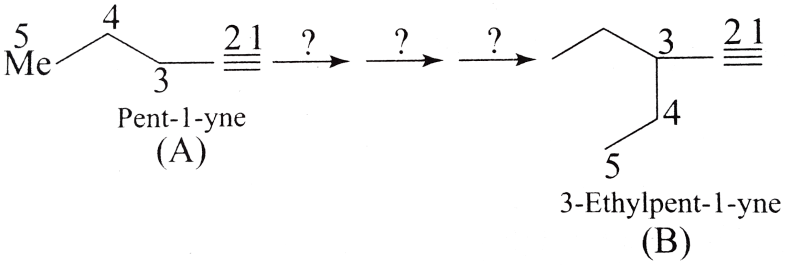
12. Convert:



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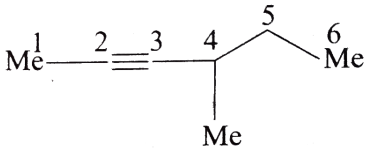
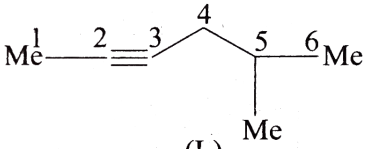
13. Complete the following reactions:

a. $Prop-1-\text{yne} \xrightarrow[liq.NH_2]{NaNH_2} (B)$

I. ? (G) + ? (H) → 

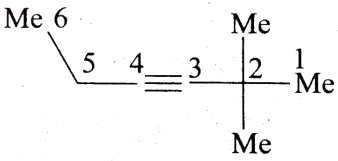
(I)

4-Methylhex-2-yne

II. ? (J) + ? (K) → 

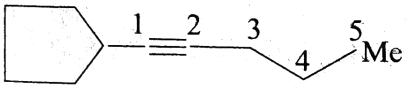
(L)

5-Methylhex-2-yne

III. ? (M) + ? (N) → 

2,2-Dimethylhex-3-yne

(O)

IV. ? (P) + ? (Q) → 

1-Cyclopentylpent-1-yne

(R)

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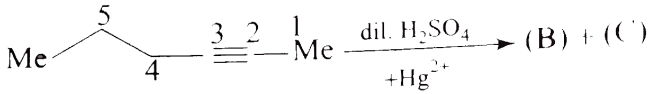
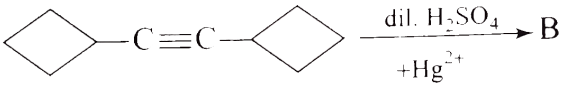
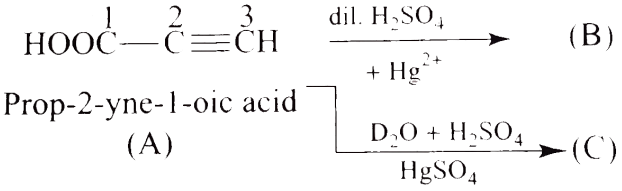
14. Complete the following reactions:

a. 

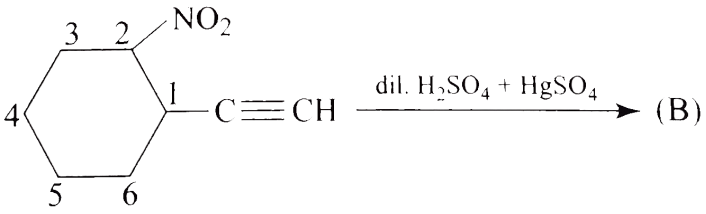
Hex-2-yne
(A)

b. 

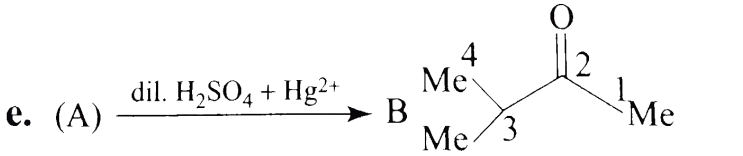
Dicyclobutyl ethyne (A)

c. 

Prop-2-yne-1-oic acid
(A)

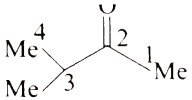
d. 

(2-Nitrocyclohexyl)-ethyne (A)

e. 

3-Methyl butan-2-one
(B)

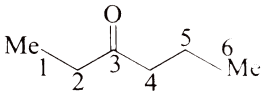
e. (A) $\xrightarrow{\text{dil. } H_2SO_4 + Hg^{2+}}$ B



3-Methyl butan-2-one

(B)

f. (A) $\xrightarrow{\text{dil. } H_2SO_4 + Hg^{2+}}$



Hexan-3-one

(B)

g. $Me^{3}-\overset{2}{\equiv}\overset{1}{}$ Propyne (A) $\xrightarrow[\text{(ii) } C_2H_5Br]{\text{(i) } NaNH_2 + \text{liq. } NH_3}$ (B) $\xrightarrow{H_2 + \text{Poisoned Pd}}$ (C)

(B) $\xrightarrow{LAH}$ (E) $\xrightarrow{Br_2}$ (D)

(C) $\xrightarrow{Br_2}$ (D)

(B) $\xrightarrow{\text{dil. } H_2SO_4 + Hg^{2+}}$ (F) + (G)

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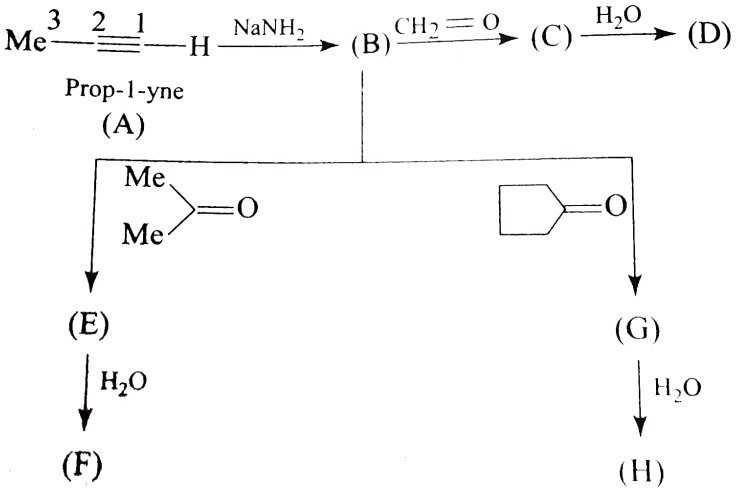
15. Compolete the following:

a.

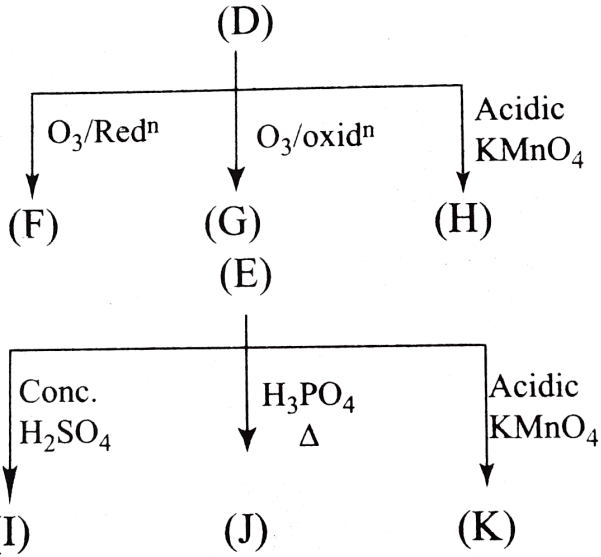


b.

c. $HC \equiv CH + 2\,CH_2{=}O \xrightarrow[(ii)\ H_2O]{(i)\ CH_3ONa}$

(A) (B)

(C) $\xrightarrow{H_2 + Ni_2B}$ (D) $\xrightarrow{H_2 + Pt}$ (E)



c.

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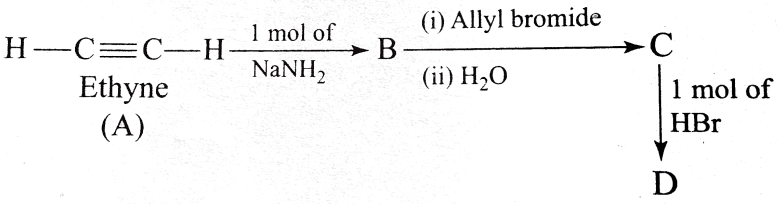
16. Complete the following reaction



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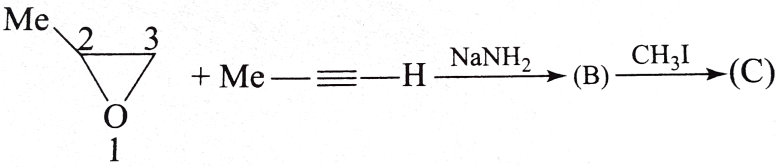
17. 

2-Methyl oxirane

Give the products (B) and (C) in the above reaction.

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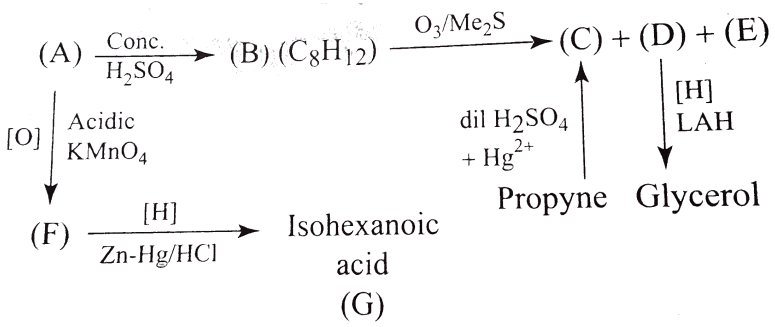
18. Compound (A) is an important consituent of hormone that is found in beetles and gives the following reactions. Identify compounds (A) to (G).



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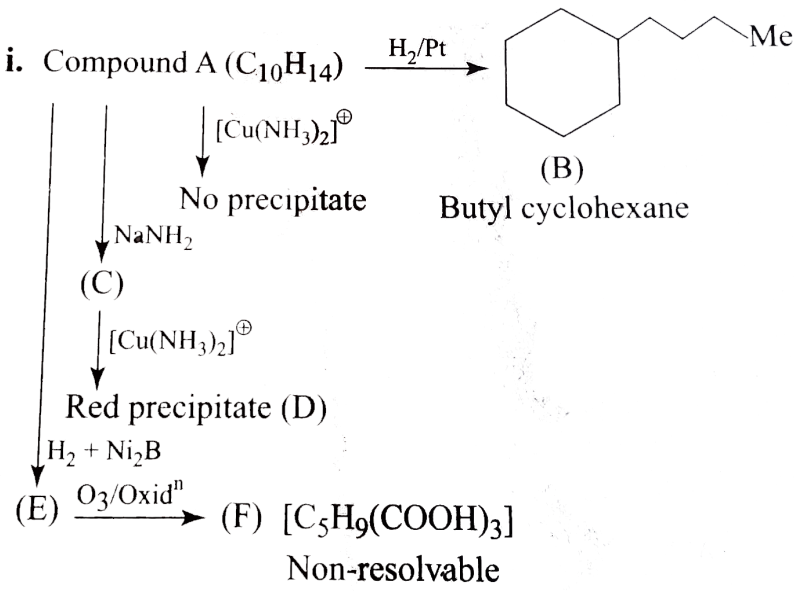
19. Identify (A) to (F).

i.



ii. What would be the structure of (A) if (F) is resolvable?

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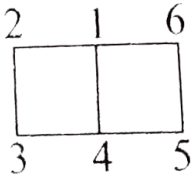
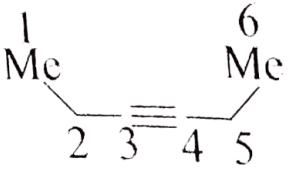
20. Distinguish between the following pairs:



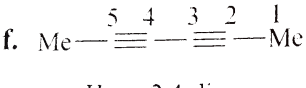
and



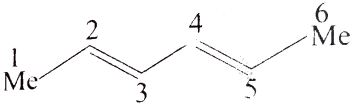
Bicyclo [2.2.0] hexane
(V)

Hex-3-yne
(VI)

a. and

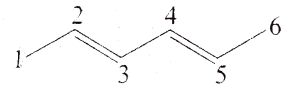


and

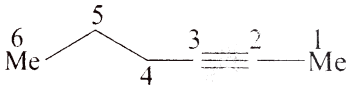


Hexa-2,4-diyne
(XI)

Hexa-2,4-diene
(XII)

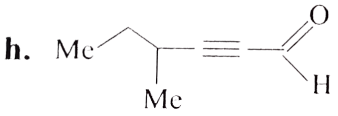


and

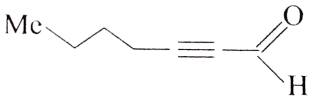


Hexa-2,4-diene
(XIII)

Hex-2-yne
(XIV)



and



(XV)

(XVI)

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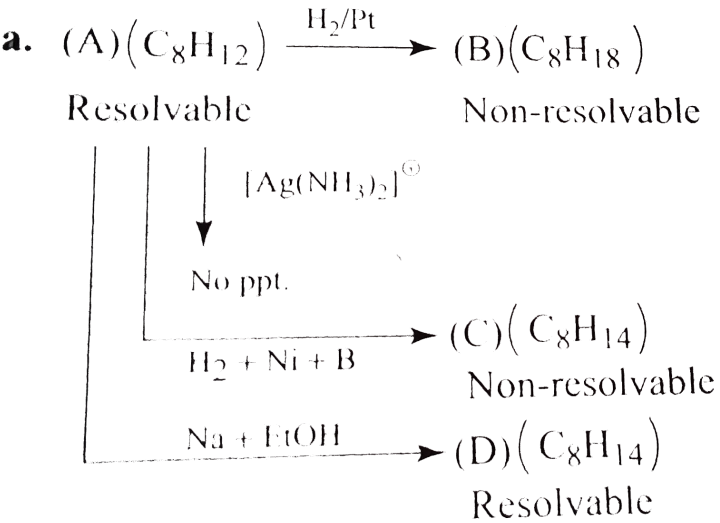
21. Identify (A) and (D).

a.



a.

b. What would be the structure of (A), if on reaction with $(Na + EtOH)$ or $(H_2 + Ni_2B)$, it gives an optically active compound?

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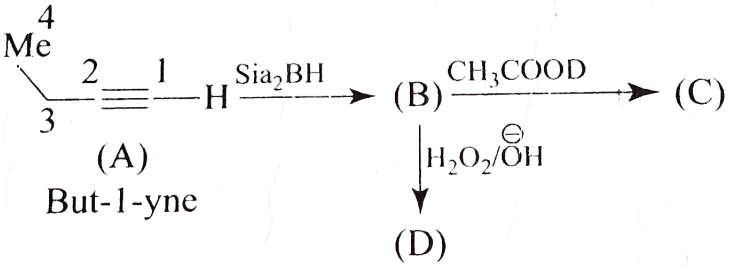
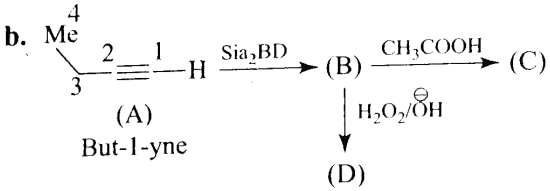
22. Complete the following reactions:

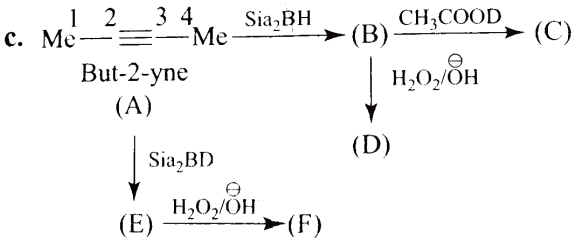
a.



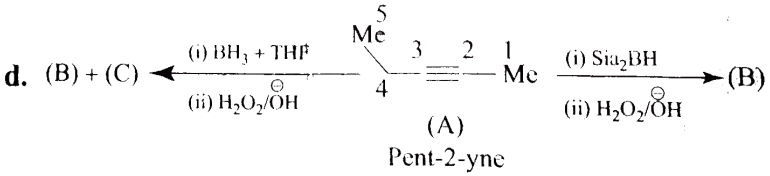
b.



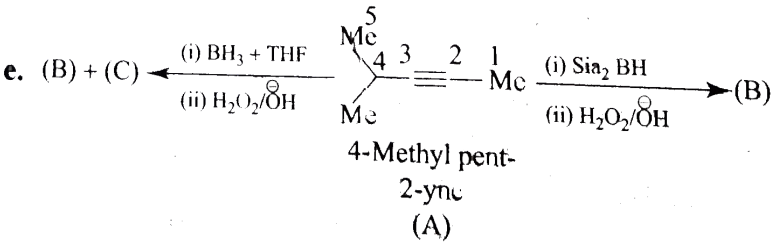
c.



d.



e.



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23. a. Give the structure of lowest molecular mass and optically active alkyne.

b. Give the structure of unsaturated hydrocarbon with lowest molecular mass showing diastereomers.

c. Give the structure of alkyne that gives the same product on reaction with either $H_2 + Ni_2B$ or $K + C_2H_5OH$.

d. Give the structure of alkyne that gives the same single product on reaction with either $\left(B_2H_6/THF + H_2O_2/\overset{\ominus}{H}\right)$ or dil. $H_2SO_4/Hg^{2+}/H^{\oplus}$.

e. Give the structure of alkyne that gives the same two products with either of the reagents in (d).

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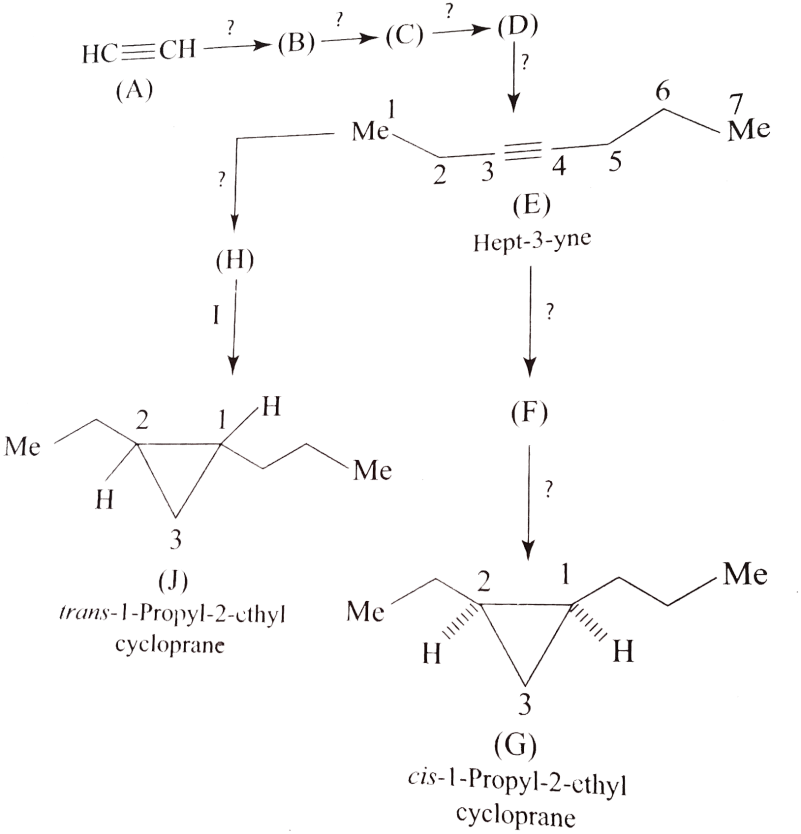
24. Complete the following reactions:

$$HC \equiv CH \xrightarrow{?} (B) \xrightarrow{?} (C) \xrightarrow{?} (D)$$



The compounds (E) to (F) can be obtained by four different reagents. Give the names of the reagents.

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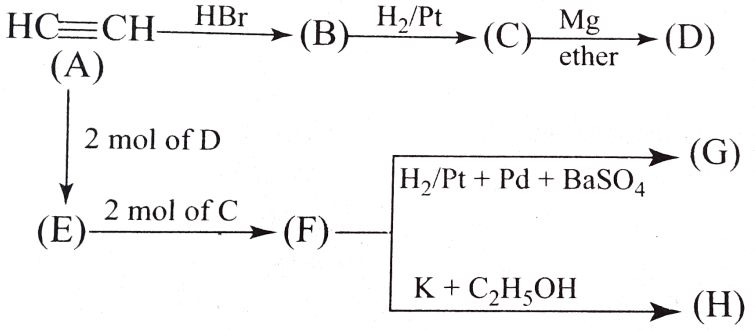
25. Complete the following reactions:



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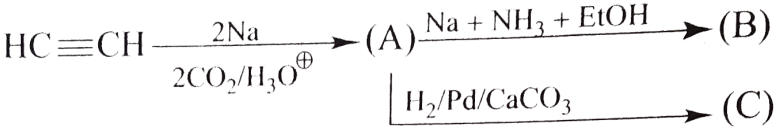
Solved Examples

1. Identify A to C.



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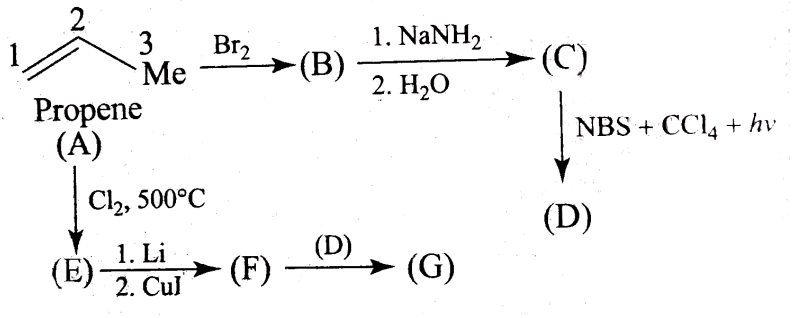
2. Identify B to G.



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3. $HC \equiv CH \xrightarrow[\text{under pressure}]{Heated} (A) \xrightarrow{O_3 / Red.} Glyoxalonly.$

Vapour density of $(A) = 4.643gI^{-1}$ at STP. On catalytic hydrogenation, $0.2gm$ of (A) consumed $172ml$ of H_2 at STP. What is the structure of (A)?

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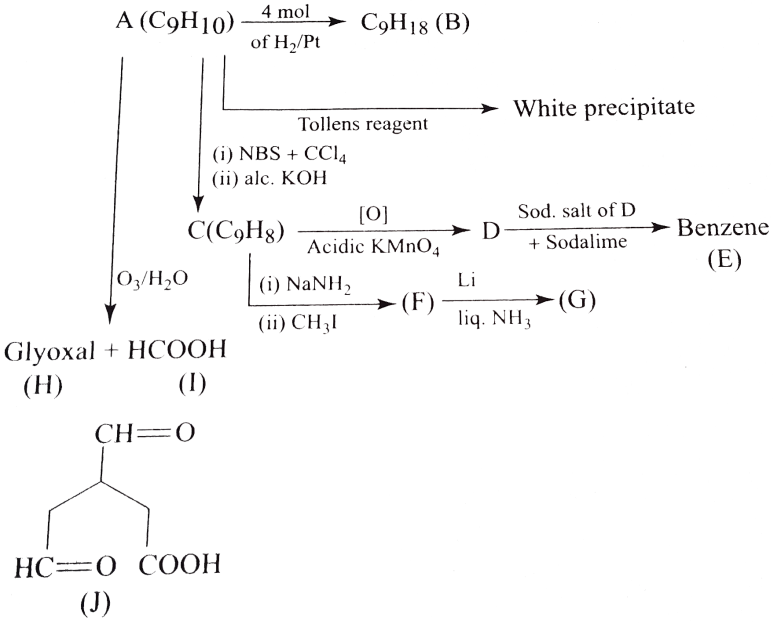
4. Identify (A) to (J), showing all reactions.



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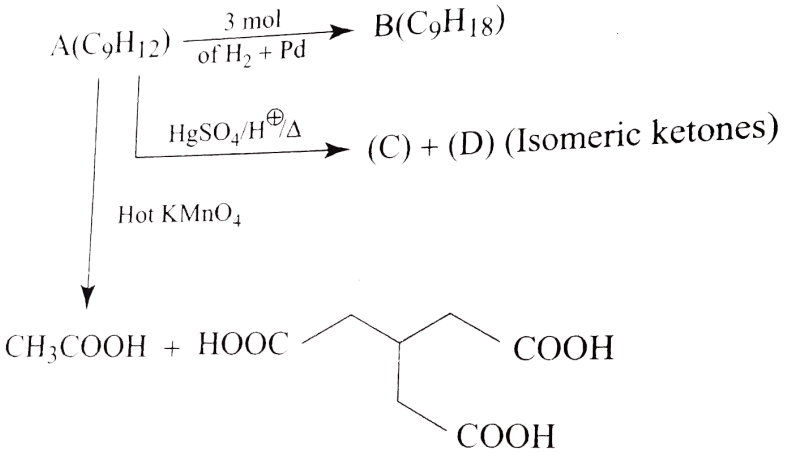
5. Identify A to D.



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6. Alkenes are more reactive than alkynes towards electrophillic addition reaction, yet vinyl acetylene reacts with 1 mol of HBr at triple bond. Explain why.

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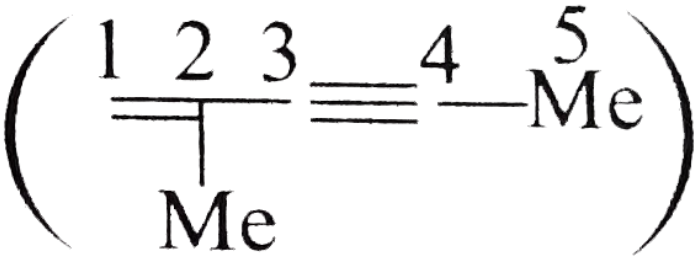
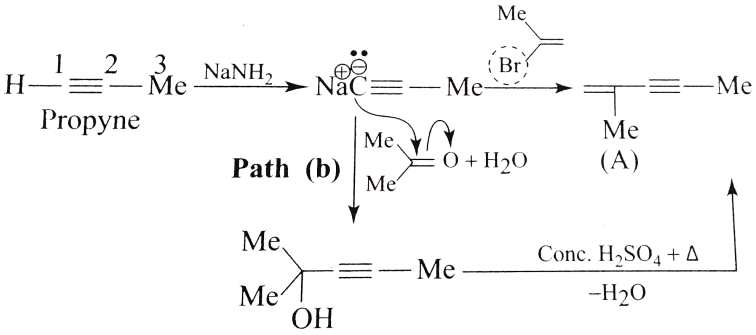
7. There are two paths (a) and (b) for the preparation of a compound (A)



(2-methylpent-1-en-3-yne), which path is correct and why? Also name the path (a) and (b).



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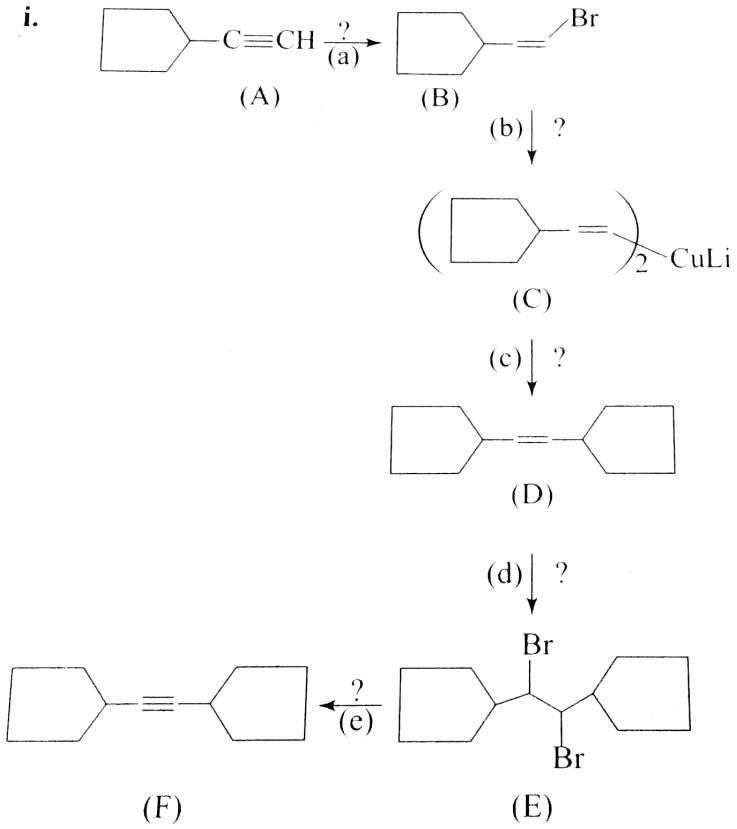
8. Complete the following missing reagents:

i.



i.

ii. There are two disastereomers of (D). Name the stereoisomers of (E) obtained from two diastereomers of (D). Name the stereoisomers of (E) obtained from two diastereomers of (D).

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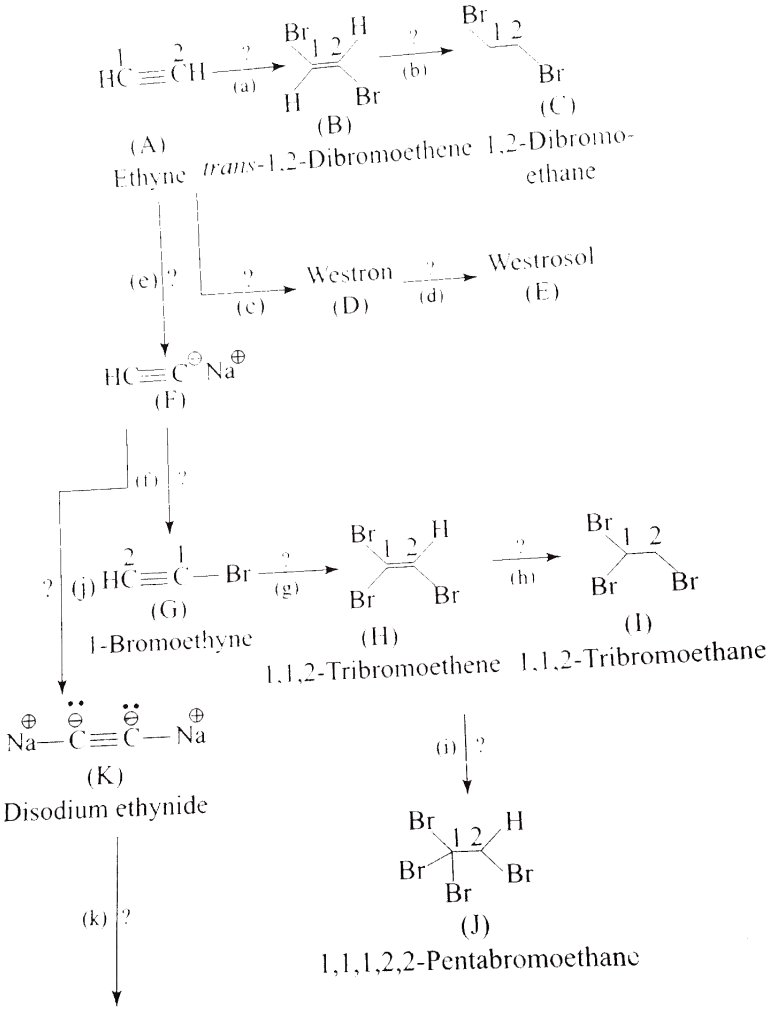
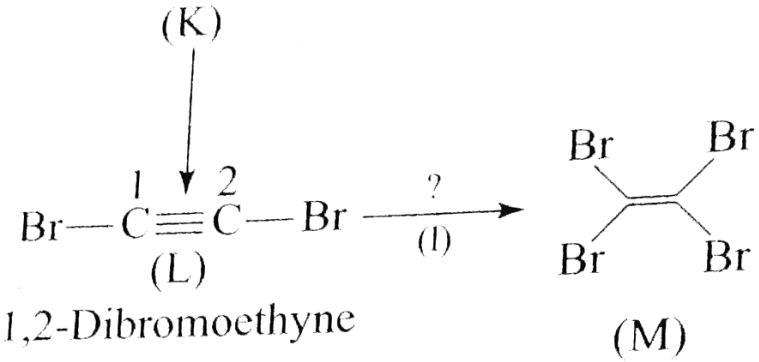
9. i. Complete the following missing reagents.





1,2-Dibromoethyne

ii. Write the formula and uses of compounds (D) and (E). Name the type of elimination in reactions from (D) to (E).

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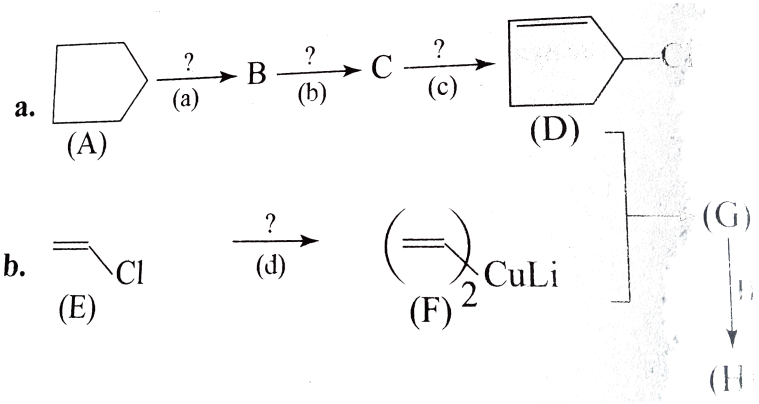
10. Convert the following:



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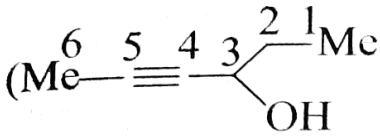
11. Convert propyne $(Me - \equiv - H)$ (A) to



(Hex-4-yn-3-ol) (B).

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12. i. $27.8gm$ mixture of alkyne and alkane (both containing same number of carbon atoms) is dissolved in $1000gm$ of benzene. The solution freezes at $2.45^\circ C$ (lower than that of benzene). Another $27.8gm$ mixture requires 0.6 mol of H_2 for complete hydrogenation. Calculate the chemical formula of alkyne and alkane (K_f for $C_6H_6 = 4.9$).

ii. Alkyne on hydrogenation with $H_2 + Pt$ gives the same alkane.

Alkyne does not react with ammoniacal $AgNO_3$ solution. Give the structures of both alkyne and alkane.

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13. Identify A, B, and C.

A, B, and C$(C_6H_{10}) \xrightarrow{Br_2 / CCI_2}$ All $\underset{Br_2\text{solution}}{\text{decolourises}}$

$\xrightarrow[conc.\,H_2SO_4]{Cold}$ All are soluble

$(A) \xrightarrow[AgNO_3]{\text{Ammoniacal}}$ White precipitate

$(A \text{ and } B) \xrightarrow[of H_2 / Pt]{\text{excess}}$ Hexane

$(C) \xrightarrow[H_2 / Pt]{1mol} D(C_6H_{12})$

$(A) \xrightarrow[KMnO_4]{Hotalk.}$ Pent anoic acid only

$(B) \xrightarrow[KMnO_4]{Hotalk.}$ Propanoic acid only

$(C) \xrightarrow[KMnO_4]{Hotalk.}$ Adipic acid only

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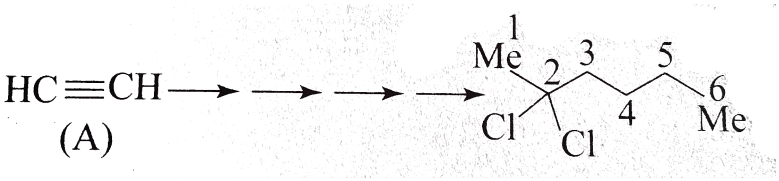
14. Convert:



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15. Convert:

$$HC \equiv CH(A) \xrightarrow{?} \xrightarrow{?} \xrightarrow{?} \xrightarrow{?} \underset{(Z-Tri\cos-9-one)}{(B)Muscalure}$$

Muscalure is a sex attractant of the common housefly (Musca domestica).

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16. $(A) \xrightarrow[Catalyst]{H_2+P-2} (B)$

cis-Jasmone

$cis-3-Methyl-2-(pent-2-enyl)$

Cyclopent-2-en-1-one

cis-Jasmone is an important perfume consituent.

Write the structures of (A) and (B).

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17. Terminal alkynes $(RC \equiv CH)$ are not reduced by alkali metals (e.g., Na, K, or Li) in liq. NH_3, but reduction takes place when $(NH_4)_2SO_4$ is added in the reaction mixture. Explain why.

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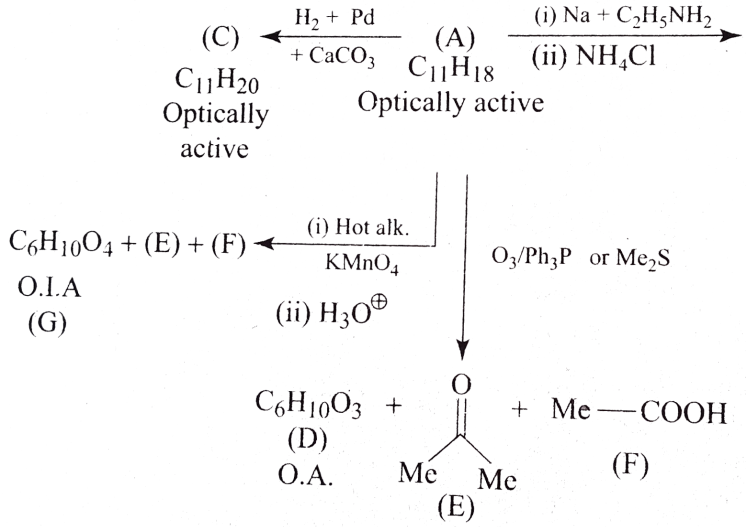
18. Identify (A) to (G).



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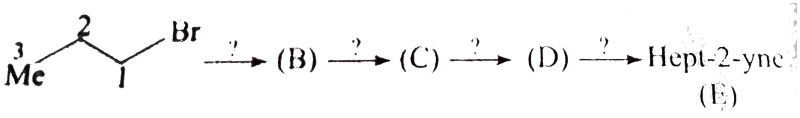
19. Convert the following:



$\xrightarrow{?}(B)\xrightarrow{?}(C)\xrightarrow{?}(D)\underset{(E)}{\text{Hept-2-yne}}$

1-Bromopropane (A)

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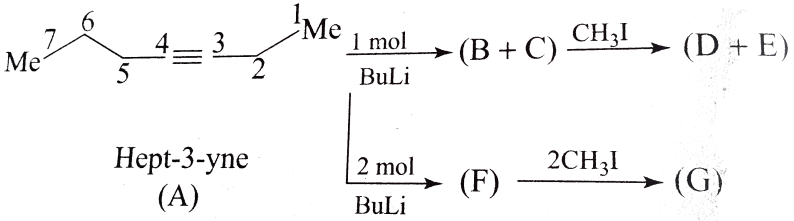
20. Complete the following:



Give the major and minor products (C and D).

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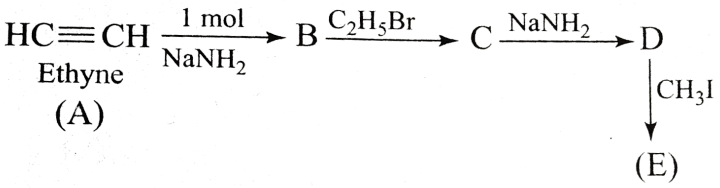
21. Complete the following:



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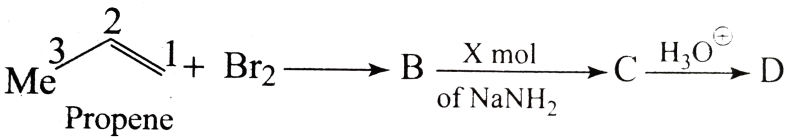

22.

In the conversion of (B) to (C), how many moles of $NaNH_2$ are used?

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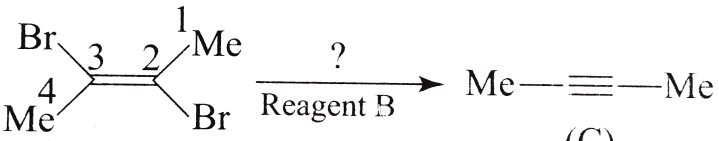
23. Give the products of the following reactions.



E-2,3-Dibromo but-2-ene
(A)

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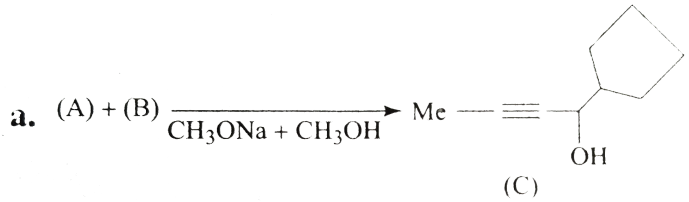
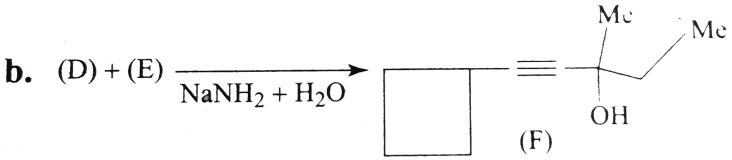
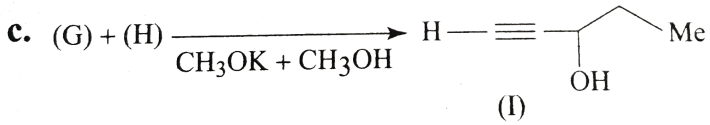
24. Complete the following reactions:

a. $(A) + (B) \xrightarrow[CH_3ONa + CH_3OH]{}$







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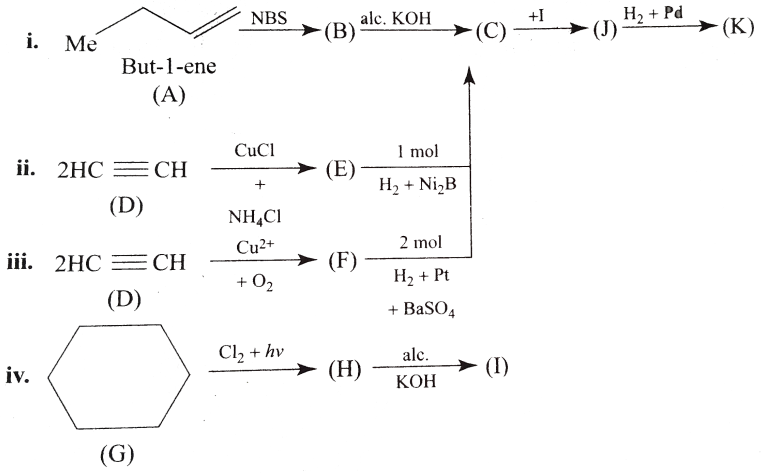
Exercises Subjective Type

1. Identify the products.



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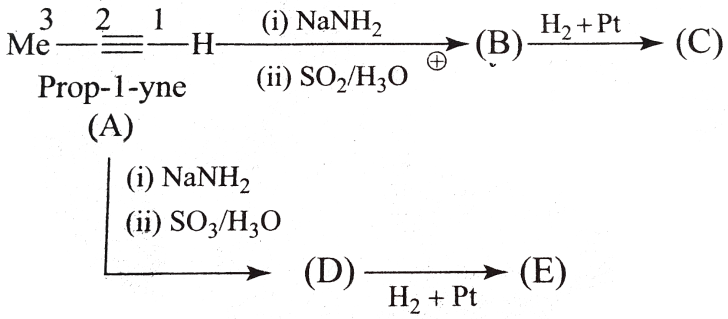
2. Identify the products.



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3. Oleic acid and eladic acid are naturally occuring compounds which are isolated from various oils and fats.

Both diastereomers have one double bond at $C-9$. Oleic acid is cis and eladic acid is a trans isomer at $C-9$. Both have molecular formula $C_{17}H_{33}COOH$. Synthesise both from ethyne.

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4. Give the products formed from the reactions of each of the following compounds with: i. $KMnO_4$ in warm acid

ii. O_3 / H_2O

a. Pent-1-yne

b. Nona-2, 6-diyne

c. Hex-3-yne

d. 2-Methylhept-3-type

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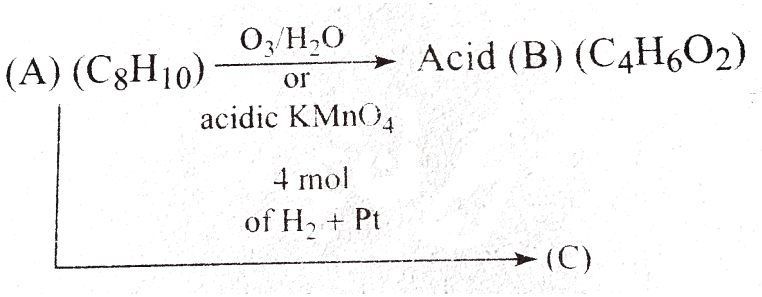
5. Identify (A) to (C).



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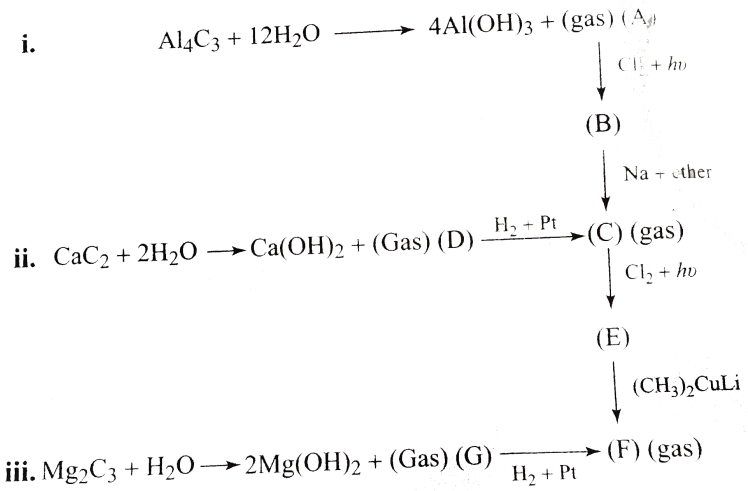
6. Complete the following reactions:



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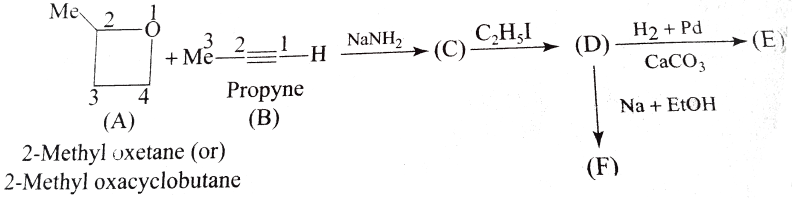
7. Identify the products.



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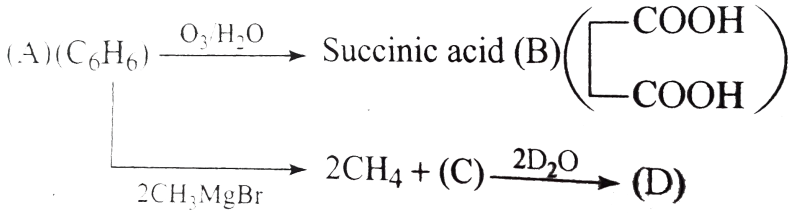
8. Identify (A) to (D).



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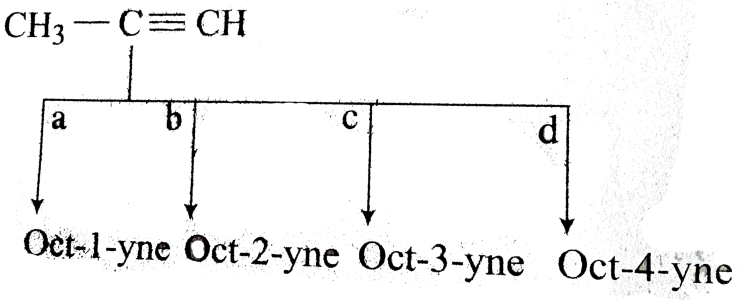
9. Convert the following:



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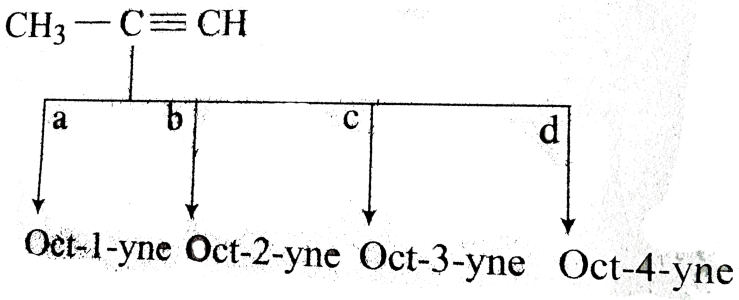
10. Convert the following:



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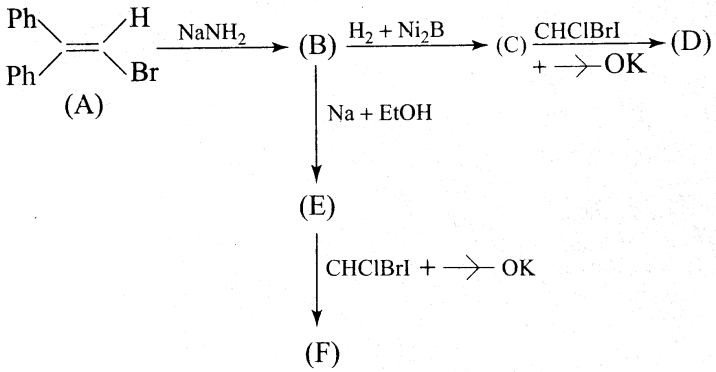
11. Identify the products:



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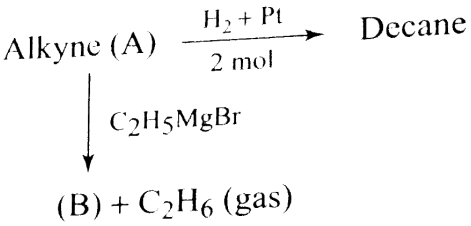
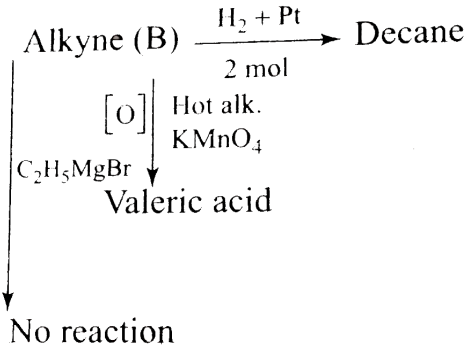
12. Identify the three alkynes A, B $(CH_{10}H_{18})$, and C $(C_{10}H_{16})$ which give the following reactions.

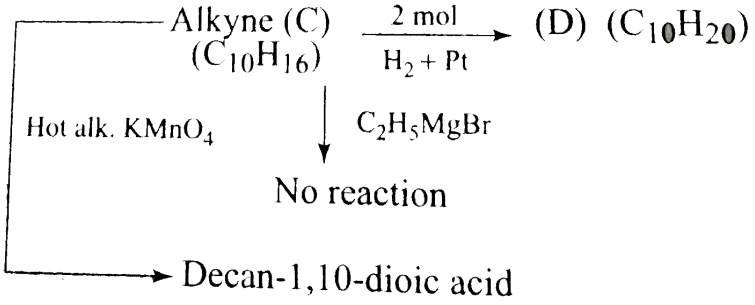
i.



ii.



iii.



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13. Deduce the structural fomula of a compound A (C_6H_{10}) which shows the following reactions:

i. Adds 2 mol of H_2 to form 2-methyl pentate.

ii. Reacts with aqueous $H_2SO_4 + HgSO_4$ solution to give a carbonyl compound.

iii. Does not react with ammoniacal $AgNO_3$ solution.

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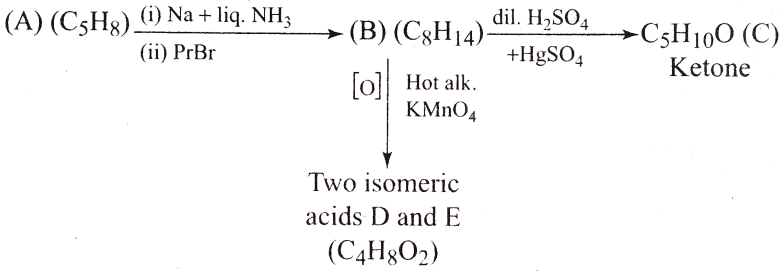
14. Identify (A) to (E).



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15. Write the structures of isomeric hexynes and also give their IUPAC names.

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16. What are the geometrices of:

i. Prop-1-yne

ii. But-2-yne

iii. Hept-2-en-5-yne

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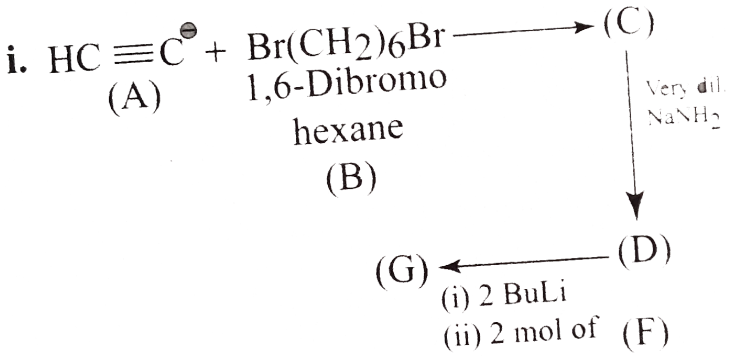
17. Complete the following:



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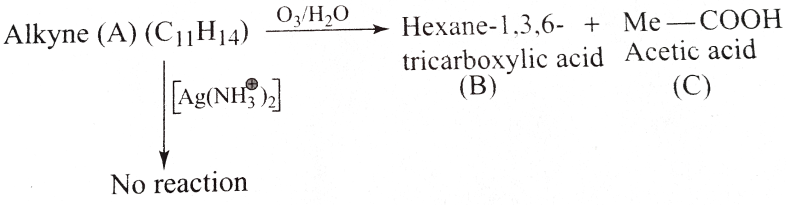
18. Identify A, B and C.



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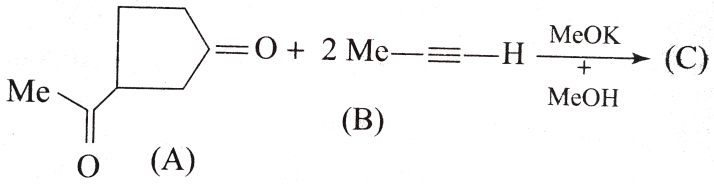
19. Identify the products.



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20. a. Convert but-1-yne to but 2-yne and vice versa.

b. Convert (cis or trans) pent-2-ene to pent-2-yne and vice versa.

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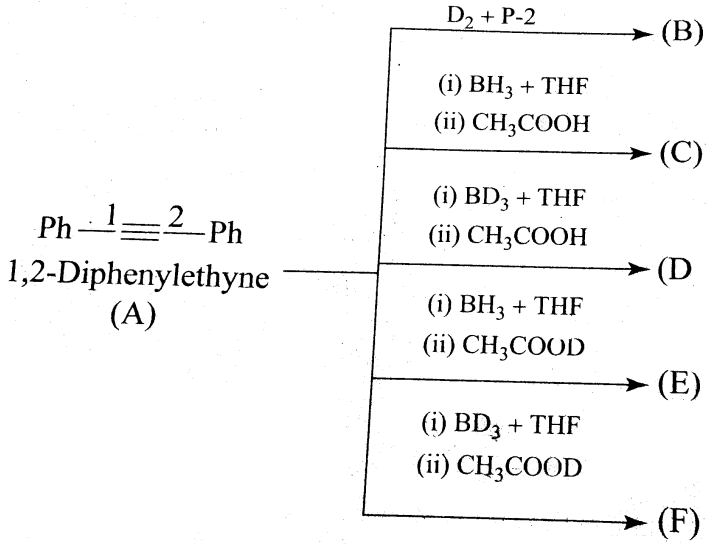
21. Complete the following



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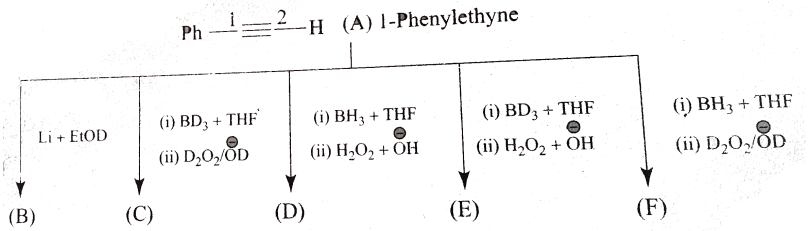
22. Identify the products.



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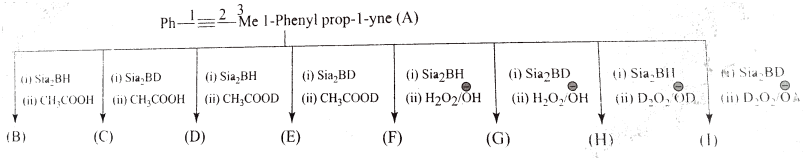
23. Complete the following reaction



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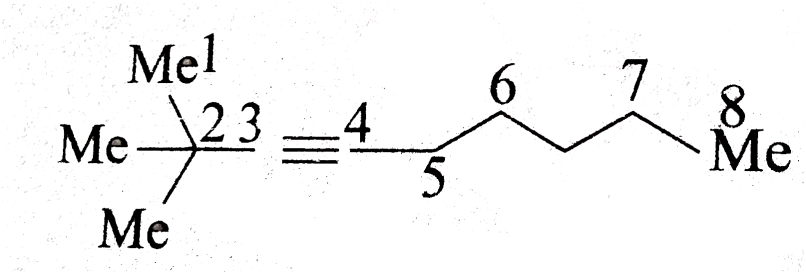
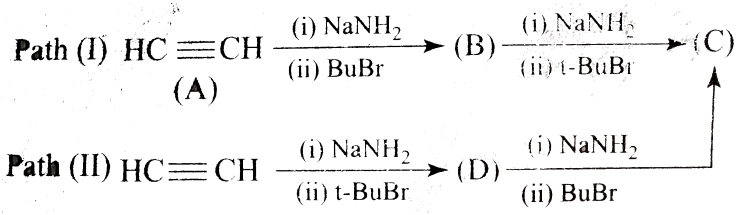
24. There are two paths to prepare compound (C).



Which path is feasible and why?



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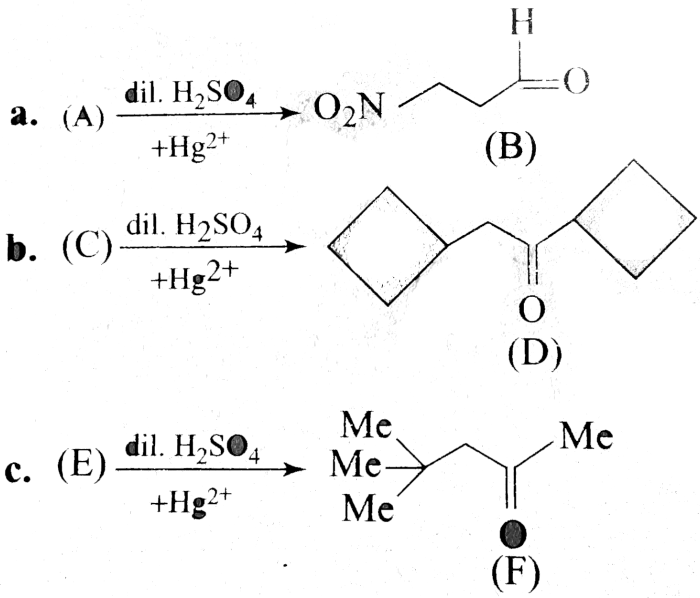
25. Give the structures of reactants:



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26. Give the structure of reactants:

a. $(A) + (B) \xrightarrow{NaNH_2 + \text{liq. } NH_3} HC{\equiv}C-\underset{OH}{\overset{Ph}{C}}$ (C)

b. $(D) + (E) \xrightarrow{NaNH_2 + \text{liq. } NH_3} Ph-{\equiv}-\underset{OH}{\overset{Ph}{\overset{|}{C}}}-Me$ (F)

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27. Complete the following equations:

$$\underset{Me}{\overset{Me}{\diagdown\!\!=O}} \xrightarrow{NaNH_2} (B) \xrightarrow{C_2H_2} (C) \xrightarrow{H^{\oplus}} (D)$$

(A) $\xrightarrow[+Pd + BaSO_4]{H_2}$ (E) $\xrightarrow[400^{\circ}C]{Al_2O_3}$ (F)

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28. With alcoholic potash, $C_4H_8Cl_2$ (A) gives C_4H_6 (B), which reacts with ammoniacal cuprous chloride. Identify the compounds (A) and (B).

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29. Three compounds A, B, and C are isomers of the formula C_5H_8. All of them decolourise bromine in CCl_4 and give a positive test with Baeyer's reagent. All three compounds dissolve in cone. H_2SO_4. Compound A gives a white precipitate with ammoniacal silver nitrate, whereas compounds B and C do not react with it. On hydrogenation, in the presence of platinum catalyst, both compounds A and B yield n-pentane, whereas compound C gives a product of formula C_5H_{10}. On oxidation with hot acidified $KMnO_4$, B

gave acetic acid and CH_3CH_2COOH. Identify compounds A, B, and C.

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30. A dihalogen derivative (A) of a hydrocarbon having two carbon atoms reacts with alcoholic potash and forms another hydrocarbon which gives a red precipitate with ammoniacal cuprous chloride. Compound A gives an aldehyde when treated with aqueous KOH. Write down the name and formula for the organic compound.

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31. An unsaturated hydrocarbon (A), C_6H_{10}, readily gives (B) on treatment with $NaNH_2$ in liquid NH_3. When (B) is allowed

to react with 1-chloropropane, a compound (C) is obtained. On partial hydrogenation in the presence of Lindar's catalyst, (C) gives (D), C_9H_{18}. On ozonolysis, (D) gives 2, 2-dimethylpropanal and 1-butanal. Identify compounds A, B, C and D.

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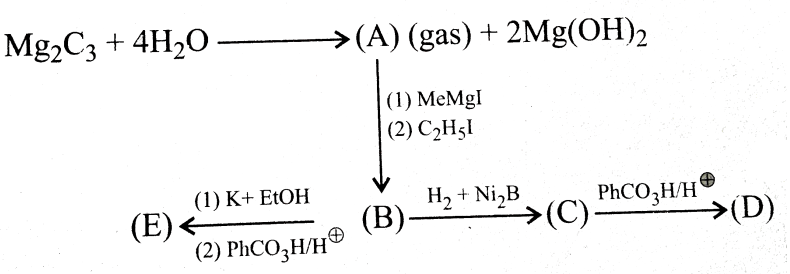
Exercises Linked Comprehension Type

1. In the following sequence of reactions, products A, B, C, D, and E are formed:



The structure of product (A) is:

A. $H_2C = CH_2$

B. $HC \equiv CH$

C. $Me - \equiv - H$

D. $Me - \equiv - Me$

Answer: C

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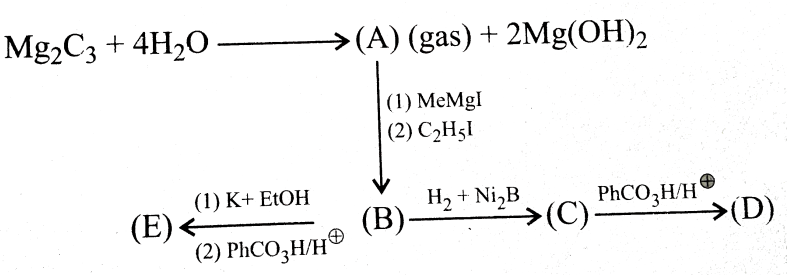
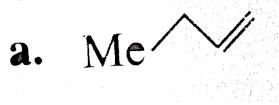
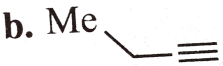
2. In the following sequence of reactions, products A, B, C, D, and E are formed:

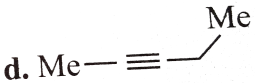


The structure of product (A) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: D

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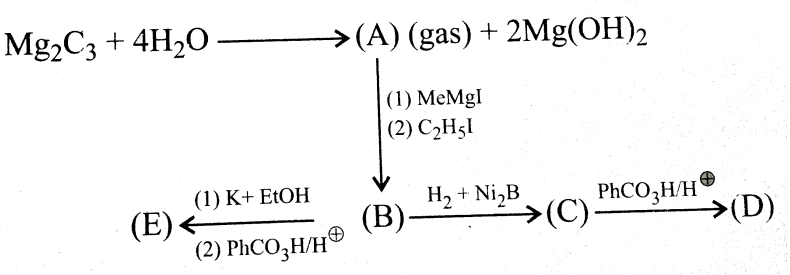
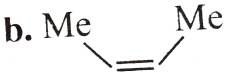
3. In the following sequence of reactions, products A, B, C, D, and E are formed:

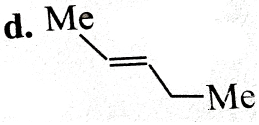


The structure of product (A) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: C

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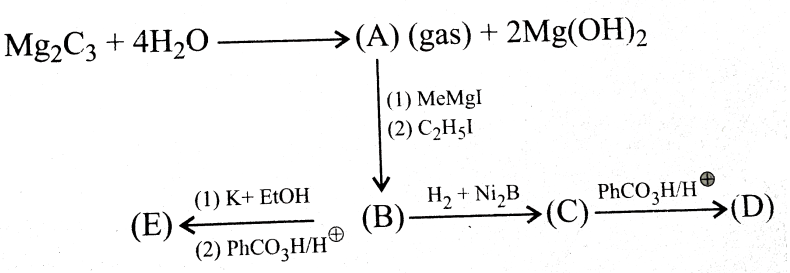
4. In the following sequence of reactions, products A, B, C, D, and E are formed:



The structure of product (A) is:

A. meso-Pentan-2, 3-diol

B. meso-Butan-2, 3-diol

C. ($\pm$) or rac-Butan-2, 3-diol

D. ($\pm$) or race-Pentan-2, 3-diol

Answer: D

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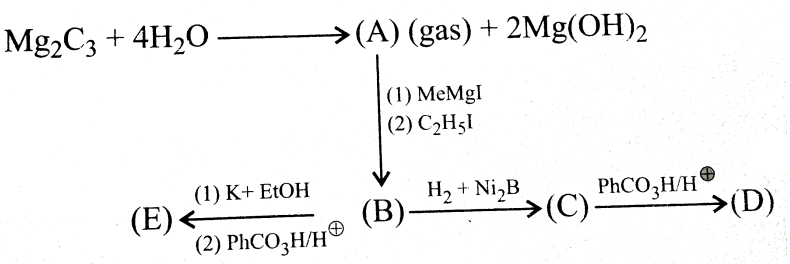
5. In the following sequence of reactions, products A, B, C, D, and E are formed:



The structure of product (A) is:

A. meso-Pentan-2, 3-diol

B. meso-Butan-2, 3-diol

C. $(\pm)$ or rac-Butan-2, 3-diol

D. $(\pm)$ or rac-Pentan-2, 3-diol

Answer: D

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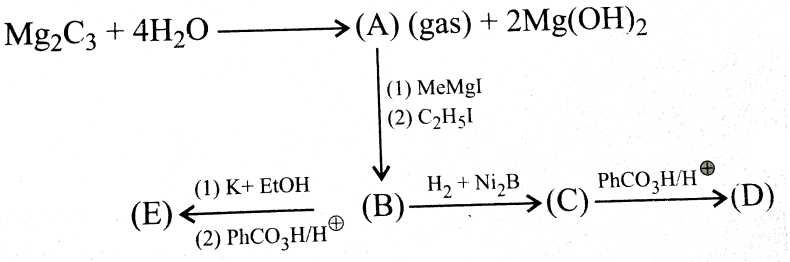
6. In the following sequence of reactions, products A, B, C, D, and E are formed:



The structure of product (A) is:

A. Both syn-addition

B. Both anti-addition

C. Syn-and anti-addition

D. Anti-and syn-addition

Answer: C

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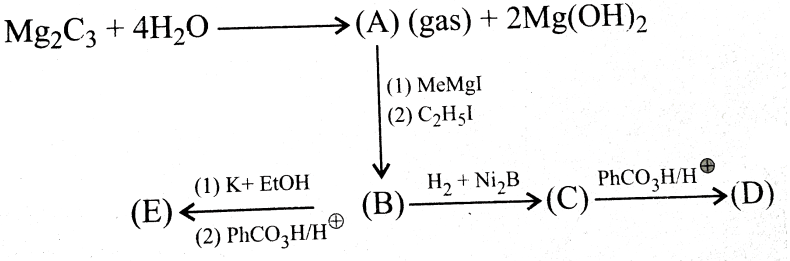
7. In the following sequence of reactions, products A, B, C, D, and E are formed:



The structure of product (A) is:

A. It is stereospecific but not stereoselective reaction.

B. It is stereoselective but not stereospecific reaction.

C. It is both stereospecific and stereoselective reaction.

D. It is neither stereospecific nor stereoselective reaction.

Answer: C

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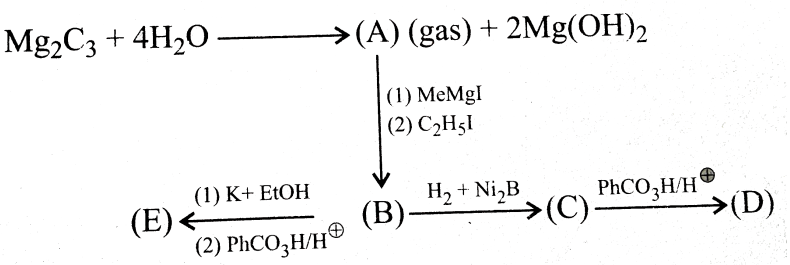
8. In the following sequence of reactions, products A, B, C, D, and E are formed:



The structure of product (A) is:

A. It is stereospecific but not stereoselective reaction.

B. It is stereoselective but not stereospecific reaction.

C. It is both stereospecific and stereoselective reaction.

D. It is neither stereospecific nor stereoselective reaction.

Answer: A

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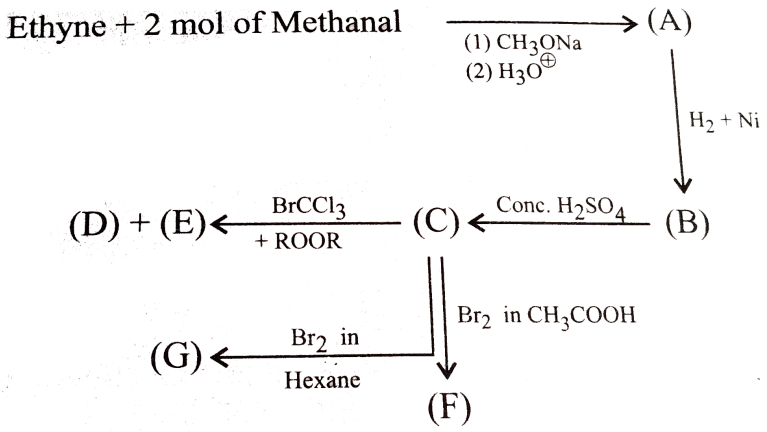
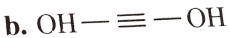
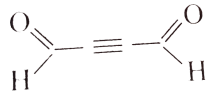
9. In the following reaction sequence, products (A) to (G) are formed.

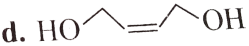


Product (A) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: A

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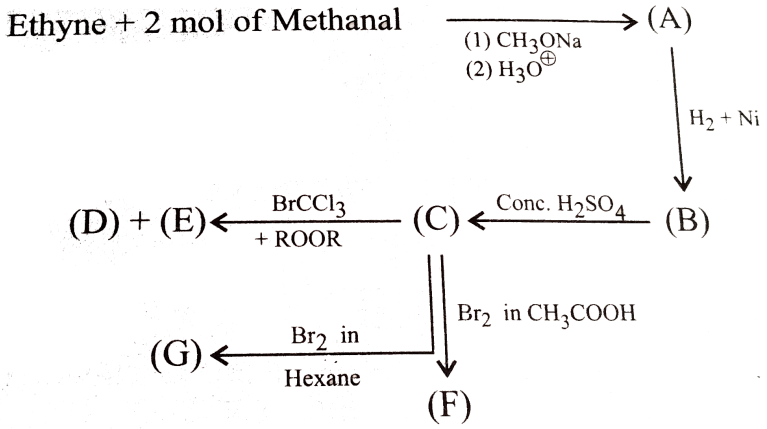
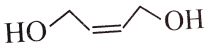
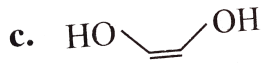
10. In the following reaction sequence, products (A) to (G) are formed.

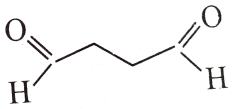


Product (A) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: B

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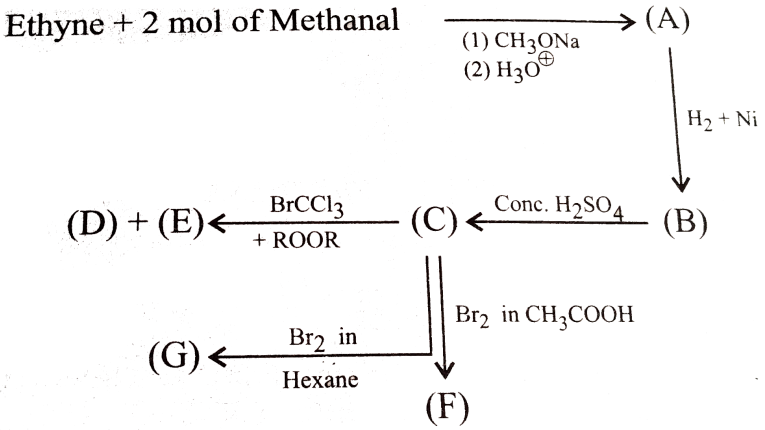
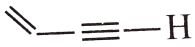
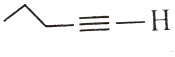
11. In the following reaction sequence, products (A) to (G) are formed.



Product (A) is:

A. a. 

B. b. Me 

C. c. Me — ≡ — Me

D. d. 

Answer: D

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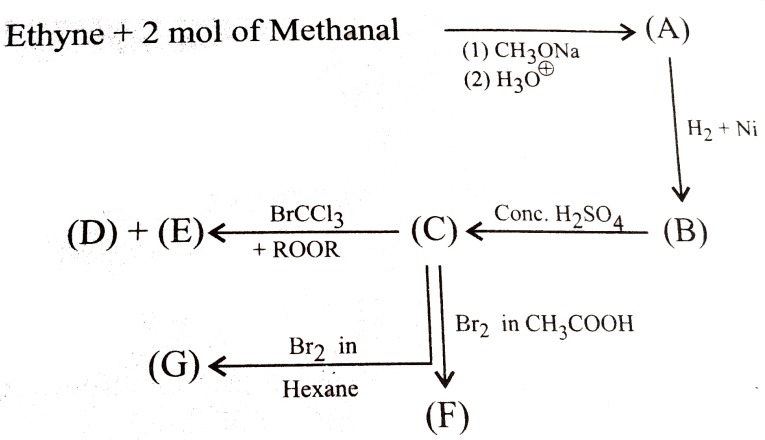
12. In the following reaction sequence, products (A) to (G) are formed.



Product (A) is:

A. a. (D) Cl_3C Br —≡—H (E) Br CCl₃ —≡—H

B. b. Me Br CCl_3 H Me CCl_3 Br H

C. c. Br CCl_3 H CCl_3 Br H

D. d. Br CCl_3 CCl_3 Br

Answer: D

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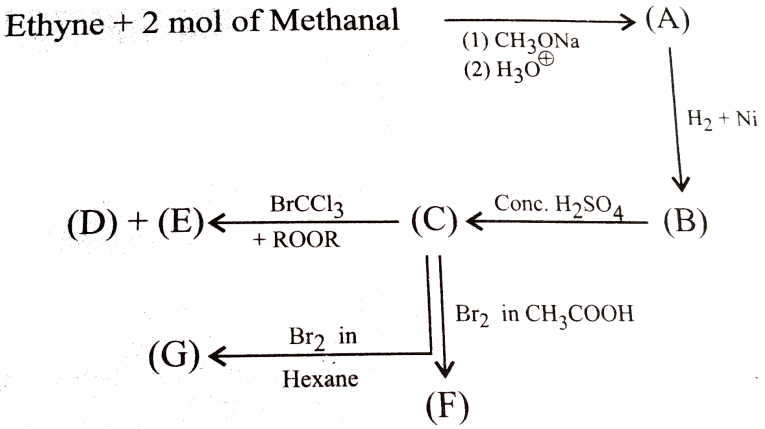
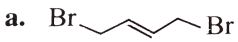
13. In the following reaction sequence, products (A) to (G) are formed.

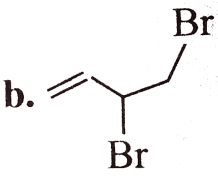


Product (A) is:

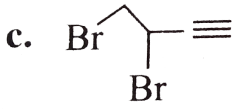
A.

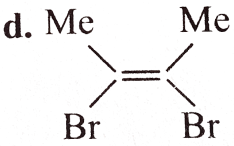


B.



C.



d. 

D.

Answer: A

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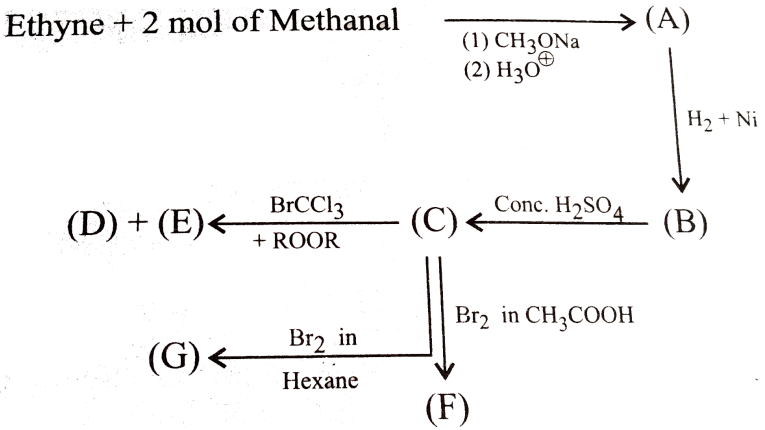
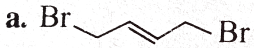
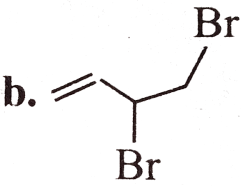
14. In the following reaction sequence, products (A) to (G) are formed.

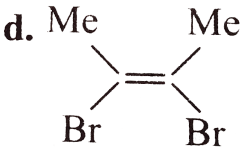


Product (A) is:

A. 

B. 

C. 

D. 

Answer: B

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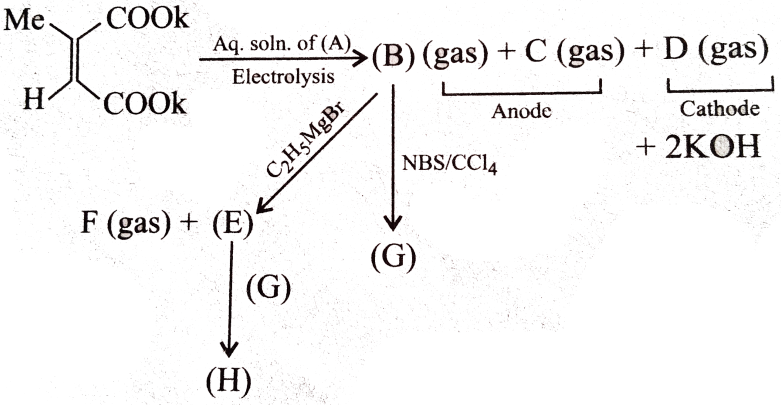
15. In the following sequence of reactions, products (A) to (H) are formed:



The gases (B), (C), and (D), respectively, are:

A. $\begin{array}{lll} \text{(B)} & \text{(C)} & \text{(D)} \\ \hline (a)HC \equiv CH & CO_2 & H_2 \end{array}$

B. $\begin{array}{lll} \text{(B)} & \text{(C)} & \text{(D)} \\ \hline (a)HC \equiv CH & H_2 & CO_2 \end{array}$

C. $\begin{array}{lll} \text{(B)} & \text{(C)} & \text{(D)} \\ \hline (a)Me- \equiv -Me & CO_2 & H_2 \end{array}$

D. $\begin{array}{lll} \text{(B)} & \text{(C)} & \text{(D)} \\ \hline (a)Me- \equiv -H & H_2 & CO_2 \end{array}$

Answer: C

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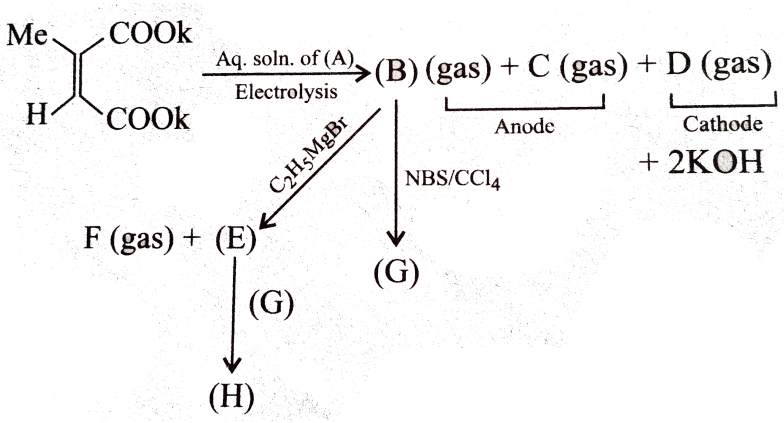
16. In the following sequence of reactions, products (A) to (H) are formed:



The gases (B), (C), and (D), respectively, are:

A. 67.2 litres

B. 68.1 litres

C. 73.2 litres

D. 74.1 litres

Answer: D

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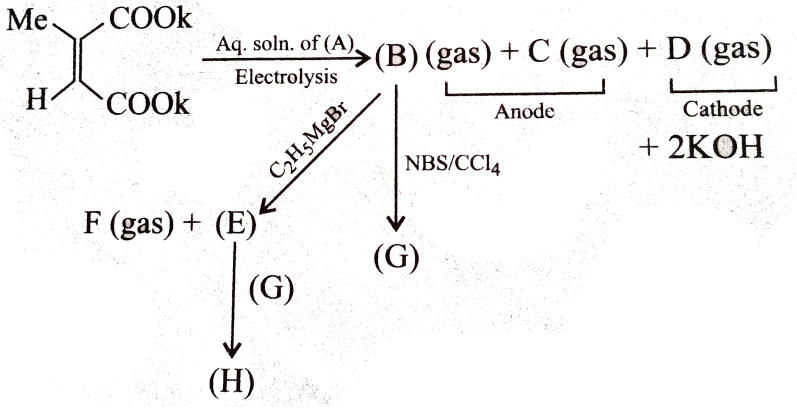
17. In the following sequence of reactions, products (A) to (H) are formed:



The gases (B), (C), and (D), respectively, are:

A. 11.2 litres

B. 11.35 litres

C. 22.4 litres

D. 22.7 litres

Answer: B

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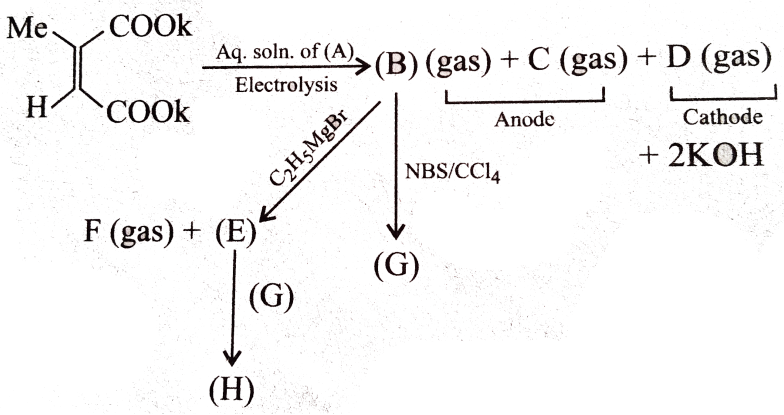
18. In the following sequence of reactions, products (A) to (H) are formed:



The gases (B), (C), and (D), respectively, are:

A. CH_4

B. C_2H_6

C. Ethene

D. Ethyne

Answer: B

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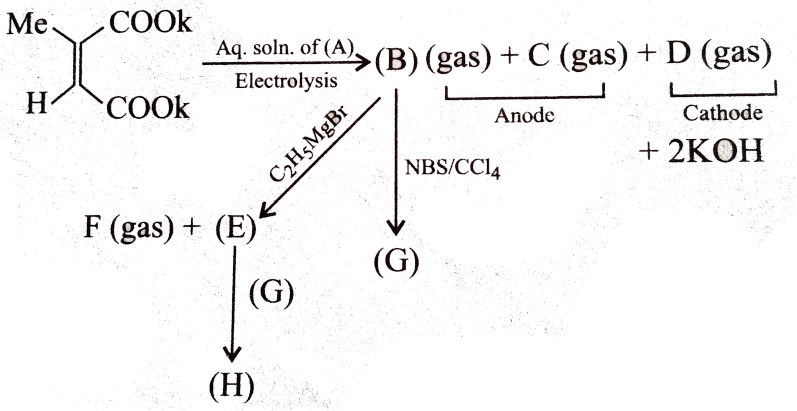
19. In the following sequence of reactions, products (A) to (H) are formed:



The gases (B), (C), and (D), respectively, are:

A. 22.4 litres

B. 2.24 litres

C. 24.7 litres

D. 2.47 litres

Answer: B

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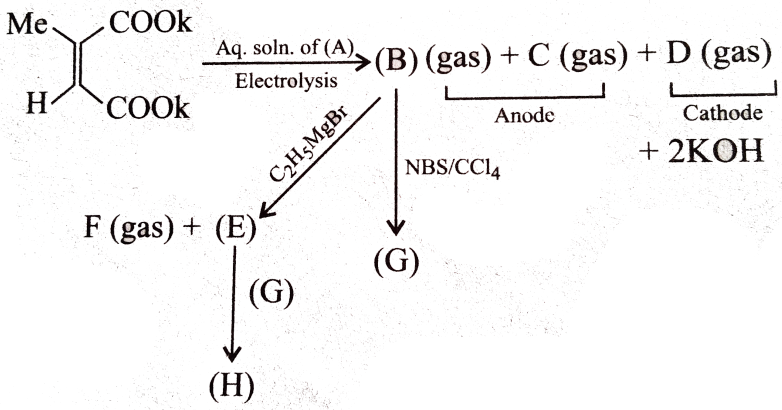
20. In the following sequence of reactions, products (A) to (H) are formed:



The gases (B), (C), and (D), respectively, are:

A. 1

B. 13

C. 2

D. 12

Answer: B

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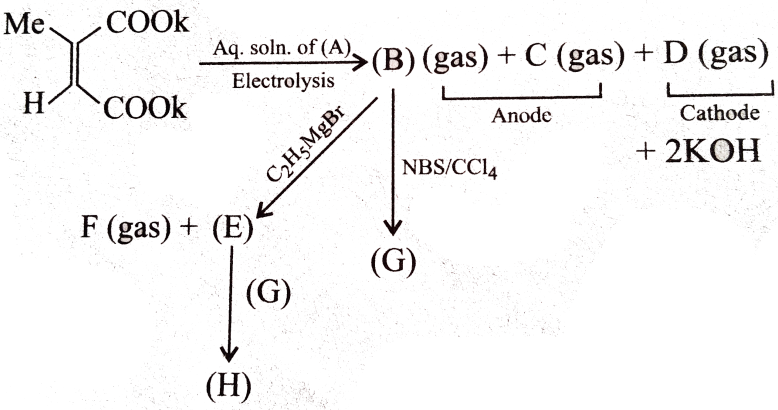
21. In the following sequence of reactions, products (A) to (H) are formed:

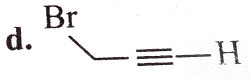


The gases (B), (C), and (D), respectively, are:

A. $Me - \equiv - Br$

B. $H - \equiv - Br$

C. $Br - \equiv - Br$

D. d. 

Answer: D

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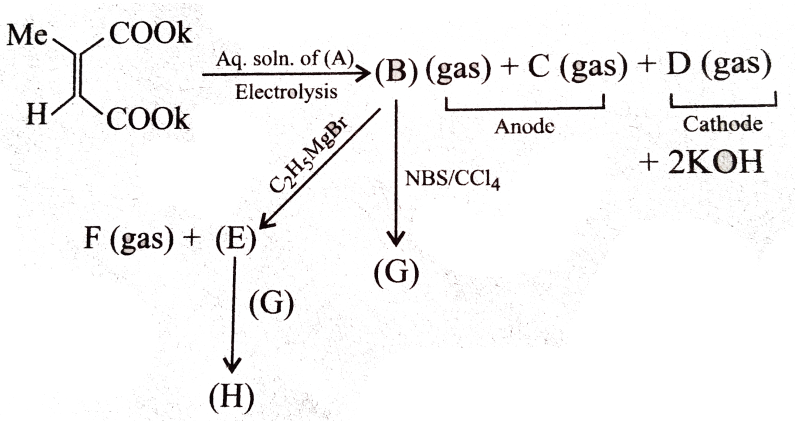
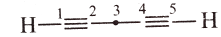
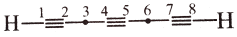
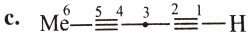
22. In the following sequence of reactions, products (A) to (H) are formed:

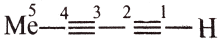


The gases (B), (C), and (D), respectively, are:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: C

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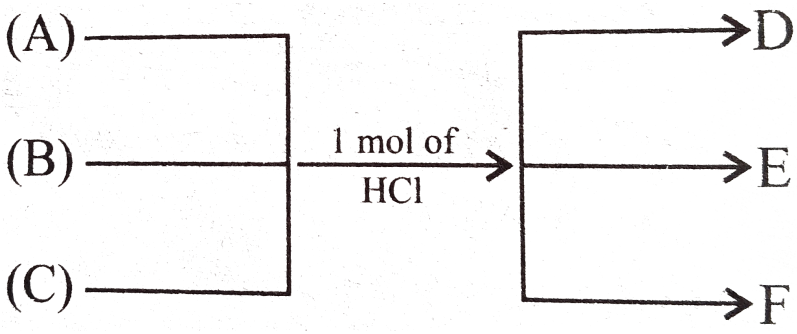
23. i. (A), a compound with lowest number of C atoms, is unsaturated hydrocarbon and is optically active.

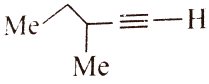
ii. (B), a compound with lowest number of C atoms, is unsaturated hydrocarbon and shows diastereomerism.

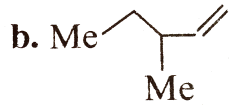
iii. (C), a compound with lowest number of C atoms and unsaturated hydrocarbon, shows both optical and geometrical isomerism.

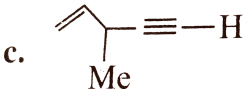
Following is the reaction sequence of A, B, and C.



The structure of compound (A) is:

A. a. 

B. 

C. 

D. 

Answer: C

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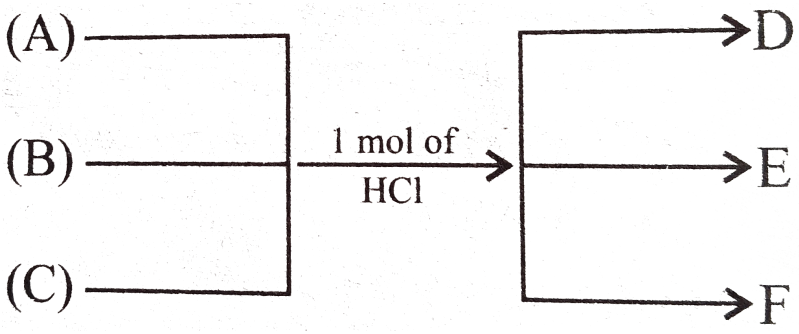
24. i. (A), a compound with lowest number of C atoms, is unsaturated hydrocarbon and is optically active.

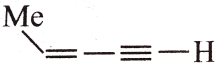
ii. (B), a compound with lowest number of C atoms, is unsaturated hydrocarbon and shows diastereomerism.

iii. (C), a compound with lowest number of C atoms and unsaturated hydrocarbon, shows both optical and geometrical isomerism.

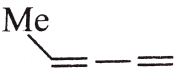
Following is the reaction sequence of A, B, and C.



The structure of compound (A) is:

A. a. 

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

C. c. 

D. $= - =$

Answer: A

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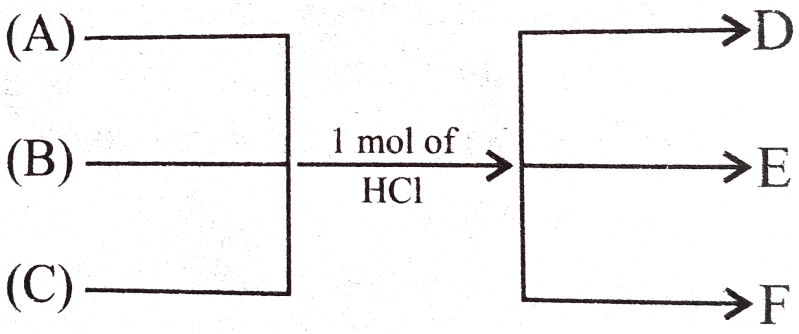
25. i. (A), a compound with lowest number of C atoms, is unsaturated hydrocarbon and is optically active.

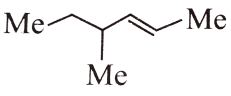
ii. (B), a compound with lowest number of C atoms, is unsaturated hydrocarbon and shows diastereomerism.

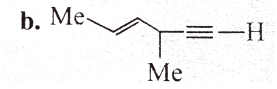
iii. (C), a compound with lowest number of C atoms and unsaturated hydrocarbon, shows both optical and geometrical isomerism.

Following is the reaction sequence of A, B, and C.

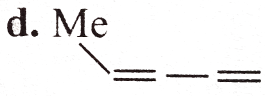


The structure of compound (A) is:

A. **a.** 

B. 

C. 

D. 

Answer: B

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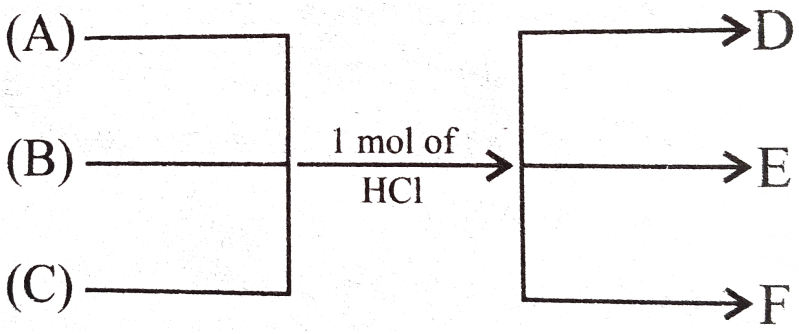
26. i. (A), a compound with lowest number of C atoms, is unsaturated hydrocarbon and is optically active.

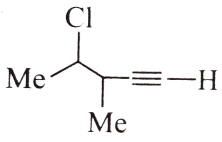
ii. (B), a compound with lowest number of C atoms, is unsaturated hydrocarbon and shows diastereomerism.

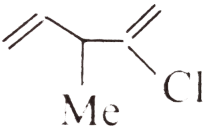
iii. (C), a compound with lowest number of C atoms and unsaturated hydrocarbon, shows both optical and geometrical isomerism.

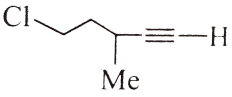
Following is the reaction sequence of A, B, and C.

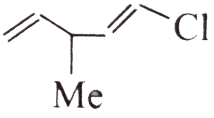


The structure of compound (A) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: A

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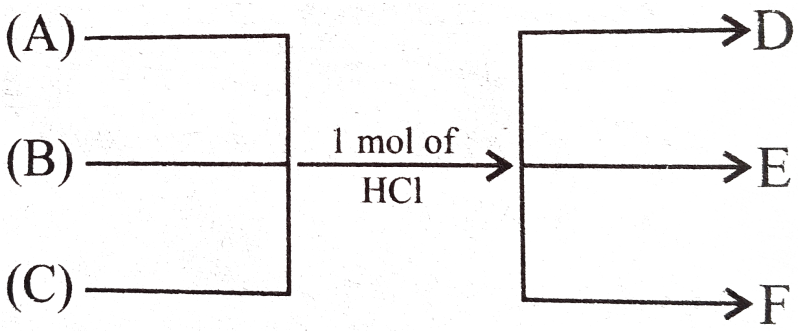
27. i. (A), a compound with lowest number of C atoms, is unsaturated hydrocarbon and is optically active.

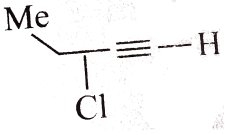
ii. (B), a compound with lowest number of C atoms, is unsaturated hydrocarbon and shows diastereomerism.

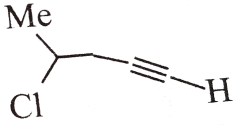
iii. (C), a compound with lowest number of C atoms and unsaturated hydrocarbon, shows both optical and geometrical isomerism.

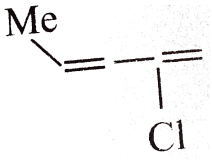
Following is the reaction sequence of A, B, and C.

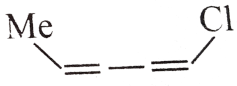


The structure of compound (A) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: C

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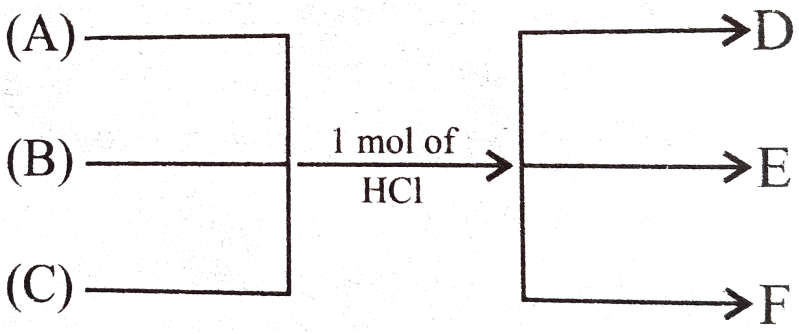
28. i. (A), a compound with lowest number of C atoms, is unsaturated hydrocarbon and is optically active.

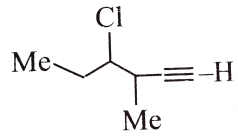
ii. (B), a compound with lowest number of C atoms, is unsaturated hydrocarbon and shows diastereomerism.

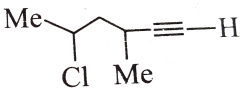
iii. (C), a compound with lowest number of C atoms and unsaturated hydrocarbon, shows both optical and geometrical isomerism.

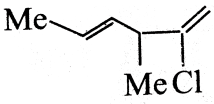
Following is the reaction sequence of A, B, and C.

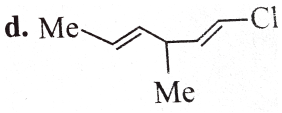


The structure of compound (A) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: B

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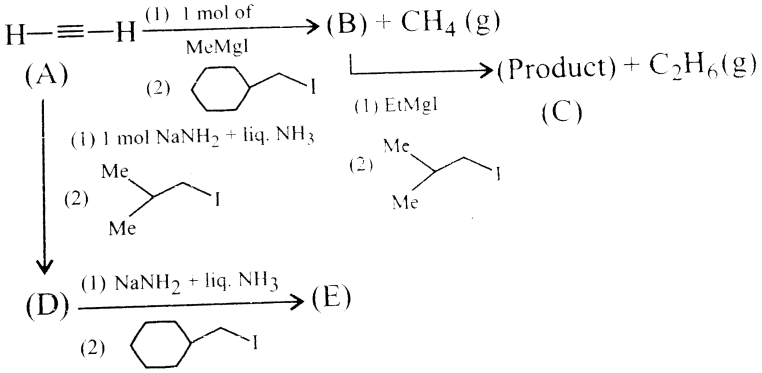
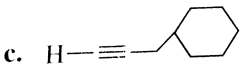
29. In the following sequence of reactions, products (B) to (E) are formed:

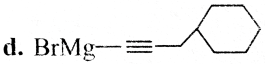


Product (B) is:

A. $H \equiv -MgBr$

B. $BrMg- \equiv -MgBr$

C. 

D. d. 

Answer: C

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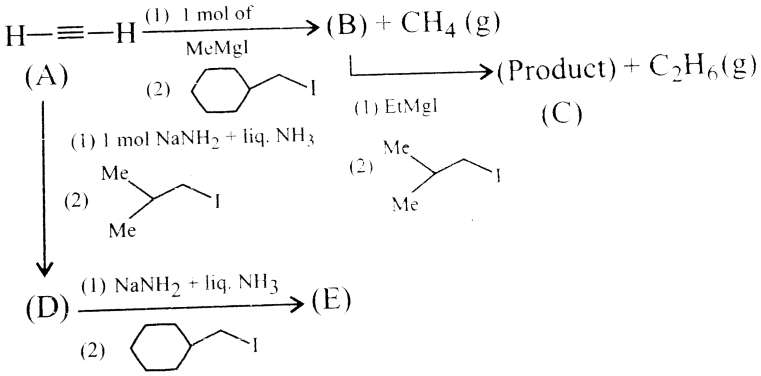
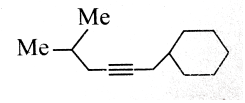
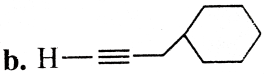
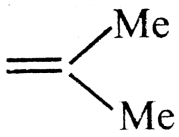
30. In the following sequence of reactions, products (B) to (E) are formed:



Product (B) is:

A. a. 

B. b. 

C. c. 

D. Both (b) and (c)

Answer: D

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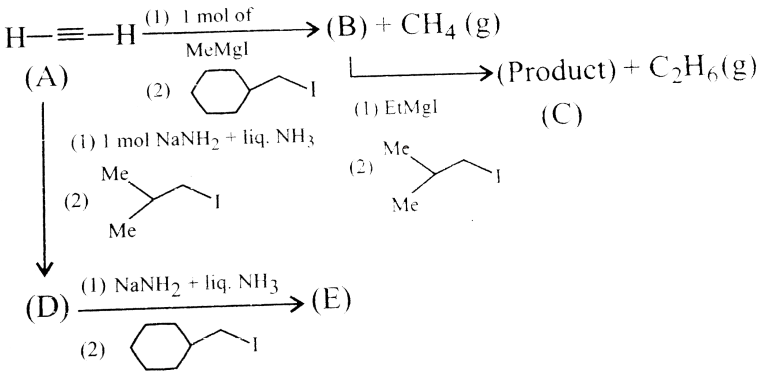
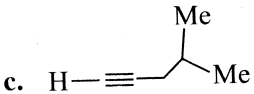
31. In the following sequence of reactions, products (B) to (E) are formed:

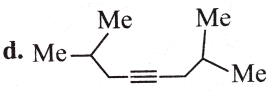


Product (B) is:

A. $H - C \equiv \overset{\cdot\cdot}{\overset{\ominus}{C}}Na$

B. $\overset{\oplus}{N}a\overset{\cdot\cdot}{\overset{\ominus}{C}} \equiv \overset{\cdot\cdot}{\overset{\ominus}{C}}\overset{\oplus}{N}a$

C. 

D. 

Answer: C

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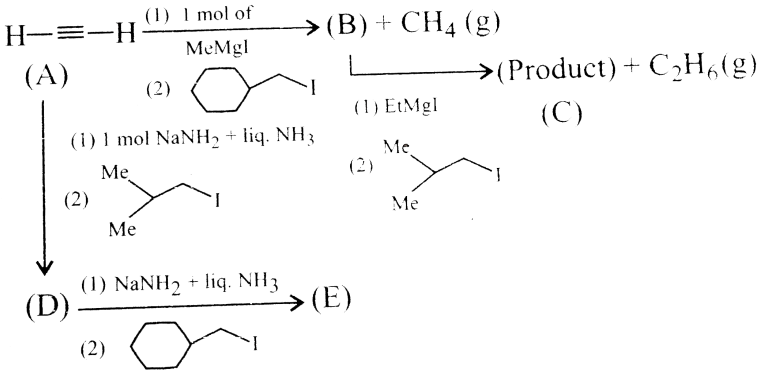
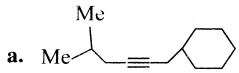
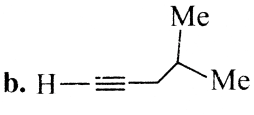
32. In the following sequence of reactions, products (B) to (E) are formed:



Product (B) is:

A. 

B. 

C. 

D. Both (b) and (c)

Answer: A

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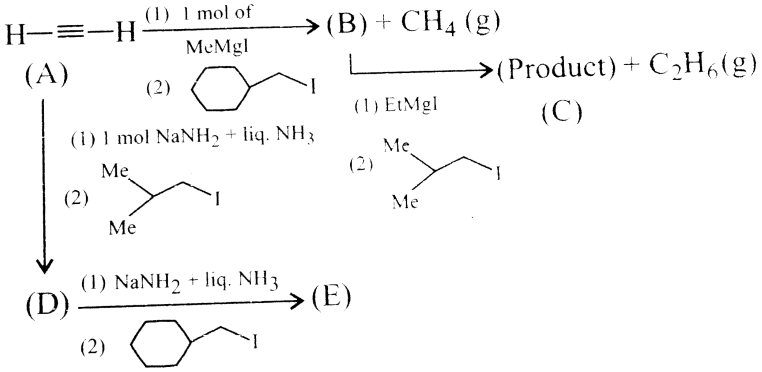
33. In the following sequence of reactions, products (B) to (E) are formed:



Product (B) is:

A. Both proceed via SN^2 mechanism

B. Both proceed via E2 mechanism

C. B to C proceeds via E2 and D to E via SN^2 mechanism

D. B to C proceeds via SN^2 and D to E via E2 mechanism.

Answer: C

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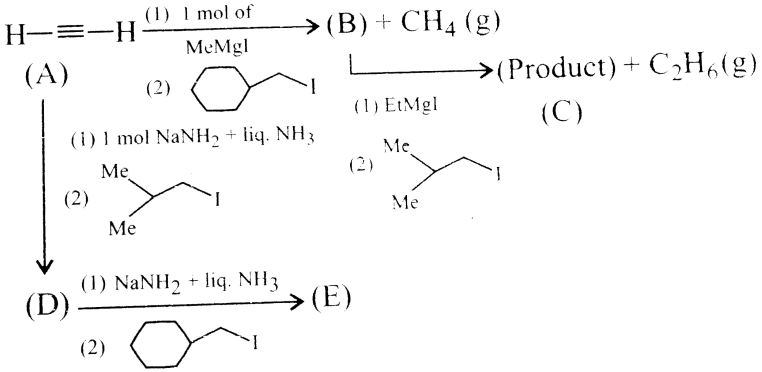
34. In the following sequence of reactions, products (B) to (E) are formed:



Product (B) is:

A. a. Me, Me, ≡C (I) is more nucleophilic than ≡C (II).

B. I is more basic than II.

C. II is more basic than I.

D. In E2 elemination reaction, β-proton is abstracted by base

Answer: B

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35. In the following sequence of reactions, the products (A) to (G) are formed:

i. $2CH_4(g) \xrightarrow[1773K]{\Delta} (A)(g) + B(g)$

ii. $4molof(A) \xrightarrow[Ni(CN)_4+THF]{\Delta} (C) \xrightarrow{O_3/oxid.} (D)only$

iii. $(A) \xrightarrow[(2)\,C_2H_5I]{(1)\,1molofNaNH_2} (E) \xrightarrow[Redhottube]{3molofE} \underset{(G)\,only}{\overset{F}{\downarrow O_3/Red.}}$

Compounds (A) and (B), respectively, are:

A. Ethane and O_2

B. Ethene and H_2

C. Ethyne and O_2

D. Ethyne and H_2

Answer: D

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36. In the following sequence of reactions, the products (A) to (G) are formed:

i. $2CH_4(g) \xrightarrow[1773K]{\Delta} (A)(g) + B(g)$

ii. $4molof(A) \xrightarrow[Ni(CN)_4+THF]{\Delta} (C) \xrightarrow{O_3/oxid.} (D)only$

iii. $(A) \xrightarrow[(2)\,C_2H_5I]{(1)\,1molofNaNH_2} (E) \xrightarrow[Redhottube]{3molofE} \underset{(G)\,only}{\overset{\downarrow O_3/Red.}{F}}$

Compounds (A) and (B), respectively, are:

A. Benzene

B. Mesitylene

C. Cycloocta-1,3,5-triene

D. Cycloocta-1,3,5,7-tetraene

Answer: D

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37. In the following sequence of reactions, the products (A) to (G) are formed:

i. $2CH_4(g) \xrightarrow[1773K]{\Delta} (A)(g) + B(g)$

ii. $4molof(A) \xrightarrow[Ni(CN)_4+THF]{\Delta} (C) \xrightarrow{O_3/oxid.} (D)only$

iii. $(A) \xrightarrow[(2)\,C_2H_5I]{(1)\,1molofNaNH_2} (E) \xrightarrow[Redhottube]{3molofE} \underset{(G)\,only}{\overset{F}{\downarrow O_3/Red.}}$

Compounds (A) and (B), respectively, are:

A. Glyoxal

B. Glycol

C. Oxalic acid

D. Methylglyoxal

Answer: C

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38. In the following sequence of reactions, the products (A) to (G) are formed:

i. $2CH_4(g) \xrightarrow[1773K]{\Delta} (A)(g) + B(g)$

ii. $4molof(A) \xrightarrow[Ni(CN)_4+THF]{\Delta} (C) \xrightarrow{O_3/oxid.} (D)only$

iii. $(A) \xrightarrow[(2)\,C_2H_5I]{(1)\,1molofNaNH_2} (E) \xrightarrow[Redhottube]{3molofE} \underset{(G)\,only}{\overset{F}{\downarrow O_3/Red.}}$

Compounds (A) and (B), respectively, are:

A. Propyne

B. Butyne

C. cis-But-2-yne

D. trans-But-2-yne

Answer: B

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39. In the following sequence of reactions, the products (A) to (G) are formed:

i. $2CH_4(g) \xrightarrow[1773K]{\Delta} (A)(g) + B(g)$

ii. $4molof(A) \xrightarrow[Ni(CN)_4+THF]{\Delta} (C) \xrightarrow{O_3/oxid.} (D)only$

iii. $(A) \xrightarrow[(2)\,C_2H_5I]{(1)\,1molofNaNH_2} (E) \xrightarrow[Redhottube]{3molofE} \underset{(G)\,only}{\overset{F}{\downarrow O_3/Red.}}$

Compounds (A) and (B), respectively, are:

A. Mesitylene

B. 1,2,3-Triethylbenzene

C. 1,2,3-Trimethylbenzene

D. 1,3,5-Triethylbenzene

Answer: D

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40. In the following sequence of reactions, the products (A) to (G) are formed:

i. $2CH_4(g) \xrightarrow[1773K]{\Delta} (A)(g) + B(g)$

ii. $4molof(A) \xrightarrow[Ni(CN)_4+THF]{\Delta} (C) \xrightarrow{O_3/oxid.} (D)only$

iii. $(A) \xrightarrow[(2)\,C_2H_5I]{(1)\,1molofNaNH_2} (E) \xrightarrow[Redhottube]{3molofE} \underset{(G)\,only}{\overset{F}{\downarrow O_3/Red.}}$

Compounds (A) and (B), respectively, are:

A. 2-Oxobutanal

B. 2-Oxobutanoic acid

C. Methylglyoxal

D. 2-Oxopropanoic acid

Answer: A

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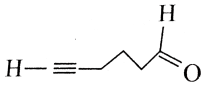
41. In the following sequence of reactions, products (A) to (H) are formed:

Compound (B) is:

A. a. 

B. b. H—≡—⟋⟍⟋⟍OH

C. c. H—≡—⟋⟍⟋(OH)⟍O

D. d. H—≡—⟋⟍⟋⟍OH

Answer: B

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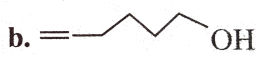
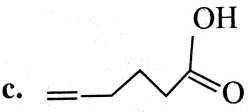
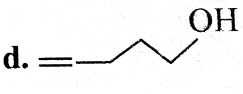
42. In the following sequence of reactions, products (A) to (H) are formed:

Compound (C) is:

A. a. =—⟋⟍⟋(H)⟍O

B. b. 

C. c. 

D. d. 

Answer: B

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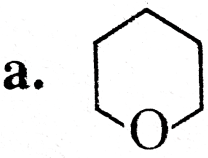
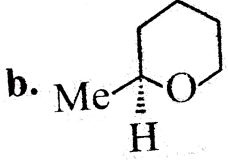
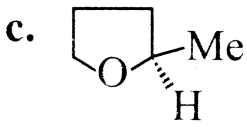
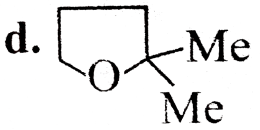
43. In the following sequence of reactions, products (A) to (H) are formed:

Compound (D) is:

A. a. 

B. 

C. 

D. 

Answer: B

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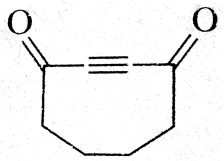
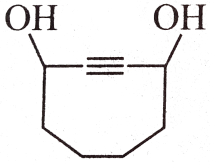
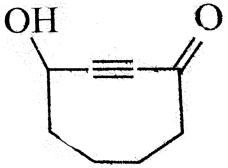
44. In the following sequence of reactions, products (A) to (H) are formed:

Compound (F) is:

A. a. 

B. b. 

C. c. 

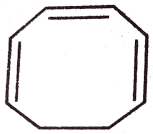
D. d. 

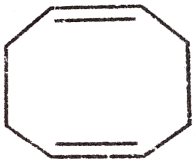
Answer: C

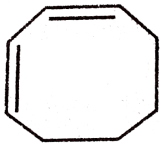
View Text Solution

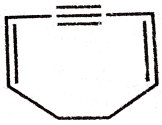
45. In the following sequence of reactions, products (A) to (H) are formed:

Compound (G) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: A

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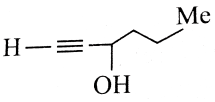
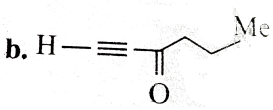
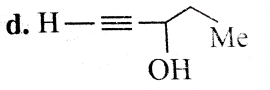
46. In the following sequence of reactions, products (A) to (H) are formed:

Compound (H) is:

A. a. 

B. b. 

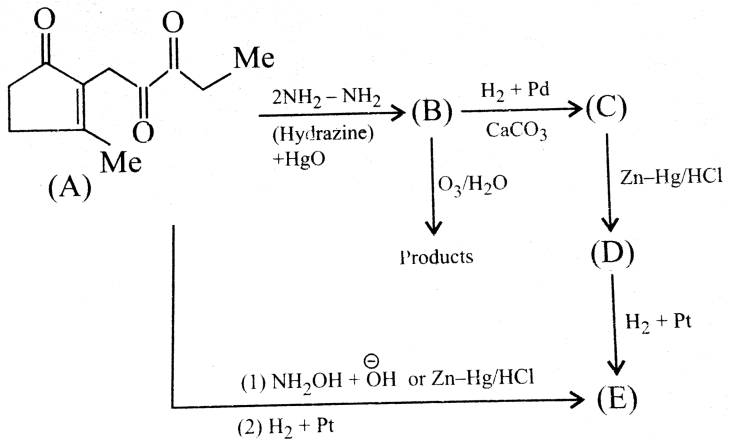
C. c. 

D. d. 

Answer: A

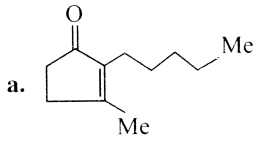
View Text Solution

47. In the following sequence of reactions, products A to D are formed:

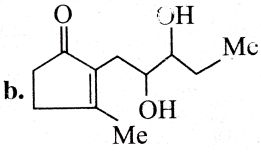


The structure of product (B) is:

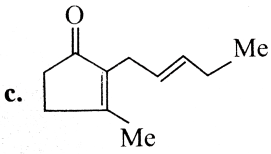
A.

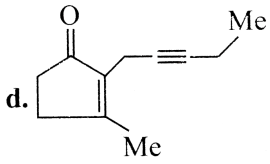


B.



C.





D.

Answer: D

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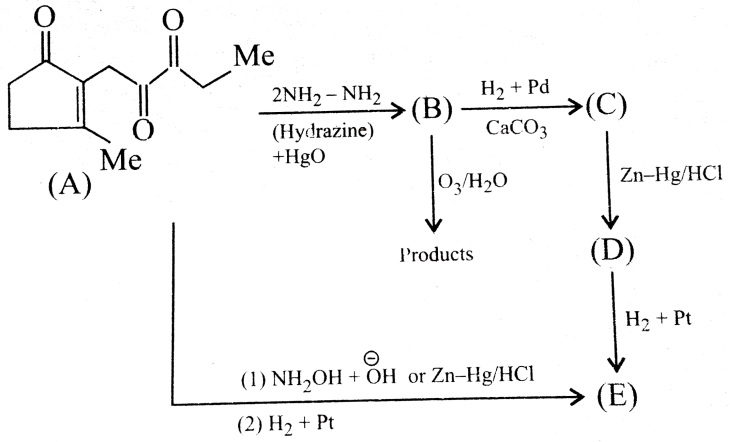
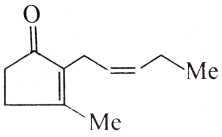
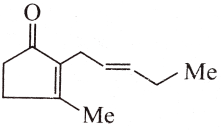
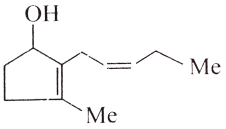
48. In the following sequence of reactions, products A to D are formed:

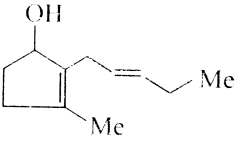


The structure of product (B) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: A

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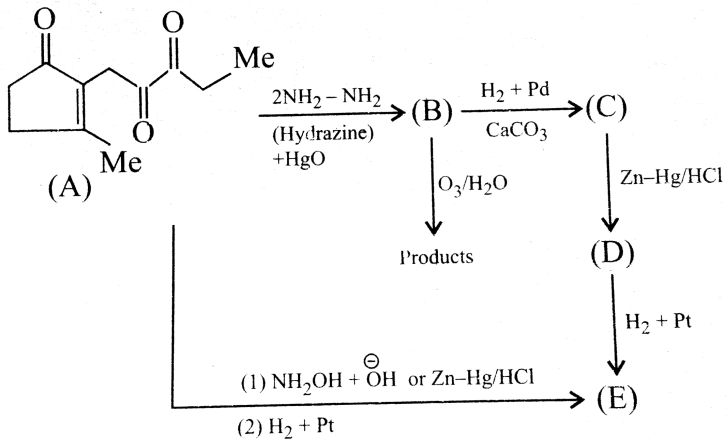
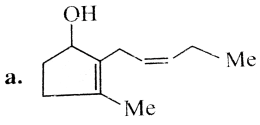
49. In the following sequence of reactions, products A to D are formed:

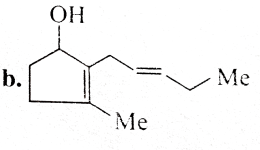


The structure of product (B) is:

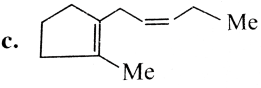
A.



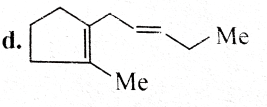
B.



C.



D.



Answer: C

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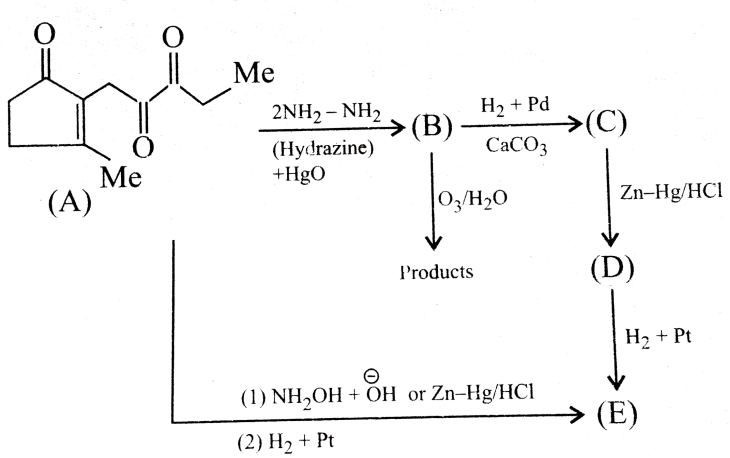
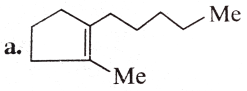
50. In the following sequence of reactions, products A to D are formed:

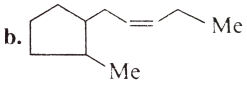


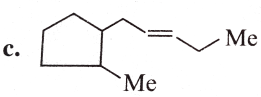
The structure of product (B) is:

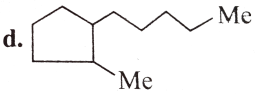
A.



B.



C. 

D. 

Answer: D

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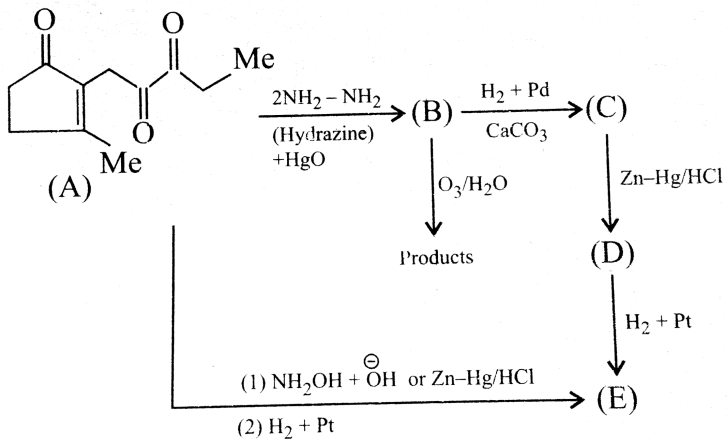
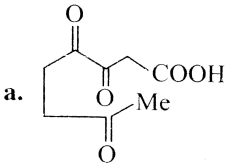
51. In the following sequence of reactions, products A to D are formed:

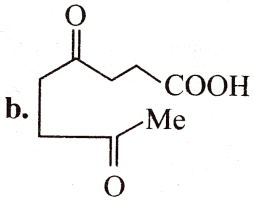


The structure of product (B) is:

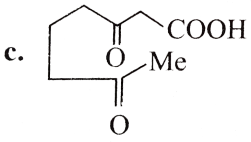
A.



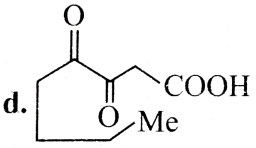
B.



C.



D.



Answer: A

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Exercises Multiple Correct Answers Type

1. Which of the statements are correct?

A. (a) Alkenes are more reactive than alkynes towards electrophilic addition reaction.

B. (b) Alkynes are more reactive than alkenes towards nucleophilic addition reaction.

C. (c) Catalytic hydrogenation of alkynes is more reactive than alkenes.

D. (d) Catalytic hydrogenation of alkenes is more reactive than alkynes.

Answer: A::B::C

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2. $HC \equiv CH \xrightarrow[+Hg^{2+}]{Dil.\,H_2SO_4} CH_3CH = 0$

Which statement(s) is/are correct about the given reaction?

A. (a) C atom accepting the H is reduced, and the C atom forming a bond with OH is oxidised.

B. (b) Given reaction is a redox reaction.

C. (c) The average oxidation number of the two C atoms in each compound is same (-1).

D. (d) The average oxidation number of the two C atoms in each compound is same (-2). The net effect is no change in average oxidation state.

Answer: A::C

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3. Which statement(s) is/are WRONG?

A. (a) Acetylene is insoluble in conc. H_2SO_4 due to not formation of vinyl carbocation $\left(CH_2 = \overset{\oplus}{C}H\right)(HSO_4^-)$.

B. (b) Ethylene is soluble in conc. H_2SO_4 due to the formation of alkyne carbonation

$\left(H_3C-\overset{\oplus}{C}H_2\right)\left(HSO_4^-\right)$

C. (c) But-2-yne dissolves in conc. H_2SO_4 due to the formation of vinyl carbocation $\left(Me-\overset{\oplus}{C}=CH-Me\right)\left(HSO_4^-\right)$, but it is stabilised by electron-donating methyl group and is more stable than the vinyl carbocation formed from acetylene.

D. (d) More the s character in the positively charged C, the more stable is the carbocation and more likely is its formation.

Answer: D

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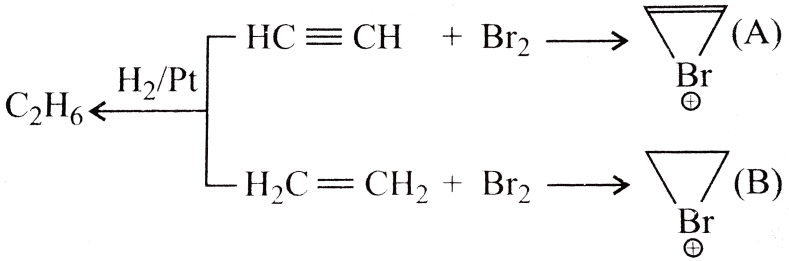

4.

Which of the statements are correct about the reactivities of alkene, alkynes, and arenes?

A. (a) Ring (A) is more strained due to full double bond and is less stable than ring (B). Moreover, C atoms in ring (A) have more s character than those in ring (B), further making it less stable than ring (B). Hence, alkenes are more reactive towards EA reaction.

B. (b) EN of sp-hybridised C atom of alkynes is greater than sp^2-hybridised C atom of alkenes, which holds the π electrons of alkynes more tightly. Moreover, there is a

greater delocalisation of π electrons (due to cylindrical nature) in alkynes than in alkenes. In alkenes, $\pi\bar{e}$'s are less easily available for EA reactions than those in alkynes. So alkynes are less reactive than alkenes towards EA reactions.

C. (c) In alkynes, because of the cylindrical nature of their π -bonds, approach by hydrogen along the axis of cylinder is more effective. Thus the transition state in alkynes is less strained. So alkynes react faster than alkenes with H_2.

D. (d) Arenes are more reactive towards EA reaction than alkenes and alkynes due to delocalisation of their $\pi\bar{e}'s$.

Answer: A::B::C

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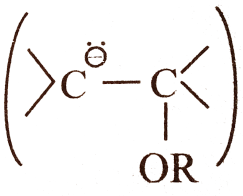
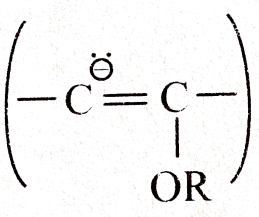
5. Which of the statements are WRONG about the nucleophilic addition reaction of alkenes and alkynes?

A. Addition of nucleophile $\left(\overset{\ominus}{RO}\right)$ to alkene gives an alkyl carbanion  whose negative charge is on the sp^3-hydridised C atom.

B. Addition of nucleophile $\left(\overset{\ominus}{RO}\right)$ ot an alkyne gives a vinyl carbanion  whose negative charge is on the sp^2-hybridised C atom. Due to more s character, it is

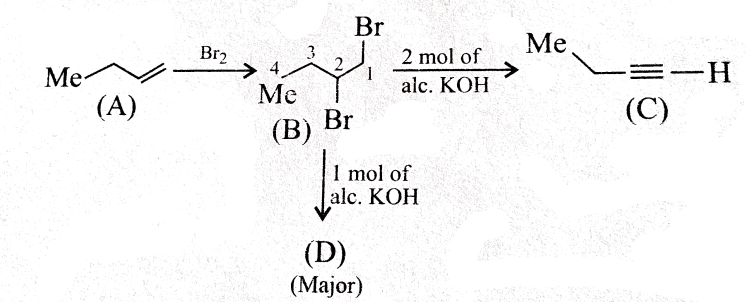
readily formed and more stable than alkyl carbanion formed with alkenes. So alkynes are more reactive than alkenes towards NA reaction.

C. Strong electron-withdrawing inductive effect $(-I)$ further stabilises both vinyl and alkyl carbanion.

D. Strong electron-donating inductive effect $(+I)$ further stabilises both vinyl and alkyl carbanion.

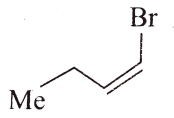
Answer: D

6. In the following sequence of reactions,

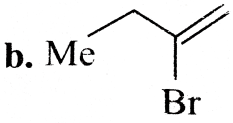


Which of the statements are correct about the compound (D)?

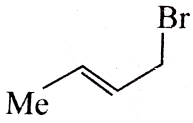
A. a.



B. b.



C. c.



D. IN E2 elimination, the most acidic H atom is removed. The inductive effect $(-I)$ of Br atom increases the acidity of H atoms to which Br atoms are bonded.

Decreasing acidity of H atom in (B) is as follows:

H at $C-1>H$ at $C-2>H$ at $C-3$

Answer: A::D

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7. Acetylene is thermodynamically unstable and readily explodes, therefore it is stored in commercial cylinders used for oxy-acetylene torch for welding. These cylinders contain:

A. (a) Pumice stone saturated with acetone.

B. (b) Charcoal powder saturated with acetone.

C. (c) Dissolved in water to give $0.5M$ solution.

D. (d) Dissolved in turpentine oil.

Answer: A::C

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8. Which of the statements are correct for alkyne with molecular formula C_6H_{10}?

A. (a) It shows 7 structural isomers.

B. (b) It shows 4 terminal and 3 internal alkynes.

C. (c) It shows 3 terminal and 4 internal alkynes.

D. (d) Only one isomer is chiral.

Answer: A::B::D

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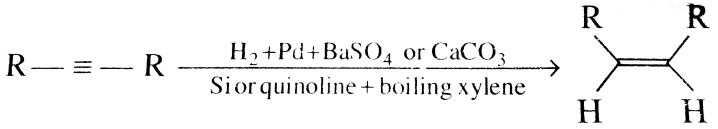
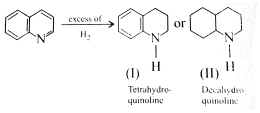
9. For the conversion of alkyne to cis-alkene, $H_2 +$ Lindlar's catalyst is used:



Which of the statements are wrong:

A. (a) The function of $BaSO_4$ or $CaCO_3$ is to reduce the surface area of finely divided catalyst Pd so that adsorption of H_2 on Pd is reduced.

B. (b) The function of S or quinoline is to remove excess of H_2. It is done through the formation of $H_2S(g)$ with S or by absorption of excess H_2 by quinoline to form (I) or (II).



C. (c) Boiling xylene acts as a solvent to dissolve the reactant (alkyne).

D. (d) Boiling xylene acts as inhibitor, decreasing the asborption of H_2 on finely divided catalyst Pd or Pt.

Answer: D

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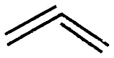
10. i. $Me - \equiv - H \xrightarrow[(ii)\, H_2O_2 / \overset{\ominus}{O}H]{(i)\, Sia_2BH} A$

ii. $Me - \equiv - H \xrightarrow[(ii)\, H_2O_2 / H]{(i)\, BH_3 + THF} B$

iii.  $\xrightarrow{H_3O^{\oplus}} C$

(iii) **iv.** $Me- \equiv - H \xrightarrow{Dil.\, H_2SO_4 + Hg^{2+}} D$

iv. $Me - \equiv - H \xrightarrow{Dil.\,H_2SO_4 + Hg^{2+}} D$

Which of the statements are correct?

A. (a) In all, acetone is the major product.

B. (b) In all, propanal is the major product.

C. (c) C and D are acetone, whereas A and B are propanal as the major product.

D. (d) C and D are propanal, whereas A and B are acetone as the major product.

Answer: C

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11. Which of the following statements are correct?

A. (a) ΔH_c° of cis-pent-2-ene is greater than trans-pent-2-ene

B. (b) ΔH_c° of hex-1-ene is greater than trans-hex-2-ene

C. (c) ΔH_c° of 2,5-dimethyl hexane is greater than octane

D. (d) ΔH_c° of 2-methyl-pent-2-ene is greater than trans-hex-2-ene

ΔH_c° = Heat of combusion

Answer: A::B::D

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12. Which of the following statement(s) is/are correct:

A. (a) Hydrogenation of but-2-yne in the presence of Lindlar's catalyst yields cis-but-2-ene.

B. (b) Hydrogenation of pent-2-yne in the presence of P-2 catalyst yields trans-pent-2-ene.

C. (c) Hydrogenation of pent-2-yne in the presence of K (potassium) and liquid NH_3 yields trans-pent-2-ene.

D. (d) Hydrogenation of but-2-yne in the presence of $LiAlH_4$ yields cis-but-2-ene.

Answer: A::C

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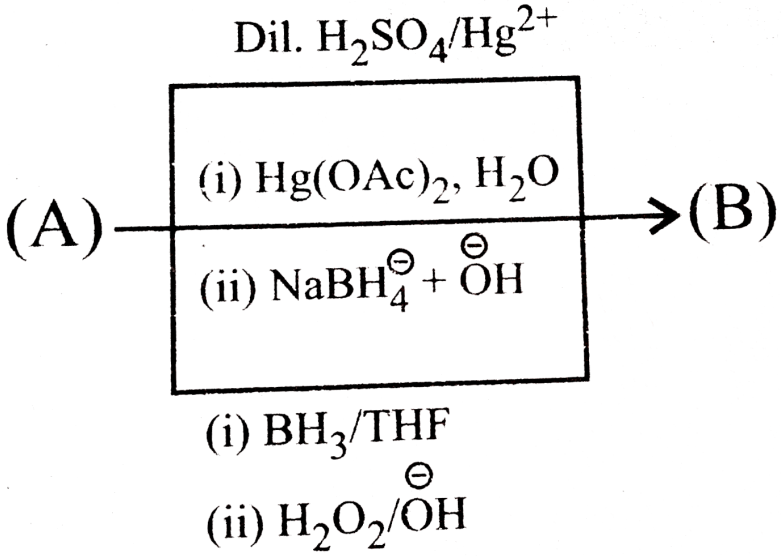
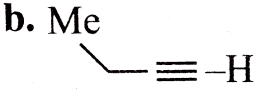
13.

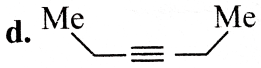


Compound (B) is same when (A) is:

A. (a) $Me - \equiv - Me$

B. **b.** 

C. (c) $H - \equiv - H$

D. **d.** 

Answer: A::C::D

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14. Which of the statements are correct?

$$R- \equiv -R' \xrightarrow[+EtOH]{Na+liq.NH_3} (A) \xrightarrow{Br_2/CCl_4} B+C$$

where (B) and (C) are:

A. (a) Enantiomers if $R \neq R'$.

B. (b) Diastereomers if $R \neq R'$.

C. (c) Both are meso and hence the same compound if $R = R'$.

D. (d) An equimolar mixture of (B) and (C) is a racemic mixture if $R \neq R'$.

Answer: A::C::D

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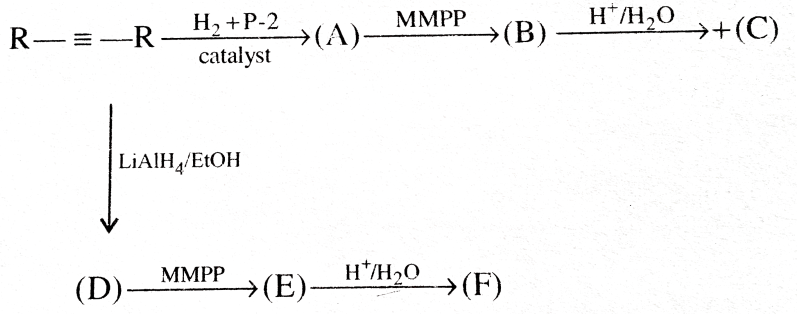
15. Which of the statements are correct?

$$R- \equiv -R \xrightarrow[Catalyst]{H_2+P-2} (A) \xrightarrow{MMPP} (B) \xrightarrow{H^+ / H_2O} + (C)$$



$$(D) \xrightarrow{MMPP} (E) \xrightarrow{H^+ / H_2O} (F)$$

A. (a):- (C) is an equimolar mixture of two enantiomeric compounds.

B. (b):- (F) is a single compound and is optically inactive.

C. (c):- (C) is a single compound and is optically inactive.

D. (d):- (F) is an equimolar mixture of two enantiomeric compounds.

Answer: A::B

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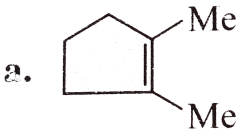
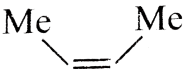
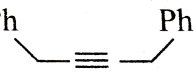
16. Hydroboration oxidation and acid hydration will yield the same product in case of:

A. a. 

B. b. $Me - \equiv - Me$

C. c. 

D. d. 

Answer: A::B::C::D

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17. $C_4H_6 \xrightarrow[1mol]{H_2+Pt} C_4H_8 \xrightarrow{O_3/H_2O}$ Acedic acid

(A) and (B), respectively, are:

A. a.  ; 

B. b.  ; 

C. c. Me—≡—Me ; 

D. d.  ; 

Answer: A::C

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18. All reagents, $\left[Cu(NH_3)_2\right]^{\oplus}$, $\left[Ag(NH_3)_2\right]^{\oplus}$,

CH_3MgBr, and $NaNH_2$ react with:

A. (a) Cyclooctyne

B. (b) Pent-1-yne

C. (c) Pent-2-yne

D. (d) Ethyne

Answer: B::D

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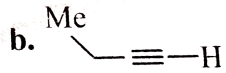
19. Compound (A) does not react with Tollens or Grignard reagent, but after treatment with $NaNH_2$, it gives the above test. The compound (A) is/are:

A. (a) $Me - \equiv - Me$

B. **b.** 

C. c. 

D. (d) $Ph - \equiv - Me$

Answer: A::C::D

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20. Compound (A) reacts with $\left[Cu(NH_3)_2\right]^+$ and Tollens reagent, but after with alc: KOH it does not give the above test. Compound (A) is:

A. (a) $Me - \equiv - Me$

B. (b) $Me - \equiv - H$

C. c. 

D. (d) $Ph - \equiv - H$

Answer: C

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21. Which of the statements are correct?

A. (a) $Be_2C + H_2O \rightarrow$ Marsh gas

B. (b) $Al_4C_3 + H_2O \rightarrow$ Gas is a content of CNG

C. (c) $CaC_2 + H_2O \rightarrow$ Gas is used for welding purpose with O_2 gas

D. (d) $Ca_3P_2 + H_2O \rightarrow$ Gas is used in Holme signals with CaC_2

Answer: A::B::C::D

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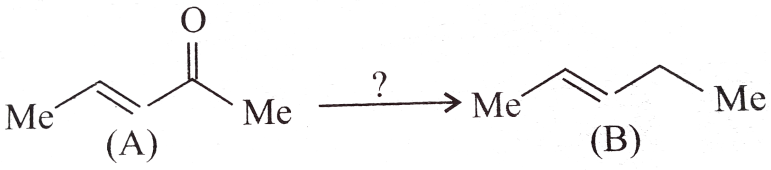
22. 

Reagents used in conversion from (A) to (B) are:

A. (a) $Sn(Hg)/conc.\ Hcl$

B. (b) $HI + P$

C. (c) $Zn(Hg)/conc.\ HCl$

D. (d) $PhNHNH_2, glycol/\overset{\Theta}{O}H$

Answer: A::B::C::D

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23. Which gas is in an antidote of Lewisite (a poisonous gas used in World War II):

A. (a) Sarin gas

B. (b) MIC

C. (c) BAL

D. (d) Mustard gas

Answer: C

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24. Which statements are correct:

A. (a) Heterogeneous catalyst used in polymerisation of alkene is Ziegler Natta catalyst (for the synthesis of HDPE).

B. (b) Homogeneous catalyst used in the hydrogenation of alkenes is Wilkinson's catalyst.

C. (c) Formula for Ziegler Natta catalyist is $\left[RhCl(PPh_3)_3\right]$ and for Wilkinson's catalyst is $TiCl_4 + Et_3Al.$

D. (d) Wilkinson's catalyst also reduces acid (RCOOH) to alcohol (RCH_2OH).

Answer: A::B::D

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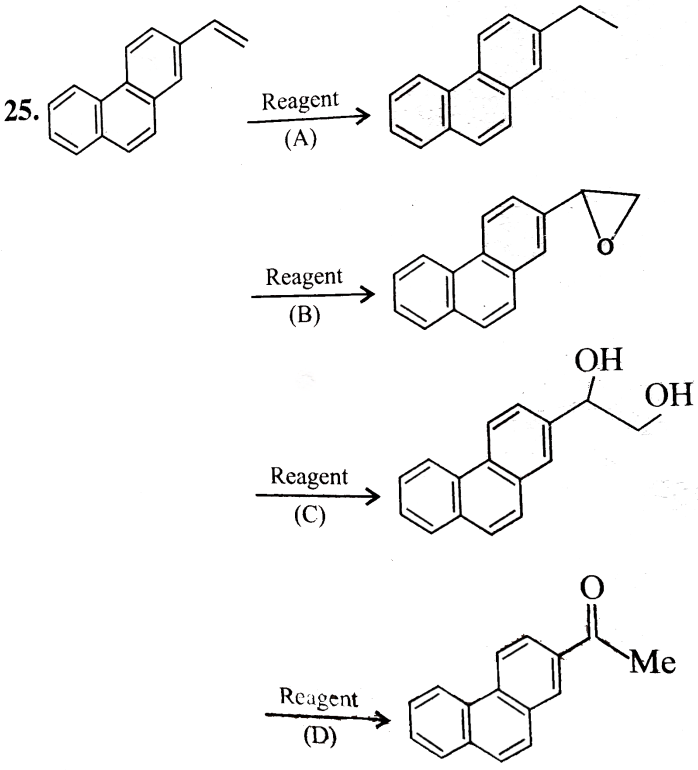
25.



25.

Which statements are correct for reagents A, B, C, and D?

A.

	(A)	(B)	(C)	(D)
a.	H_2/Pt	$MMPP$	$Coldalk._4$ $KMnO_4$	$O_2 + PdCl_2$ $+CuCl_2$ $+H_2O$

B.

	(A)	(B)	(C)	(D)
b.	$H_2/Pd + BaSO_4$ $+quinoline$	HCO_3H	$Hotalk.$ $KMnO_4$	$Dil.\ H_2SO_4$ $+Hg^{2+}$

C.

	(A)	(B)	(C)	(D)
c.	$Sia_2BH + CH_3COOH$	$PhCO_3H$	$OsO_4 / NaHSO_3$	$O_2 + PdCl_2 + CuCl_2 + H_2O$

	(A)	(B)	(C)	(D)
D. d.	$BH_3 + THF + CH_3COOH$	$MCPBA$	OsO_4 / H_2O_2	$Wacker\ process$

Answer: A::C::D

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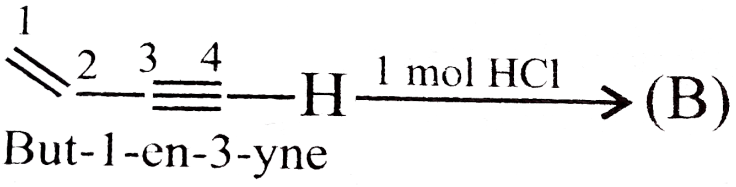
Exercises Single Correct Answers Type

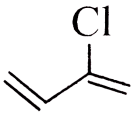
1.

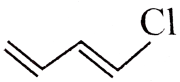


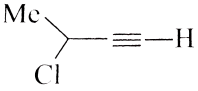
But-1-en-3-yne

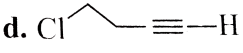
(A)

The product (B) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: A

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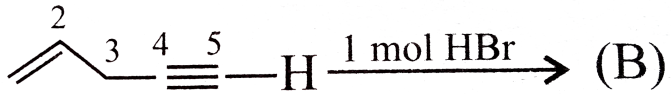
2. 

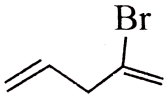
(A)

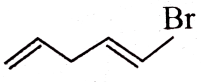
Pent-1-en-4-yne

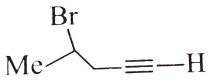
The product (B) is:

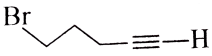
2.

The product (B) is:

A. **a.** 

B. **b.** 

C. **c.** 

D. **d.** 

Answer: C

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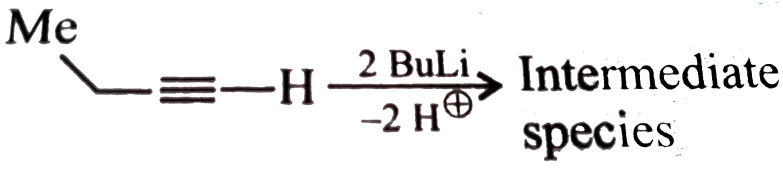
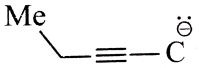
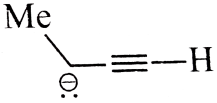
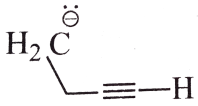
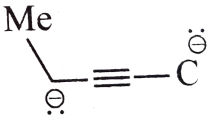
3. 

The intermediate species formed in the above reaction is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: D

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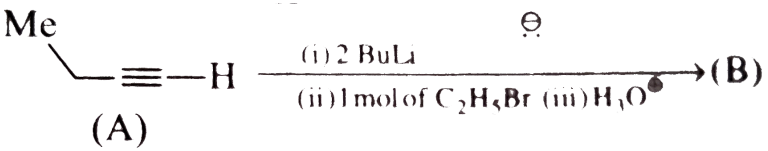
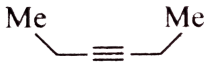
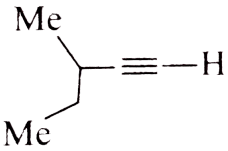
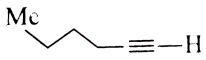
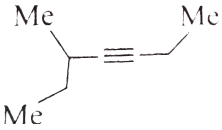
4. 

The product (B):

A. a. 

B. b. 

C. c. 

D. d. 

Answer: B

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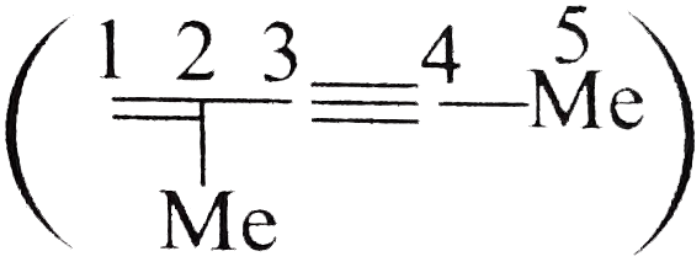
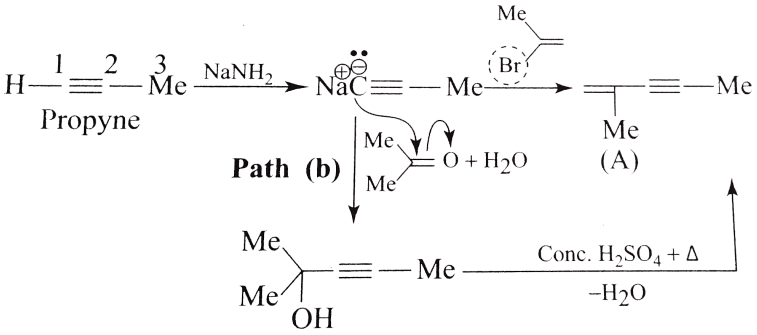
5. There are two paths (a) and (b) for the preparation of a compound (A)



(2-methylpent-1-en-3-yne), which path is correct and why? Also name the path (a) and (b).



A. Path I is feasible.

B. Path II is feasible

C. Both paths are feasible.

D. Both paths are not feasible.

Answer: B

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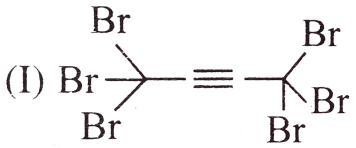
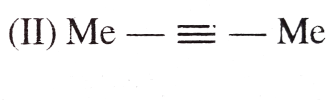
6. Give the reactivity in the decreasing order of the following alkynes towards nucleophilic addition reaction with $MeO^{\Theta} / MeOH$.

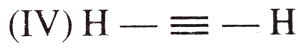


(I)



(II)

(III)



(IV)

$Me - \equiv - Me$

(III) $Me - \equiv - H$ (IV) $H - \equiv - H$

A. (a) $(I) > (II) > (III) > (IV)$

B. (b) $(I) > (IV) > (III) > (II)$

C. (c) $(IV) > (III) > (II) > (I)$

D. (d) $(II) > (III) > (IV) > (I)$

Answer: B

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7. Give the reactivity in the decreasing order of the following nucleophiles towards nucleophilic addition reaction with compound $A(F_3C - \equiv - CF_3)$.

(I) CH_3O^{Θ} (II) $C_3H_5^{\Theta}$

(III) CH_3COO (IV) $CH_3SO_3^{\Theta}$

A. (a) $(II) > (I) > (III) > (IV)$

B. (b) $(IV) > (III) > (I) > (II)$

C. (c) $(I) > (II) > (IV) > (III)$

D. (d) $(III) > (IV) > (II) > (I)$

Answer: A

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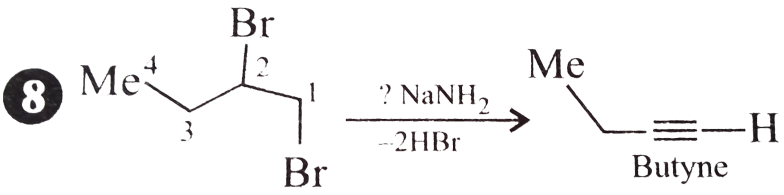
8. 

Vicinal dihalides undergo double dehydrohalogenation to give terminal alkyne. How many moles of $NaNH_2$ are used in the overall reaction?

A. One

B. Two

C. Three

D. Four

Answer: C

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9. The minimum number of C atoms an alkyne must have to show diastereomerism:

A. 4

B. 5

C. 6

D. 7

Answer: B

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10. Which of the following is propargyl group?

A. (a) $-CH_2-C\equiv CH$

B. (b) $-C\equiv C-Me$

C. (c) $-C\equiv CH$

D. (d) $-C\equiv C-CH_2-CH_3$

Answer: A

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11. What is the smallest ring that can accommodate a triple bond?

A. Cyclohexyne

B. Cycloheptyne

C. Cyclooctyne

D. Cyclononyne

Answer: C

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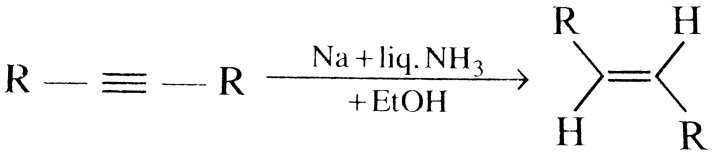
12. In the conversion of alkyne to trans-alkene by Birch reduction using alkali metals (such as Na or K) in liquid NH_3 and alcohol ($MeOH$ or $EtOH$),

$$R- \equiv -R \xrightarrow[+EtOH]{Na+liq.NH_3}$$



the mechanism takes place in the formation of intermediate species in the following sequence:

A. (a) Radical anion $\rightarrow$ vinylic radical $\rightarrow$ trans-vinylic anion $\rightarrow$ trans-alkene

B. (b) Radical anion $\rightarrow$ trans-vinylic anion $\rightarrow$ vinylic radical $\rightarrow$ trans-alkene

C. (c) Vinylic radial $\rightarrow$ radical anion $\rightarrow$ trans-vinylic anion $\rightarrow$ trans-alkene

D. (d) Vinylic radical $\rightarrow$ trans-vinylic anion $\rightarrow$ radical anion $\rightarrow$ trans-alkene

Answer: A

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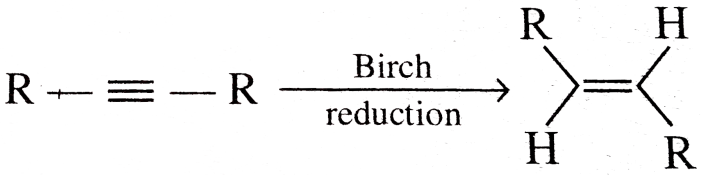
13. In the reaction, $R - \equiv - R \xrightarrow[reduction]{Birch}$



source of two H atoms which are added to alkyne to give trans-alkene is:

A. (a) NH_3

B. (b) $EtOH$

C. (c) $Et - NH_2$

D. (d) Both (a) and (c)

Answer: D

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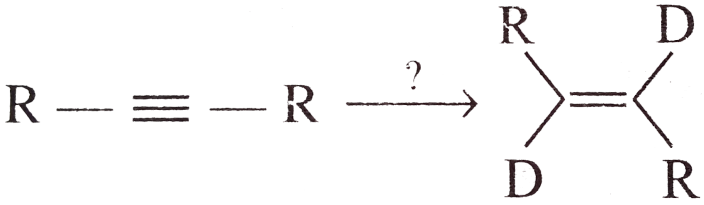
14. In the reaction:



A. (a) $Na + NH_3 + EtOD$

B. (b) $Na + ND_3 + EtOH$

C. (c) $Na + ND_3 + EtOD$

D. (d) Both (b) and (c)

Answer: D

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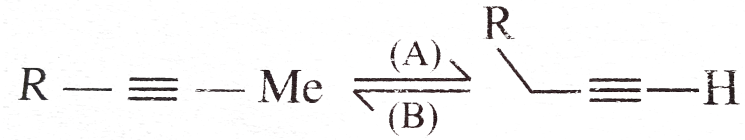
15. Interconversion of terminal to internal alkyne and vice versa takes place by the following reagents (A) and (B):



Reagents (A) and (B) are:

A. (a) $NaNH_3$ and alc. KOH

B. (b) alc. KOH and $NaNH_2$

C. (c) alc. KOH and $P-2$ catalyst

D. (d) $NaNH_2$ and Lindlar's catalyst

Answer: A

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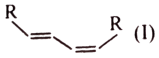
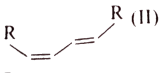
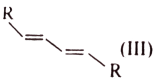
16. $R-\underset{(A)}{\equiv}-\equiv-R \xrightarrow{\text{Lindlar's catalyst} + H_2} (B)$

$$\xrightarrow[\text{catalyst}]{H_2 + \text{P-2}} (C)$$

Compounds (B) and (C) are:

A. a. Both are  (I)

B. b. Both are  (II)

C. c. Both are  (III)

D. (B) is (II) and (C) is (III)

Answer: B

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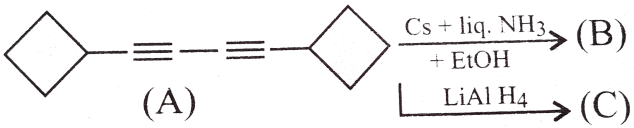
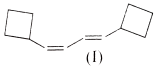
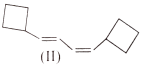
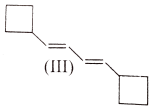
17. 

17.

Compounds (B) and (C) are:

A. a. Both are 

B. b. Both are 

C. c. Both are 

D. B is (I) and C is (II)

Answer: C

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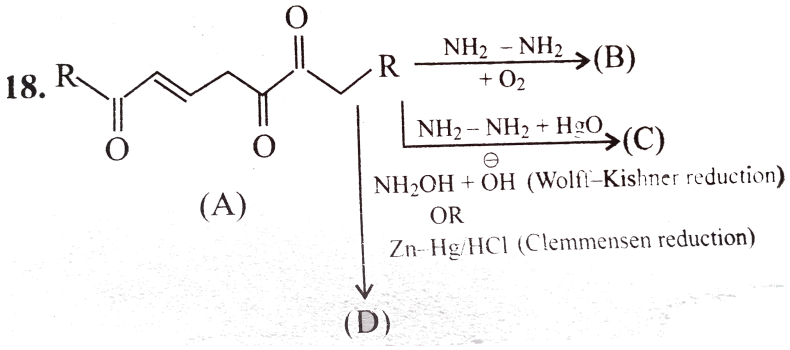
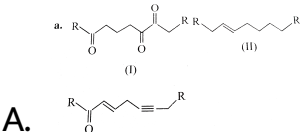
18. 

18.

(B), (C), and (D), respectively, are

A. 

B. (b) (I), (III), (II)

C. (c) (III), (II), (I)

D. (d) (III), (I), (II)

Answer: B

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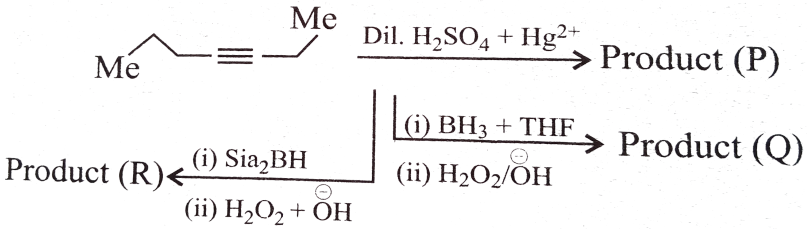
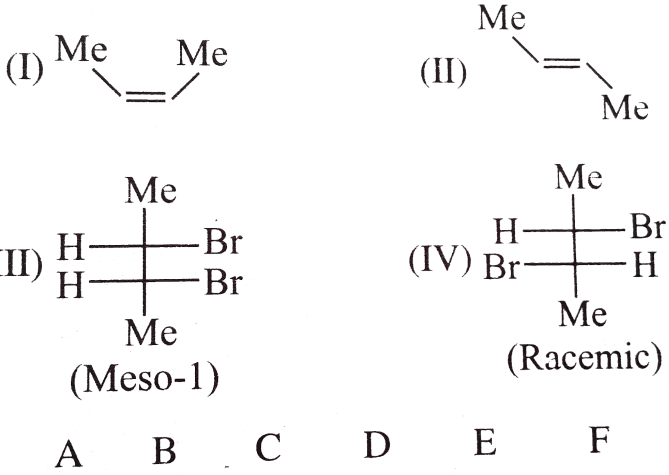


19.



A B C D E F

A. $\Pi mpliesI$, Q and $R \Rightarrow II$

B. P and Q both I and II, $R \Rightarrow II$

C. P is both I and II, Q and $R \Rightarrow II$

D. P, Q, and $R \Rightarrow AllII$

Answer: B

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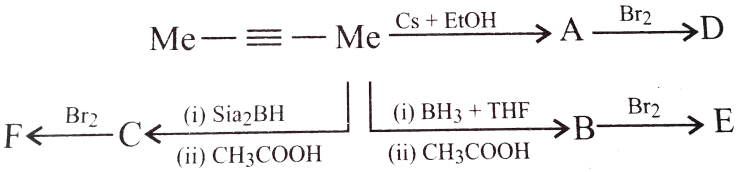
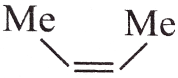
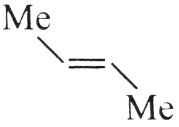
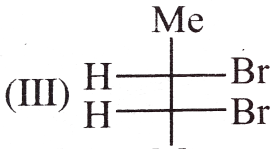


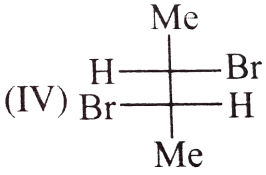
20.

(I) 

(II) 

(III) 

(Meso-1)

(IV) 

(Racemic)

A B C D E F

A. (a) $\begin{matrix} A & B & C & D & E & F \\ .(I) & (II) & (I) & (IV) & (III) & (IV) \end{matrix}$

B. (b) $\begin{matrix} A & B & C & D & E & F \\ .(I) & (I) & (II) & (IV) & (IV) & (III) \end{matrix}$

C. (c) $\begin{matrix} A & B & C & D & E & F \\ .(II) & (I) & (I) & (IV) & (III) & (III) \end{matrix}$

D. (d)

A	B	C	D	E	F
. (II)	(I)	(I)	(III)	(IV)	(IV)

Answer: D

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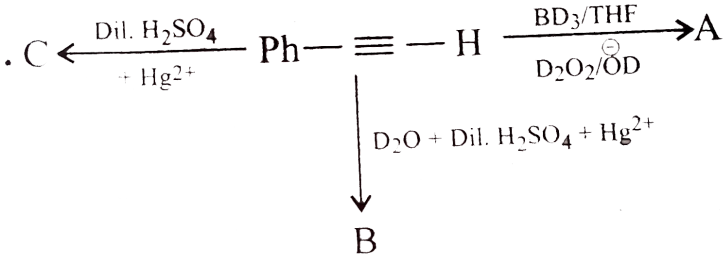
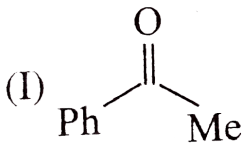
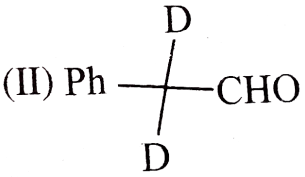
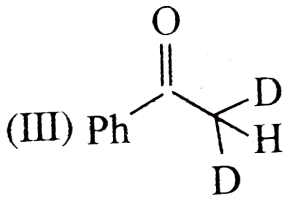


A, B, and C are:







21.

A. (a) (I), (II), and (III)

B. (b) (II), (I), and (III)

C. (c) (II), (III), and (I)

D. (d) (I), (III), and (II)

Answer: C

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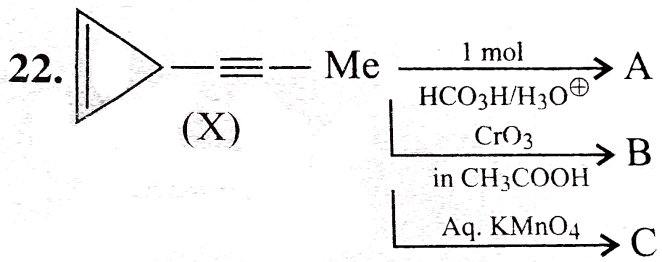
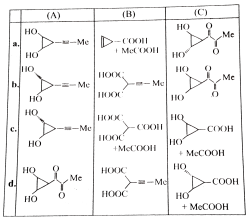
22. 

A, B, and C are:

22.

A, B, and C:

A. 

B.

C.

D.

Answer: B

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23. Compound (X) on complete catalytic hydrogenation with H_2 / Pt gives an alkane. The number of moles of H_2 required per mole of compound (X) is:

A. 2

B. 3

C. 4

D. 5

Answer: C

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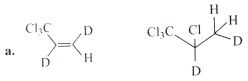
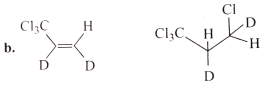
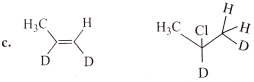
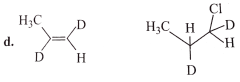
24. $Cl_3 - \underset{(X)}{\equiv} - H \xrightarrow[D_2+P-2catalyst]{} (A) \xrightarrow{HCl} (B)$

Compounds (A) and (B) are:

A. 

B. 

C. 

D. 

Answer: B

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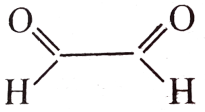
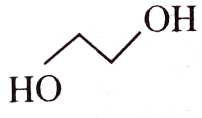
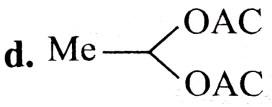
25. $H - \equiv - H \xrightarrow[(ii)\,(H_2O)\,/\,(Zn)]{(i)\,O_3} (A) \xrightarrow{Zn\,/\,CH_3COOH} (B)$

Compound (B):

A. a. 

B. (b) $Me - COOH$

C. c. 

D. d. 

Answer: C

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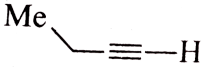
26. Which one of the following does not dissolve in conc. H_2SO_4?

A. (a) $H - \equiv - H$

B. (b) $Me - \equiv - Me$

C. **c.** 

D. d. $H_2C = CH_2$

Answer: A

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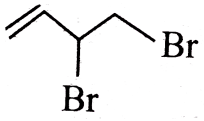
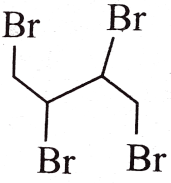
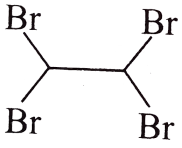
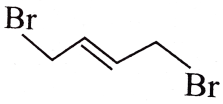
27. $2H - \equiv - H \xrightarrow[NH_4Cl]{CuCl} A \xrightarrow{H_2 + Ni_2B} B \xrightarrow[(Major)]{Br_2} C$

The major amount of (C) is:

A. a. 

B. b. 

C. c. 

D. d. 

Answer: D

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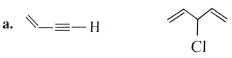
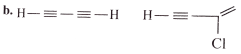
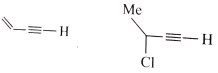
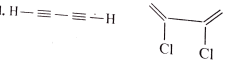
28. $2HC \equiv CH \xrightarrow[+NH_4Cl]{CH_2Cl_2} (A) \xrightarrow[HCl]{1mol} (B)$

Compounds (A) and (B) are:

A. 

B. 

C. 

D. 

Answer: A

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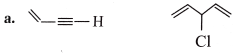
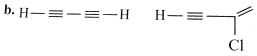
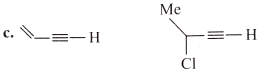
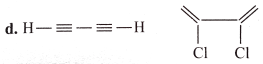
29. $2HC \equiv Ch \xrightarrow{Cu^{2+} + O_2} (A) \xrightarrow[HCl]{1mol} (B)$

Compound (A) and (B) are:

A. 

B. 

C. 

D. 

Answer: B

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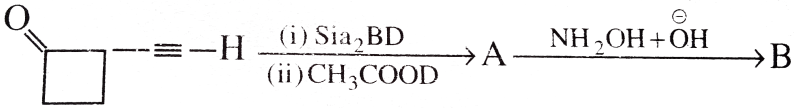
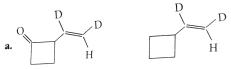
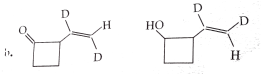
30.



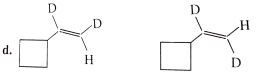
$$-\equiv-H \xrightarrow[(ii)\,CH_3COOD]{(i)\,Sia_2BD} A \xrightarrow{NH_2OH+\overset{\Theta}{O}H} B$$

Compounds (A) and (B) are:

A. 

B. 

C. 

D. 

Answer: A

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Exercises Archives Single Correct Answer Type

1. When propyne is treated with aqueous H_2SO_4 in the presence of $HgSO_4$, the major product is:

A. (a) Propanal

B. (b) Propyl hydrogen sulphate

C. (c) Acetone

D. (d) Propanol

Answer: C

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2. Acidic hydrogen is present in:

A. (a) Ethyne

B. (b) Ethene

C. (c) Benzene

D. (d) Ethane

Answer: A

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3. The number of stuctural and configuration isomers of a bromo compound, C_5H_9Br formed on addition of HBr to 2-pentyne respectively are:

A. (a) 1 and 2

B. (b) 2 and 4

C. (c) 4 and 2

D. (d) 2 and 1

Answer: B

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4. Identify a reagent from the following list which can easily distinguish between 1-butyne and 2-butyne.

A. (a) Bromine, CCl_4

B. (b) H_2, Lindlar's catalyst

C. (c) Dilute H_2SO_4, $HgSO_4$

D. (d) Ammoniacal Cu_2Cl_2 solution

Answer: D

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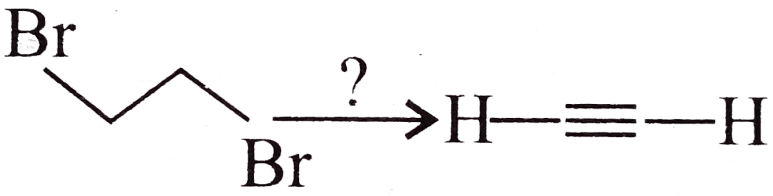
5. The reagent(s) for the following conversion



is/are:

A. (a) Alcoholic KOH

B. (b) Alcoholic KOH followed by $NaNH_2$

C. (c) Aqueous KOH followed by $NaNH_2$

D. (d) Zn/CH_3OH

Answer: B

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6. The synthesis of 3-octyne is achieved by adding a bromoalkane into a mixture of sodium amide and alkyne. The bromoalkane and alkyne, respectively, are

A. (a) $BrCH_2CH_2CH_2CH_2CH_3$ and $CH_3CH_2C \equiv CH$

B. (b) $BrCH_2CH_2CH_3$ and $CH_3CH_2CH_2 \equiv CH$

C. (c) $BrCH_2CH_2CH_2CH_2CH_3$ and $CH_3C \equiv CH$

D. (d) $BrCH_2CH_2CH_2CH_3$ and $CH_3CH_2C \equiv CH$

Answer: B

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Exercises Archives Fill In The Blanks Type

1. ..... is more acidic (Ethane, Ethene, Ethyne).

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2. Acetylene is treated with excess sodium in liquid ammonia. The product is reacted with excess of methyl iodide. The final product is.....

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3. Addition of water to acetylene compound is catalysed by.....and.....

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Exercises Archives Analytical And Desriptive Type

1. Outline the reaction sequence of the conversion of ethene to ethyne (the number of steps should not be more than two).

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2. Identify a reagent from the following list which can easily distinguish between 1-butyne and 2-butyne.

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3. How would you convert acetylene to acetone?

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4. Give reasons for the following:

$CH_2 = CH^{\Theta}$ is more basic than $HC \equiv C^{\Theta}$

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